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CONDITION OF NON-SPECIFIC PROTECTION FACTORS OF ORAL CAVITY AMONG PREGNANT WOMEN

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Conditions of non-specific resistance factors of oral cavity among the pregnant who live in different ecological-geographic terms of Uzbekistan have been studied. It has been established that a number of lymphocytes in oral fluid doesn't alter reliably among the pregnant of Khoresm region, compared to the nonpregnant, and among the pregnant of Tashkent region it increases reliably. Concentration of sIgA among the pregnant of Khoresm region decreases reliably along the pregnancy terms, and this indicator increases among the pregnant of Tashkent region.

Keywords: non-specific resistance factor, pregnant women, oral cavity, ecological-geographic term

Non-specific resistance factors form the basis of local immunity of a man's oral cavity. They carry out a barrier function and protect an organism from different pathogenic and conditionally-pathogenic microorganisms [1, 2, 4, 6].

Studies have shown that quantitative and qualitative decrease in activity of immune system take place in among pregnant women, including non-specific resistance factors [3, 5, 8].

It is known that immune status of a man is negatively affected by different exogenous factors, including those ecologically-unfavourable, to which we refer water, soil, climate, and atmospheric factor [5, 7].

Due to it the objective of our research was studying conditions of factors of non-specific resistance of oral cavity among the pregnant who live in different ecological-geographic conditions of Uzbekistan.

Materials and methods of research

We have studied pregnant women who live in Khoresm region ($n = 63$), that is referred to an ecological-

ly-unfavourable region of the Aral pool. For comparison we have studied the pregnant of Tashkent region ($n = 54$) as an ecologically-favourable region. 15 nonpregnant women of each region have formed control groups. Age structure of the studied (16–49 years) was equal in all groups, a comparative analysis of the results was carried out according to age and terms of pregnancy.

The method of simple radial immune-diffusion (Manchini, 1964) was used to define a concentration of sIgA in saliva. Definition of lysozyme in saliva was carried out via method of K.A. Kagramanova and Z.V. Ermoliyeva (1966), modified by A.M-T. Bektimirov and S.K. Adylov (1990). To define cellular structure of oral fluid we used the method, introduced by L.E. Leonidov and co-authors (2002).

Results of research and their discussion

The obtained results shows us that a number of lymphocyte in oral fluid among the pregnant of Khoresm region did not alter reliably. However, in the III term, compared to the I term of pregnancy, a reliable decrease in lymphocytes was registered (Table), besides, in the III term a reliable decrease in monocytes, compared to the control group, was registered.

Parameters of non-specific resistance factors of oral cavity among the pregnant who live in different ecological conditions

Terms	Research location	Lymphocytes, %	Monocytes, %	Neutrophils (rod-core), %	Lysozyme, titre	sIgA, g/l
Non-pregnant	Khoresm	$1,5 \pm 0,3$	$2,8 \pm 0,1$	$3,0 \pm 0,2$	1:72	$0,53 \pm 0,03$
	Tashkent	$1,1 \pm 0,2$	$2,7 \pm 0,1$	$2,5 \pm 0,3$	1:64	$0,49 \pm 0,02$
I term	Khoresm	$2,1 \pm 0,4$	$2,7 \pm 0,2$	$3,4 \pm 0,4$	1:65	$0,46 \pm 0,05$
	Tashkent	$1,3 \pm 0,1$	$2,6 \pm 0,2$	$2,9 \pm 0,2$	1:75	$0,55 \pm 0,02^*$
II term	Khoresm	$1,3 \pm 0,1$	$2,3 \pm 0,3$	$3,6 \pm 0,5$	1:105*	$0,42 \pm 0,04^*$
	Tashkent	$1,9 \pm 0,1^*$	$2,1 \pm 0,2^*$	$2,8 \pm 0,3$	1:115*	$0,68 \pm 0,01$
III term	Khoresm	$1,1 \pm 0,3$	$1,8 \pm 0,2^*$	$3,3 \pm 0,5$	1:162*	$0,39 \pm 0,07^*$
	Tashkent	$2,0 \pm 0,2^*$	$2,5 \pm 0,4$	$3,5 \pm 0,3^*$	1:166*	$0,71 \pm 0,01^*$

Note: * – reliability in relation to the data of non-pregnant

Obviously, a decrease in number of lymphocytes and monocytes shows us a deficit in main factors of non-specific resistance of oral cavity among the pregnant, and revelation of neutrophils level within the limits of norm shows some preservation of an organism's pro-

TECTIVE forces against conditionally-pathogenic microorganisms.

While defining lysozyme titre and the level of sIgA in oral cavity among the pregnant of the I term, no reliable differences, compared to the non-pregnant were registered. However, in the

II term or the II term of pregnancy lysozyme titre has increased reliably ($p < 0,01$), and the level of sIgA has decreased ($p < 0,05$).

A number of lymphocytes among the pregnant of the II and the III term who live in Tashkent region was reliably increased. Among the pregnant of Khoresm region percent of lymphocytes stayed within the norm. Indicators, received according to the monocyte level, didn't show any differences in the compared regions. Among the women who live in Khoresm region, these indicators differed reliably in their decrease.

While comparing indicators of lysozyme titre among the pregnant of the compared regions, no reliable differences were registered ($p > 0,05$).

The results, received according to the level of sIgA require a special attention, as along with an increase in pregnancy term among women who live in Tashkent region content of sIgA increased reliably ($p < 0,01$). Among the pregnant of Khoresm region we observed an opposite situation, as along with an increase in pregnancy term, concentration of sIgA decreased reliably.

Thus, our attention is drawn by a dynamics of two indicators – the number of lymphocytes didn't alter reliably in the pregnant group of Khoresm region, compared to the non-pregnant, and, among the pregnant of Tashkent region it increased, and concentration of sIgA among the pregnant of Khoresm region decreases reliably according to the terms, while this indicator tended to increase among the pregnant of Tashkent region.

The next stage of our research was studying factors of non-specific resistance of oral cavity according to the age categories of the pregnant who live in different ecological conditions.

While studying percent correlations of lymphocytes in age groups up to 10 years and 21–29 years we observed a reliable increase in their number, compared to the non-pregnant ($p < 0,05$). However, in the age group of 30 years and older this indicator didn't differ reliably from the parameters of the non-pregnant.

The number of rod-cellular neutrophils among the pregnant up to 20 years, 20–29 years, and 30 years and older was reliably increased, and, according to the number of microxyphilic neutrophils these indicators were close in all age groups, among the pregnant and non-pregnant.

The received results prove that the half of the studied indicators of non-specific resistance factors of oral fluid are reliably increased in groups of the pregnant up to 20 years and 20–29 years, and they have a sufficient, physiologically-defined counteraction against the ongoing pathological conditions and inflammation process.

According to the titre of lysozyme and the level of sIgA, reliable differences were revealed between different age groups ($p < 0,001$).

Among non-pregnant women who live in Tashkent region insignificant decreases in all

indicators of lymphocytes, rod-cellular neutrophils, lysozyme titre, and sIgA ($p < 0,05$) were registered along with the age. No specific differences were observed in indicators of different age groups of the pregnant. The main difference was revealed in concentration of sIgA.

In our opinion, this circumstance among the pregnant of Khoresm region is linked to the secondary immune-deficit of the overall organism's immune system, deficit in sIgA synthesis in its necessary degree during an intense activity of the immune system. Among the pregnant of Tashkent region along with a tension in activity of the immune system that is linked to an increase in pregnancy term sIgA is produced in an efficient quantity and corresponds to the norm.

Resume

1. Increases in pregnancy term go along with an increase in the level of lysozyme, decrease in sIgA concentration in oral fluid among the pregnant who live in Khoresm region. It is linked to a mutual complementation of the functions of the pointed factors.

2. Among the pregnant who live in Tashkent region the main alterations in the level of lymphocytes, monocytes, and rod-cellular neutrophils, compared to the nonpregnant, are registered in the II and the II term ($p < 0,05$).

3. Along with an increase in pregnancy term among the pregnant in a region with ecological problems, an increase in lysozyme titre in oral fluid is registered, and concentration in sIgA decreases.

4. According to the level of sIgA among the pregnant who are older than 30 in the compared regions we have received a data of it gradual decrease. Also lysozyme titre decreases down to the norm level, though in other age groups these indicators were increased by 1,8–2,1 times ($p < 0,001$).

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*Materials of Conferences***THE RISK FACTORS OF TUBERCULOSIS OF CHILDREN IN REPUBLIC OF SAKHA**

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The retrospective analysis medical documents of 208 children injured by tuberculosis who were in-patients in the course of tuberculosis of 3rd clinics of phtysiatry for the period of 2008–2010 was held.

It was pointed out that the most difficultly the tuberculosis infection takes place of cases with children after the sick people who were ill of drug-stable tuberculosis, family and relative contacts. And is characterized by expressive clinical [-rayed ground of primary tuberculosis. It has stable symptoms of intoxication, complicated stream of specific process.

During the last years the consequences of global economic crisis causes the falling of the level of life of population, the growing of migration processes and the grow of number of socially unprotected groups of population. These factors have negative influence on the children. This may be proved by the growth of epidemiological indexes of tuberculosis among children and teenagers.

The main threat for the child's health is living in the centre of tuberculosis infection. One of the main risk factors which cause the children infection and sickness is epidemiological contact to tuberculosis person at home, kindergartens and schools, with relatives and neighbors.

In this case in the period of tensed epidemiological situation among the conditions of tuberculosis growth with multiple medical stability of instigator, the study of epidemiological characteristics of tuberculosis infection among children are very actual and important problem in phtysiatry.

The aim of this work is to study social-epidemiological characteristics of children with tuberculosis infection in the conditions of Yakutia.

The research was done among ill people of their case reports who were in-patients in 3rd clinics of phtysiatry for the period of 2008–2010.

We studied 208 case reports of children who were sick with tuberculosis, who had tuberculosis contact in 70,9% of cases.

The data of epidemiological medical history was analyzed – the contacts of ill child with family. The frequency of contact of 132 in-patient children with local forms of tuberculosis made up 73%. Analyzing the national belonging, the predominance of children of yakut nationality must be noted – 60,8%, russian children – 36,8%, other nationalities – 2,4%.

As far is social factor is concerned, 68% of sick children lived in incomplete families where parents

who worked in low-qualified labor, not infrequently with antisocial behavior and presence of harmful habits. Having many children families made up 76,1%, predominantly living in country sides, in the conditions of density and total absence of well-equipment only 32% of children were from well-being families where both parents had a constant job.

Families who lived in well-equipment conditions and partly equipped houses had 31% of children. 60% of sick people lived in non-equipped houses with kiln heating and absence of sewerage system, and 9% – in hostels.

The age group distribution gives evidence that 46,2% of sick children are of early ages, pre-school children made up 43%, and 10,8% – children-pupils of primary school.

The younger the children the more danger tuberculosis contact presents for them, especially in combination with hard material and everyday conditions and non-effectiveness of BCG vaccination. It should be noted that 51,7% of sick children were such called «often being sick». It may be seen from the table that the most wide spread additional diseases are angina, bronchial and allergic conditions, which served the background for the development of tuberculosis process.

The data of scope of BCG vaccination should that overwhelming number of children (99,8%) were vaccinated with anti-tuberculosis vaccine. One child wasn't vaccinated because of medical indexes and lots of anomalies of development. Since the early age he was in massive contact with drug-stable tuberculosis, which caused the development of generalized tuberculosis process. From the children who were vaccinated 56,2% were vaccinated effectively; BCG weal wasn't formed in 13,8% of cases, 30% of children weren't vaccinated effectively.

In 43,8% cases the patients were not protected enough and it caused the development of disease. Local forms of tuberculosis of children were pointed out by tuberculosis diagnosis in 74% of cases during the inspection of contact local tuberculosis, made up 17,4% appeal – 8,6%. It should be noted that preventive treatment of intoxicated and contacted persons was made in-patiently which development of disease. While the turn of tuberculosis reactions in 51,7% preventive treatment wasn't conducted.

Only 21,9% of children were isolated to antituberculosis sanatoriums, because of parent refusal of hospitalization of sick children. Among the dominate form of primary tuberculosis – tuberculosis of intra-thoracic lymph nodes (64,5%), generalized and complicated processes also were registrated, such as tuberculosis spondylitis, with total defeat of all groups of chest and lymphatic bundles. During the chronically going process with bronchial defeats, lymphematogenous disseminations made up 20,3%.

While the entering of in-patients 31,1% of sick persons had tuberculosis of intra-thoracic lymph nodes and primary tuberculosis complex in the phase of infiltration, 42,3% – phase of resolve and compression, 26,6% – phase of calcification. That is, 68,9% of inpatient children entered with revealed overdue diagnoses.

The character of tuberculosis contact, its intensify duration, presence of bacteriological secretions, directly influence the course of specific process of children.

Sick the children with tuberculosis infection were divided into groups:

1. Sick children who were intoxicated with tuberculosis from family and related contact-71 (53,8%).
2. Patients who had multiple contact – 33 (25%).
3. Two cases of illness from death hotbed – 1,5%.
4. Accidental contacts – 26 (17,4%).
5. Contact with medically-stable TB – 65 (35%).

Non-established contacts made up 76 cases what testifies of presence of unknown anti-tuberculosis sources of TB infection.

We studied contacts by the degree of relationship: contact to mom made up – 15,6%, with father – 10,3%, with grand mom – 10,3%, granddad – 3,5%, other relatives – 32,7%, multiple contact – 7,1%, after death contact – 4,2%.

The main attention was pointed to analysis of tuberculin sensitivity on the Mantoux reaction with 2 TU PPD-L of sick children from different hotbeds should that while the entering the hospital hyperergic reaction often with necrosis, was observed of 100% children with multiple contacts. Accidental contact had positive reaction of medium intensify made up 46,7%, strongly expressed – 15,4%, hyperergic – 7,7%. Children who had in-family contacts had strongly expressed – 44,2% and hyperergic reactions, that is more than half of children had high degree of sensibilization of organism to TB infection.

55,2% of children from massive in-family TB contact had strongly expressed symptoms of TB intoxication. 23,9% of children had complicated course of TB process, but children with unknown source of infection made up 4,4% of complicated course.

The study of course of the local forms of primary tuberculosis should that slow positive dynamics on the background of specific treatment in the condition of hospital made up 17,2% of children with drug-stability.

During the study of period of in-patient treatment of active tuberculosis taken with individual regime of chemotherapy it was pointed out that more durable and intensive phase were given to child from multiple family TB contact, the duration of which made up 9 month. From the hotbeds of drug-stability the duration of chemotherapy made up 1 year and more.

That is, the presence of fight, long contact in family with relatives who had stable tuberculosis

in connection with harmful factors drive to development of complicated processes of children and they may be characterized with torped course and slow positive dynamics. In the connection with it the received data dictate the necessary of revision and perfecting the methods of organization.

The work was submitted to International Scientific Conference «Fundamental and applied research in medicine», France (Paris), 14-21, October, 2012, came to the editorial office on 15.08.2012.

HOME ENTERAL NUTRITION IN PATIENTS WITH A SMALL BOWEL

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Nowdays, because of development of surgical techniques and reanimatology a lot of patients with a shot bowel survive after operations – shot bowel syndrome (in cases of big bowel resections). But then patients need metabolic correction for a long period. More than 75% of patients with shot bowel syndrome have malabsorbtion (Pironi et al., 1991; Lochs et al., 2006) and need home care enteral feeding. There are 10 times more patients on home parenteral feeding in the USA than in Europe, and it is the same for enteral feeding (H. Lochs, D.R. Thomas, 2005).

In Moscow the number of patients with shot bowel syndrome (according to reports taking from the main specialists in gastroenterology of the Moscow medical Department) who need in metabolic treatment with using a parenteral and enteral feeding increased steadily throughout 2006, picked up in 2009 and then onwards stabilized from 2011. The investigations give information about patients needing nutrition support in different Moscow regions: the SouthWest Region has lower number of patients whereas the NorthEast administrative region has risen, and the North administrative region has a higher figure. Summarizing the information by selecting the main features we can make comparisons where relevant to organize medical nutrition support. The second problem is when does malnutrition become a risk? Malnutrition is difficult to diagnose in outpatients, especially in patients with short bowel syndrome. For patients with a small bowel length less 50 cm we prefer the preventive hospitalization one time a half year.

In the article we wanted to up the problem of more effective supporting home parenteral and enteral feeding for patients with a shot bowel.

The work was submitted to International Scientific Conference Practitioner, Italy (Rome-Florence), 6-13, September, 2012, came to the editorial office on 02.07.2012.

ACTION INHIBITOR PROTEIN HEAT SHOCK 27 ON THE ACTIVITY OF GLUTATHIONE PEROXIDASE AND CATALASE IN TUMOR CELLS

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Normally, the accumulation of free radicals in the cells prevents the antioxidant system. With the accumulation of reactive oxygen species formed by oxidative stress, often accompanied by increased levels of heat shock proteins. They are involved in the formation of the correct three-dimensional conformation of newly synthesized polypeptides in the maintenance of functional activity of intracellular proteins and elimination of damaged proteins. Tumor same transformation is accompanied by increased synthesis of heat shock protein 27, as well as the accumulation of oxidation-modified metabolites.

The material for the study is based on the tumor cell line Jurkat (T-lymphoblastic leukemia), obtained from a bank of cell cultures Institute of Cytology RAS (St. Petersburg). Cells were cultured in the way the suspension medium containing 90% RPMI-1640, 10% fetal calf serum («Biolot», St. Petersburg), inactivated at 56°C for 30 min. Cells were maintained in logarithmic growth phase culture of continuous passages every 2–3 days. Assessment of cell viability were performed using trypan blue. Assessment of the activity of glutathione peroxidase and catalase was performed by spektrofotomitricheskim.

The results of this study showed that the addition of dexamethasone and an inhibitor of heat shock protein – KRIBB3, we received an increase in activity as glutathione peroxidase, and catalase. But in the case of co-added to the incubation medium, an inhibitor of heat shock protein 27, and dexa-

methasone, we recorded a decrease in the activity of both enzymes.

The work was submitted to International Scientific Conference «Fundamental and applied research in medicine», Russia (Sochi), 27 September - 1 October, 2012, came to the editorial office on 28.06.2012.

FUNCTIONAL CONDITION OF HEART AMONG CHILDREN WITH DIFFERENT TYPES OF EATING REGIME

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An impact of a healthy lifestyle, including a type and regime of diet upon functional condition of children is studied insufficiently in age physiology and hygiene [2]. A rational diet plays an especially important part in providing for an optimal psychophysical condition of a growing organism.

Functional condition of heart was studied among pupils of 1–3rd grade with different eating regime: group 1 – children who had breakfast at school regularly (GN) and group 2 – those who did not have breakfast at school (GP). For a test strain the children kept static tension on a hand dynamometer of 1/3 of its maximum strength. In rest and during the strain, heart rate (HR) and blood pressure (BP) was measured.

The results of our study have shown that HR indexes in rest among all 1st grade boys didn't differ (table), while among the girls of GN group in the 1st grade HR in rest was reliably higher than among girls of GP group. Among 2nd grade boys of GN group HR in rest was reliably higher than that of GP group, and among girls of GP group HR in rest was the opposite – reliably higher than that of GN. In the 3rd grade HR in rest was reliably higher among pupils of GP group, compared to GN.

Changes in heart rate and blood pressure after local work of schoolchildren

Class	Sex	Before						During exercise					
		HR		BPS		BPD		HR''		BPS''		BPD''	
		I	II	I	II	I	II	I	II	I	II	I	II
1	B	88,0±3,4	89,4±2,4	89,2±2,3	86,7±2,1	64,2±1,2	52,2**±1,3	95,3±2,1	100,4±2,2	99,2±2,6	97,9±1,4	72,5±2,5	65,6**±2,1
	G	84,4±1,3	94,8±2,1	87,7±3,2	81,8**±2,0	63,8±2,1	50,1**±1,5	96,6±2,2	105,2**±2,1	97,7±3,5	94,7±2,7	70,5±2,6	62,1**±1,7
2	B	84,8±2,2	90,2±2,0	90,0±3,3	83,0**±2,1	64,2±3,3	49,0**±2,6	95,8±3,3	96,2±2,4	99,2±2,4	89,8**±2,9	70,7±1,4	61,3**±2,9
	G	92,5±6,1	84,6±1,9	86,4±2,2	82,6±2,0	66,0±1,4	51,8**±2,7	111,4±2,6	100,4**±1,9	93,5±3,3	90,6±2,1	68,5±2,3	62,8±3,0
3	B	87,5±2,3	80,4**±1,7	91,6±3,2	88,1±2,8	61,2±2,5	56,7**±2,0	92,6±3,7	95,3±1,8	104,6±2,2	92,7**±2,0	76,5±3,2	65,4**±2,1
	G	89,8±3,2	85,9**±1,5	92,8±3,4	90,5±2,6	61,7±2,4	59,5±1,9	92,8±2,8	102,7**±1,9	94,4±3,1	105,1**±2,9	70,0±2,1	68,9±2,8

Notes: B – boys, G – girls; I – GN, II – GP; ** – significant differences between I and II.

BPS indexes in rest among 1st grade boys did not differ significantly between GP and GN, and among girls of GP they were reliably higher. Among boys of GP from the 2nd grade indexes of systolic BP (BPS) were reliably higher than that of GN. In the 3rd grade BPS was higher among girls of GN than of GP. Diastolic BP (BPS) in rest among pupils of GP was higher than of GN, except for the 3rd grade girls.

Local strain caused an increase in heart beat among all children differently. Thus, in the 1st grade a reliable increase in HR was registered under tension. In the 2nd and 3rd grade among boys of GN it was less obvious than among boys of GP. Among girls of the 1st group a greater increase in HR was registered under tension than among girls of GP group.

Reaction of BPS among children of GN group of the 2nd and 3rd grade against local tension was more obvious than among children of GP group. BPD indexes under local tension among all children of GP were significantly higher, except for girls of the 3rd grade.

Thus, for primary school pupils who don't eat regularly, an increase in vascular resistance is a typical side of adaptation to school loading, as proved by indexes of BPD in rest and under a local strain. Continuous breaks and disbalance in diet can lead to disruptions in homeostasis and functional condition of organism among children and adults [1, 3]. The data of our research states an increased level in functional heart tension among children with continuous breaks between meals.

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THE ROLE OF THE FACTORS OF THE SUN ACTIVITY FOR THE STATISTICAL OF THE CARDIO – VASCULAR AND NERVOUS DISEASES IN MIDDLE LATITUDE REGION

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The present article reports results of the statistical treatment of the medical and geophysical data. A serious study of the problems of the heliobiological

relationships was first begun in [Tchizhjevsky A.L., 1930]. The investigations of the influence of the sun activity on the human organism were undertaken later in [Vladimirsky B.M., 1971].

The aim of the present article is to estimate of the influence of the heliogeophysical factors on the human health in middle latitude region. The medical data were taken from the station of the first medical aid in Murom of the Vladimir region. The geophysical data were taken from the observatory Borok in Yaroslavl region. The location of Murom corresponds to the middle geomagnetic latitude about 53°. The observatory is located on the same geomagnetic latitude 53° and on the same geomagnetic meridian 111°, which crosses Karelia and Scandinavia. Murom and Borok may be found in the projection of the plasmasphere on the Earth's surface under the specific geophysical conditions. The plasmasphere is one of the structure regions of the Earth's magnetosphere. The plasmasphere is subject to dynamics depending on the geomagnetic activity. According to [Sterlikova I.V., Ivanov A.P. 1997], the intensification of the high frequency oscillations of the magnetic field of the Earth (the high frequency geomagnetic pulsations) takes place in the plasmasphere. The medical data given in the article contains the recordings of the call time of the first medical aid in connection with sudden attack cardio-vascular and neuro diseases. Analysis is made in each variety of the following cardiovascular diseases: chronic ischemia diseases of heart, hypertonia diseases, hypertonia crisis, stenocardia, myocardial infarction and in the each variety of the following neuro diseases: vegetative-vascular dystonia, neuro-circulatory dystonia, bronchial asthma, myoneurasthenia, mental affection, psychosis, schizophrenia, insult. The medical data were chosen in accordance with the concrete magnetic storm because of the each case of the magnetospheric substorm is individual and does not repeat, according to [Akasofu S.I., 1971]. The medical data were analysed in three time intervals: before the magnetic storm, during the magnetic storm, after the magnetic storm. The geophysical data contain the information about the magnetic storms: the time of beginning of the storm, duration of the storm, the types of the magnetic storms (recurrent or flash), their particulars. Moreover the medical data contain the information about the indexes of the geomagnetic activity and also the recordings of the geomagnetic pulsations. Only the high frequency geomagnetic pulsations (1–10 Hz), which rhythms have coincidence with the human biorhythms, were chosen from the number of the known geomagnetic pulsations originated in the magnetic storm (substorm). The recording of the irregular pulsations of types Pi1B – rPi2, Pi1B-rPiP and Pi1C are used in the article. The geomagnetic pulsations Pi1B – rPi2 represent a microstructure of the geomagnetic pulsations of the Pi2 type (the oscillations Pi2 period equal 40–150 s). They are called rider of Pi2. These

type of the geomagnetic pulsations is observed in the phase of the beginning of the substorm (or of the magnetic storm). The geomagnetic pulsations Pi1B – rPiP represent a microstructure of the geomagnetic pulsations of PiP type (the oscillations PiP period is more 150 s). These type of the geomagnetic pulsations is observed in the phase of the development of the substorm. They are called rider of PiP. The geomagnetic pulsations Pi1B – rPi2 and Pi1B-rPiP have a different physical nature [Sterlikova I.V. 1985, 1987] and different mechanisms of generations. The geomagnetic pulsations Pi1C are observed in the phase of the recover of the magnetic substorm and have the another source of generation. The recordings of the continuous regular geomagnetic pulsations of the type Pc1 are used in the article besides. The geomagnetic pulsations Pc1 are called pearl also, because Pc1 is like pearl necklace. The generation of Pc1 may accompany the magnetic storm and also it may be observed after the magnetic storm on a third-seventh days-nights. It is possible that they have a different mechanisms of the generation. It is possible, the fact is a reason of the different reaction of the human organism on the generation of Pc1. The instantaneous reaction of the human organism, expressed in the sudden attack of the cardio-vascular diseases or neuros diseases are observed during of the flash magnetic storm accompanied Pc1. If the magnetic storm have a recurrent

character (without the chromospheric flash on the Sun), than the reactions of the human organism on the Pc1 have a certain delay for 1–1,5 days-nights in relation to the beginning of magnetic storm. The practical doctors may use the information reported in present article.

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NEW CATALYSTS OF «SYNTHETIC OIL» AND ITS DISTILLATES ENNOBLEMENT

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The process of coal distillates hydrotreatment on Mo–Hu/Ni–Re and So–Hu/Ni–Re catalysts has been studied in the given work. As research results show the maximum exit of liquid products – 51,0–56,0 mass. % is observed on the 5% Mo–Hu, 7% Co–Hu/Ni–Re catalysts. Besides, there is an increase in a portion of gasoline fraction in a liquid product up to 29,5% on the 5% Mo–Hu/Ni–Re catalyst, and up to 21,7 mass. % on the 7% So–Hu/Ni–Re. The exit of liquid products increases up to 60,8 mass. % and exit of gasoline fraction increases up to 32,8 mass. % at simultaneous depositing of these catalysts. The content of paraffin hydrocarbons has decreased from 35,8 to 28,3 %. The quantity of isoparaffin hydrocarbons in the synthetic oil hydrogenized on deposited 5%Mo-Humate Ni-Re has increased up to 36,2%. To all appearance, during the hydrogenation there is a process of isomerizing. The olefinic, cyclo-olefinic and diene hydrocarbons are present also at the hydrotreated benzine.

Keywords: coal, hydrotreating, catalyst, coal distillate, gasoline fraction

Along with a continual growth in production of oil and gas all over the world, an interest towards coal, as an alternative source of motor fuels, oil-chemical material and chemical substances arises. Therefore, one of the important directions in modern biochemistry is the development of industrial means to receive practically important oil-chemical, chemical products from natural organic materials that allow us to avoid usage of ecologically-dangerous substances.

A development of new technologies of processing solid fuel in order to receive fluids, and also a selection of new types of catalysts that possess a high activity and selectivity level and work in mild conditions is a significant problem of modern days [1].

During the recent years, in accordance to the European standards, the following requirements are placed towards motor fuels: benzol content must not exceed 1% of mass, sulphur – 0,05% of mass, olefines – 20% of mass, polycyclic aromatic hydrocarbons – 11% of mass. The composition of coal distillate preserves unstable nitrogen, oxygen-full compounds, and also desaturated hydrocarbons that are able to polymerize, so a selec-

tion of new types of catalyst, on which processes of hydric cleaning (hydroprocessing) in mild conditions can take place, becomes urgent.

Bibliographic data [2-3] on hydrocleaning and hydrocracking of coal distillates state that that world practice uses sulphured catalysts that are based on Mo–Co–Ni–W, placed on Al_2O_3 , SiO_2 and other carriers.

Catalysts with pore radius of more than 100 nm are more active and stable in ennoblement of hydrocarbon materials.

Based on a rich experience of work with skeleton catalysts, we have suggested to use them in hydric cleaning of hydrocarbon materials. Modified skeleton catalysts, based on alloys of Ni-Al are widely used on enterprises of chemical and oil-processing industry.

This work presents the results of studying process of hydroprocessing coal distillates on Mo, Co–Fy/Ni–Re catalysts. The process of hydration and hydro-cleaning of «synthetic oil-1» that is received after liquefaction of coal on placed Mo–Humate and Co–Humate/Ni–Re catalysts was carried out in the catalyst «duck». The results are provided in Table 1.

Table 1

Hydration of «synthetic oil-1» on Mo–Hu and Co–Nu/Ni–Re catalyst
($T = 293\text{ K}$, $m_{\text{kat}} = 1\text{ g}$, P_{H_2} – atmosphere)

Catalyst	Output of fluids, mass, %				Remains, mass, %	Losses, mass, %
	under 453K	453–523K	523–593K	Σ		
Ni-Re	20	17,7	2,9	40,6	53,0	6,4
3% Mo–Hu/Ni–Re	17,5	10,0	17,0	44,5	46,1	9,4
5% Mo–Hu/Ni–Re	29,5	10,2	11,3	51,0	45,7	3,3
7% Mo–Hu/Ni–Re	25,1	10,7	14,3	50,1	45,0	4,9
3% Co–Hu/Ni–Re	16,3	7,2	21,0	44,5	46,1	
5% Co–Hu/Ni–Re	18,8	12,3	12,2	43,3	48,0	8,7
7% Co–Hu/Ni–Re	21,7	12,6	21,7	56,0	37,3	6,7
5%Mo–Hu + 7%Co–Hu/Ni–Re	32,8	13,8	14,2	60,8	34,2	5,0

As the results show, maximum output of fluids, 51,0–56,0 of mass %, is observed on 5 % Mo–Hu 7 % Co–Hu/Ni–Re catalyst. Besides, an increase in part of benzol fraction in fluid on 5%Mo–Hu, 7%Co–Hu/Ni–Re up to 29,5% take place, and on 7% Co–Hu/Ni–Re – up to 21,7% of mass. Under a simultaneous place-

ments of these catalysts an output of fluids increases up to 60,8% of mass, and benzol fraction – up to 32,8% of mass.

Then, the received fraction after liquefaction (353–593 K) was hydrated on the placed Mo–Hu/Ni–Re. The results are provided in Table 2.

Table 2

Output of fluids after hydrating fraction of 353–593 K
«synthetic oil-2» on catalyst Mo–Hu/Ni–Re

Comment	Output of fluids, mass, %				Remains, mass, %	Losses, mass, %
	under 453 K	453–523 K	523–593 K	Σ		
Zeolyte catalyst	4,8	7,7	35,0	47,5	46,6	5,9
3% Mo–Hu/Ni–Re	44,7	22,0	18,4	85,1	8,2	6,7
5% Mo–Hu/Ni–Re	48,4	28,3	14,8	91,5	4,8	3,7
7% Mo–Hu/Ni–Re	51,6	17,8	19,1	88,5	7,8	3,7

As the results show, an output of fluids increases up to 91,5% of mass, the maximum output is observed on 5% catalyst Mo–Hu/Ni–Re. We should point out that on 7% catalyst Mo–Hu/Ni–Re an output of benzol fraction increased up to 51,6% of mass.

Thus, here a principal possibility of hydro-cleaning benzol fraction, received from distillates of Kuminsk coal in mild conditions and skeleton catalysts.

Chromatographic method was used to study group hydrocarbon content of benzol fraction. The results are provided in Table 3.

Table 3

Group hydrocarbon content of benzol fraction

Hydrocarbons	Hydrocarbon content, %					
	Catalyst, zeolite	5% Mo–hu/Ni–Re (Syn. oil-1)	7% Co–Hu/Ni–Re (Syn. oil-1)	5% Mo–Hu + 7% Co–Hu/Ni–Re (Syn. oil-1)	5ml 353-453K + 5% Mo–Hu/Ni–Re, solvent ethanol (Syn. oil-2)	22ml 353-593K + 5% Mo–Hu/Ni–Re (Syn. oil-2)
Paraffines	35,8	23,2	14,7	13,6	28,3	29,4
Iso-paraffines	16,3	28,7	26,0	19,6	19,6	36,2
Aromatics	25,0	21,6	34,1	42,2	23,2	15,2
Naphtenes	14,2	16,2	14,8	16,9	16,4	11,7
Olefines	8,1	4,8	6,8	5,6	11,0	6,4
Cyclic olefines	0,6	5,2	3,5	2,1	1,5	1,0
Dienes	-	0,3	0,07	-	-	0,01
Research method	69,4	72,7	77,3	82,3	71,7	73,6

According to the data of chromatographic analysis, we can see a decrease in paraffine hydrocarbons from 35,8 to 13,6%. We can observe significant changes in the number of iso-paraffine hydrocarbons. During the process of hydro-cleaning, the reaction of dealkylation of alkile-aromatic hydrocarbons takes place. As a result, the contents of aromatic hydrocarbons multiplies by two. While contents of aromatic

hydrocarbons in benzol, that has been received with zeolite, equaled 25,0% of mass, on the placed Mo, Co–Humate/Ni–Re catalyst it increased up to 42,2% of mass. The benzol content in placed catalysts has decreased. While content of benzol fraction, received with hydration of coal on zeolite, it equaled 0,479%, on the placed Mo, Co–HumateNi–Re catalyst it equaled 0,243–0,356%. Compared to the oc-

tane number of the initial gasoline (69,4), octane number of the gasoline, cleaned on Mo, Co–Humate/Ni–Re catalyst, increased up to 82,3. The number of olefine hydrocarbons decreased from 8,1 to 4,8%. According to the chromatographic data, we can see significant changes in contents of benzole fraction that has been hydrated in ethanol. Contents of parffine hydrocarbons has decreased form 35,8 to 28,3%. The amount of iso-paraffine hydrocarbons in the «synthetic oil-2» that has been hydrated with placement of 5% Mo–Humate Ni–Re increased up to 36,2%. Obviously, process of isomerisation takes place during hydrogenation. Olefine, cyclic olefine, and diene hydrocarbons are also present in hydro-cleaned gasoline.

Thus, gasoline, received from the distillates of Kunminsk coal in mild condi-

tionson placed skeleton catalysts, corresponds to the modern requirements towards the quality of motor fuels and ecological standards.

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RESEARCH OF MECHANOCHEMICAL PROCESSING INFLUENCE ON PROCESS OF COAL HYDROGENATION

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The coal mechanochemical processing influence on an liquid products exit in the process of coal catalytical hydrogenation is investigated. Optimum time of coal dispersing is educed. Hydrocarbonic composition of coal hydrogenation products investigated by the chromatography method and positive influence of mechanochemical activation on the process of coal hydrogenation was shown. It is shown by the EPR method that as a result of mechanical processing the coal free-radical conditions (FRC) concentration is increasing as the function of coal activation time is observed. The decrease in FRC concentration is observed in the coal activated during 60 minutes. It testifies that there is a recombination of formed free radicals at more lasting processing of coal. The increase in concentration of trivalent iron is observed at mechanical activation of coal. Apparently, the part of iron which is in a bivalent condition passes in a trivalent condition as a result of mechanical activation. Signal intensity from ions of trivalent iron grows so far as increase in time of comminuting.

Keywords: coal, catalytical hydrogenation, mechanochemical activation

Mechanochemical activation of substances takes place in processes of intense dispersion of a processed material. At the same time both its dispersion and accumulation of activation energy is observed. Physical-chemical characteristics of a coal substance as a whole takes place along with an increase in the specific surface under mechanochemical activation of the substance. The process of mechanochemical reaction of coal activation can be considered as a breaking that leads to an increase in the specific surface due to decrease in geometric size of fractions and opening of pores that were unavailable before. It is also important to consider that during the mechanic impact over coal its activation takes place and is followed by a

significant structural alterations in an organic structure of coal [1–2].

The first results of the impact of mechanochemical processing over the output of fluids during the process of coal hydrogenation were received in the work [3–4]. Hydrogenation of coal took place under optimal conditions that were established in the work [5]. Coal of the minefield «Kiyakty» with the following characteristics (% mass): $W^a - 9,5$, $A^a - 11,1$, $V^{daf} - 41,2$, $C^{daf} - 74,3$, $H^{daf} - 4,7$, $O^{daf} - 19,3$, $N^{daf} - 0,8$, $S^{daf} - 0,9$ was taken as a research object.

Table 1 provides the results of a definite output of fluids during the process of hydrogenation of initial coal and one that has been processed in the aerial environment for 15,30,60 minutes.

Table 1

Impact of the mechanic processing of coal over an output of fluids
($T = 420^\circ\text{C}$, $\tau = 15$ minutes, m_k (boxite-094) = 0,67 g)

Processing time, min	P_{\max} , MPa	Output of fluids, % of mass				Gas output, % of mass	Pulp output, % of mass	Losses, % of mass
		до 180°C	180–250°C	250–320°C	Σ			
Correlation coal/paste-formator 1:1								
0	2,8	11,2	8,8	18,8	38,8	15,7	41,2	4,3
15	2,6	10,9	7,9	22,8	41,6	13,6	41,7	3,4
30	2,8	13,9	9,2	21,1	44,2	18,0	34,0	3,8
60	2,8	15,2	8,9	21,6	45,7	17,7	33,1	3,5
Correlation coal/paste-formator 1:2								
0	2,8	12,8	10,3	25,8	48,9	12,0	36,5	2,6
15	3,0	13,2	13,0	25,7	51,9	13,8	30,5	3,8
30	3,1	14,2	12,4	27,9	54,5	13,9	27,7	3,9
60	3,2	13,9	10,7	28,1	52,7	13,2	30,4	3,7

As table 1 shows, the biggest output of fluids is observed under 30 minutes of coal processing. The further increase in time of dispersion does not influence the output of fluids significantly. Obviously, under a continuous

mechanoactivation under such conditions a dynamic balance is established: the speed of formation of free radicals becomes comparable to speeds of their recombination due to mechanoconstruction. It is testified by the study of par-

amagnet characteristics of the initial coal and one that has been dispersed with the method of electronic paramagnetic resonance (EPR).

The method of EPR was used to study free-radical conditions (FRC) in coal. Concen-

tration of free radicals depends on the conditions of coal processing, a character of reaction system, in which breaking takes place, and also on the nature of the initial coal [6-7]. Table 2 provides the results of these surveys.

Table 2

Parameters of ERP sectors of coal before and after mechanoprocessing

Activation time, minutes	Line width, oersted	FRC concentration, N101 spin/g	g-factor
0	4,0	1,9	2,0021
15	4,1	2,3	2,0022
30	4,5	2,7	2,0018
60	4,4	2,4	2,0026

The analysis shows that, as a result of mechanic processing, increase in FRC concentration is observed depending on time of its activation. In coal that has been activated for 60 minutes a decrease in FRC concentration is observed. It testifies for the fact that recombination of the formed free radicals takes place under a more continuous processing of coal. An increase in concentration of trivalent iron is observed during the mechanoactivation of coal. Obviously, a part of iron that is in bivalent condition transfers into trivalent condition after mechanoactivation. The intensity of signals that come from ions of trivalent iron grows along with an increase in breaking time.

Thus, during the mechanoactivation of coal an increase in trivalent iron concentration is observed. Obviously, a part of iron that is in bivalent condition transfers into trivalent condition after mechanoactivation. It appears that an increase in concentration of trivalent iron, as in [8], increases the speed of hydrogenation process. It is possible that changes in structure of coal can have a positive impact upon the hydrogenation process and lead to an increase in fluids output.

To study the impact of mechanoprocessing of coal over the liquefaction degree, the processed coal was further treated with 0,4% solution of natrium hydroxide (Table 3).

Table 3

The impact of mechanochemical processing over the output of fluids
($T = 420\text{ }^{\circ}\text{C}$, $\tau = 15$ minutes, m_k (boxite-094) = 0,67 g)

Output of humic acids, % of mass	Processing time, min	Work pressure, MPa	Output of fluids, % of mass				Gas output, % of mass	Pulp output, % of mass	Losses, % of mass
			under 180°C	180–250°C	250–320°C	Σ			
Correlation coal/paste-formator 1:1									
0	0	2,7	11,2	8,8	18,8	38,8	15,7	41,2	4,3
20,3	15	2,7	15,4	11,8	18,2	45,4	14,4	39,2	1,1
22,1	30	2,6	18,2	10,7	19,2	48,1	14,2	33,4	4,3
20,8	60	2,2	21,6	11,5	16,2	49,3	9,9	37,3	3,5
Correlation coal/paste-formator 1:2									
0	0	2,8	12,8	10,3	25,8	48,9	12,0	36,5	2,6
20,3	15	3,0	14,6	11,2	29,0	54,8	13,9	27,3	4,0
22,1	30	3,0	18,5	12,6	28,4	59,5	13,7	23,9	2,9
20,8	60	3,4	19,0	11,1	28,0	58,1	14,2	26,0	3,7

As table 3 shows, under the hydrogenation of coal that has been treated with alkali, output of fluids grows up to 59,5% of mass. Here output of gas grows insignificantly, compared to the initial coal, and equals 13,9–14,2% of mass, and

the output of benzol fraction grows significantly and equals 18,5–19,0% of mass. Output of humic acids equals 20,3–22,1% of mass.

Destruction of coal substance structure takes place under mechanochemical process-

ing. It is shown by the IR-spectres of the initial and processed coal (Table 4). In the IR-spectres of coal that has been processed mechanically for 30 minutes absorption lines that are typical for valent oscillations of amines, carbon acids, aromatic hydrocarbons, aromatic and aril-alkile ethers, nitriles.

In coal that has been processed with alkali, intensity of absorption lines that are typical for valent oscillations of amine groups, acid dia-

mers, aromatic and aril-alkile ethers decreases significantly in comparison to the initial coal. It can testify the destruction of the coal mass and discharge of major hydrocarbon components of humic acids. In coal that has been processed with alkali presence of acid-content and aliphatic thermally-unstable structures is registered. It can condition the increase in coal conversion during the process of its catalytic hydrogenation.

Table 4

Characteristics of IR-spectres of coal that has been processed mechanically for 30 minutes (I) and coal that has been treated with a 0,4% solution of alkali (SA) (s – strong lines, med – medium lines, w – weak lines)

Oscillation nature	Connection type	Frequency, cm ⁻¹	
		Initial coal (I)	(SA)
VoH(linked)	Acid diameter	3190–2530 (cp.)	3170–2520 (сл.)
VNH free	Amines	3420 (c.)	3450 (сл.)
VCN	Nitriles	2230 (сл.)	2260 (cp.)
VC = 0	Carbonyl acid links	1700 (c.)	1690 (сл.)
Vc-c	Arenes	1590 (cp.)	1585 (c.)
Vcoc	Complex ethers	1275 (cp.)	1220 (сл.)
8OH	Spirits, phenols, acids	1370 (cp.)	1330 (c.)

Chromatographic analysis of benzol fraction of the mechanically-processed coal (Table 5) shows a decrease in content of paraffine hydrocarbons, increase in contents of aromatic hydrocarbons, in difference to the hydrocarbon structure of the initial coal. Besides, a decrease in contents of olefin hydrocarbons is observed. This data proves that a deeper destruction of coal macromolecule that influences characteristics of the coal distillate output, takes place under mechanochemical processing of coal.

Table 5

Hydrocarbon structure of benzols of hydrogenation of the initial coal and coal that has been treated mechanochemically

Hydrocarbon structure	Content, % of mass	
	Initial coal	Mechanochemically treated coal
Paraffines	32,68	27,46
Iso-paraffines	24,16	23,95
Arenes	12,23	29,74
Naphthenes	11,72	11,74
Olefines	5,99	3,88
Diene	0,92	0,21
Cyclic olefines	1,02	-
Unidentified substances	11,28	3,02

Thus, preliminary mechanochemical processing provides for an increase in degree of coal conversion during the hydrogenation process. A deeper conversion is proved by an increase in output of benzol fraction.

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THE BROWN COAL AND COMBUSTIBLE SLATE(S) THERMOCATALYTIC PROCESSING OF THE «KENDERLYK» DEPOSIT

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The article is devoted to the actual problem – expansion of raw hydrocarbonic base, involving of brown coal and slates in processing. The process of simultaneous thermocatalytic transformation of coal and slates of the «Kenderlyk» deposit is studied. Results demonstrate the fact that transformation degree of coal and slate mix above by 8–9 % than of coal, the process proceeds without intensive coke formation in the temperature interval 425–440°C and under the pressure 5 MPa. It is shown that organic and mineral parts of slates make activating influence on the coal hydrogenolysis. The mineral part, containing aluminosilicates, iron oxides and others catalytically active forms of metals, activates cracking of coal hydrocarbons, and the organic part of slate promotes hydrogenation and stabilization of formed radicals. The bitumens received from the firm leavings of a coal and slates mix processing with $T_{\text{boil}} > 320^\circ\text{C}$ meet the requirements of state standard for oil bitumens.

Keywords: coal, slate, catalysis, heat treatment

The raw materials source of the industry should be flexible enough and be based on the various inter – related types of the organic raw materials application for the sustainable development of the country. From this point of view, the most valuable are the coal, the combustible slates and the oil – shales, the oil – bituminous rocks, the already proven reserves, as in Kazakhstan, well as abroad are very huge and great. So, in the future, these fossil fuels and the combustible minerals consumption will be increased, as the energy source, and their complex processing into the synthetic fuel and the chemical products will be further developed. This carbon and slate – chemistry direction is the widely – studied subject in many countries, including Kazakhstan. We note that their application may be economically justified just now, for a number of the regions.

On the Kazakhstan's territory, up to the present time, about 25 combustion slates and the oil – shales manifestations deposits have already been identified, they have been confined to the Upper Devonian, the Lower Carboniferous, the Upper Paleozoic, the Middle, and the Upper Jurassic, and the Paleogene sedimentations. So, they are quite different and various by the initial substance, the starting material composition, and their formation conditions, which have largely been predefined their main technological – numerically characteristics. All these deposits, except for the «Kenderlyksky» and «Chernozatonsky» fields, have been poorly studied. The «Kenderlyksky» deposit combustion slates and the oil – shales reserves are made up more, than 4 bln. tons, of which 750 mln are the balance ones. In addition, over a billion tons of the coal, and the brown coals extraction is quite be possible on this deposit, which is increased the economic attractiveness of this deposit's further development.

A number of processes of the combustion slates and the oil – shales thermochemical pro-

cessing is being developed in the Scientific Research Institute of New Chemical Technologies and Materials (NCHT&M), which are based on the NCHT&M study results by the complex technological – chemically coal and the brown coals processing in Kazakhstan, having carried out in 1990–2010-es. All these obtained studies have already been shown, that the organic and the mineral parts of the combustion slates and the oil – shales have been made the activating effect upon the brown coals and the lignites thermal conversion.

A number of the authors [1–4] explain the combustion slates and the oil – shales activating effect, that the combustion slates and the oil – shales liquefying liquid products, having formed in the 390–440°C temperature range, are contained the significant amount of the tetrahydroderivative condensed aromatic hydrocarbons, the oxygen and the nitrogen compounds, and also the alicyclic alcohols, which are had by the hydrogen – donor properties. By their hydrogen activity, all these compounds are quite similar to the tetralin, and in some reactions, they are surpassed it, in terms of its ability reactivity [2–5].

This has been confirmed by the obtained data, having shown, that in the 390–440°C temperature range in the hydrocarbon raw materials cracking, in the presence of the combustion slate and the oil – shale, the hydrogenation and the reduction reactions are actively proceeded, the dimerization and the condensation reactions are suppressed, and the carbon – the carbonaceous bond destruction is accelerated [2].

The combustion slate and the oil – shale mineral part, having contained the aluminium silicates, the iron oxides, and the other catalytically metals' active forms, in its turn, is quite activated the cracking reaction proceeding [6, 7].

So, the process of the co – catalytic thermal processing of the brown coal and the combustion slate, and the oil – shale of the «Kender-

lyksky» deposit has been studied by us in the present paper. The coal and the slate, and the oil – shale liquefaction process, having taken in the equal quantities by their organic mass, has been carried out in the laboratory installation under the 5,0 MPa pressure, at the 420°C temperature. For the coal liquefaction process intensification, the catalytic system has been introduced, having consisted in the fine – dispersed solid particles of the multimetallic ores concentration sludge. So, further, the destructive processes are additionally realized on these particles surface. Under the experiments conditions, the coke – forming products have not been formed on the installation walls and in the reaction mixture volume in the process of the catalytic processing of the coal, the slate, and the oil – shale mixture.

The liquid products, having obtained in the process, have been subjected to the distillation with the fraction selection, with the boiling point up to 200°C, the fraction with the 200–320°C boiling point. The residue with above 320°C boiling point has been contained the undissolved organic matter of the slate, the oil – shale, and the coal, and also their mineral component in their composition. The process characteristic of the catalytic thermal processing of the brown coal and the ordinary «Kenderlyksky» slate and the oil – shale has been shown in the Table 1.

Table 1
The Process Characteristic of the Catalytic Thermal Processing of the «Kenderlyksky» Coal, and the «Kenderlyksky» Slate and the Coal Mixture

The Process Indicator	Coal	Coal + Slate
<i>The Process Conditions</i>		
The Coal: paste-former (slate + coal): paste-former	1:1,3	(0,6 + 0,4) :1,3
OMC:OMY		1:0,9
Temperature, °C	420	420
Pressure, MPa	5,0	5,0
Duration, min	15	30
<i>The Products Yield, %</i>		
Gas	11,8	4,4
Losses + water	8,8	5,3
Fraction with boiling point up to 200°C	10,3	13,5
Fraction with 200–320°C boiling point	12,7	15,6
Fraction with above 320°C boiling point	40,5	43,0
Solid products	15,9	18,2

As our studies results have been shown, the combustible slates and the oil – shales catalytic properties are quite allowed to be carried out, under the optimum conditions, the process of the thermal decomposition of the organic coal matter, with the high degree of the coal conversion into the liquid distillate products, without the intensive carbon – producing. The conversion degree of the organic matter mixture of the slate, the oil – shale, and the coal is much higher, than that of the coal. The solid residue with the above 320°C boiling point has been tested, as the organic binder for the road construction (see, the Table 2).

Table 2
The Quality Characteristic of the Ash Binding Materials, Having Obtained at the Thermochemical Conversion of the Coal and the Coal + the Slate

The Indicator	Coal	The Coal + the Slate
The needle penetration depth, mm ⁻¹ at 25°C	130	138
at 0°C	-	68
The softening temperature by KiSh; °C	40	42
The extensibility, cm at 25°C	-	68
at 0°C	-	11
The adhesion test	-	It is withstood

The tests results have already been indicated, that the bitumen – based products processing of the slate and the brown coal mixture of the «Kenderlyk» deposit are completely satisfied the GOST main requirements for the petroleum bitumen.

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THE INDUSTRIAL CATALYSTS ENLARGED TESTS RESULTS IN THE BUTYNEDIOL-1,4 HYDROGENATION PROCESS

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Publication is devoted to carrying out of the butindiol-1,4 hydrogenation process enlarged tests. Results of the enlarged tests have shown that the process selectivity and product cleanness raises at use of alloy catalyst SKN-39 in the process of butindiol-1,4 hydrogenation. The tests have shown that the butanol exit grows much more slowly, i.e. from 2,3 up to 8,0% at work with alloy catalyst SKN-39. Comparing the data of alloy catalyst SKN-39 to industrial catalyst MNH advantage of the first catalyst is obviously observed. Their application in production allows to increase selectivity of process on butandiol by 18–27%, and stability in 1,5–2 times. SKN-39 catalyst possesses higher hydrogenating ability than industrial MHX. The productivity of process raises in 1,5–2,0 times, selectivity raises by 15–30%, and the target product possesses higher quality at the butindiol hydrogenation on the SKN-39 catalyst.

Keywords: butindiol-1,4, butandiol-1,4, nickel catalysts

The butynediol-1,4 hydrogenation kinetic regulations study is very significant in the practical relations, as, especially, this reaction has already been laid in the basis of the butandiol-1,4 obtaining industrial process.

So, it should quite necessary to be developed and to be implemented the most efficient and the most stable catalysts for the organic synthesis in the production for the modern production development. The high – performance steady – state and the stationary catalysts development for the hydrogenation process at the modern requirements level in the industry is the most significant, while, at the same time, it is the complex technical challenge, the final solution of which is resulted in the butanediol-1,4 increase in its yield and, in general, its obtaining process efficiency. That is why, it should be necessary the highly – efficiently catalysts, due to the special requirements just to the obtained substances purity for this process carrying

out [1–3]. In this connection, the butindiol hydrogenation process study on the modified nickel catalysts is the most actual and relevant [4–6].

So, the laboratory researches have been shown, that, developed by us, the SKN-39 alloyed catalyst is displayed the highest activity, its selectivity, and its stability, and the MNX and the NX industrial catalysts – the smallest ones at the butindiol-1,4 hydrogenation NX [4]. At present, the SKN-39 from the alloyed catalyst has its industrial applications in a number of the hydrogenation processes, such as the oil aldehydes hydrogenation and the others. In this connection, the catalytic properties on the pilot installation have already been investigated by us, for the SKN-39 alloyed catalyst early introduction, which is also the highly – efficient catalyst in the butindiol-1,4 hydrogenation process. Thus, the MNX, NX, and SKN-39 catalysts enlarged and the integrated testing final results have already been given in the Tables 1–3.

Table 1

The MNX Various Catalysts Enlarged Tests Results, in the Butindiol-1,4 Hydrogenation Process. The Test Conditions: The Raw Materials Volume Flow Rate – 1 l./h., the Hydrogen Flow – 3 NM/h, pH – 7,0 – 9,...

The tests duration, h	The reactor temperature, t, °C	The weight hour space velocity h ⁻¹	The hydrogen flow, nm ³ /h	The BID concentration in charge stock, %	The hydrogenation products composition, %					The initial BID product yield, % mass	
					Bu-tanol	OMA	BAD	BED	BID	Butanol	BAD
24	90	0,8	0,2	16,9	1,20	abs.	12,6	0,23	trace	7,1	74,8
80	90	0,8	0,2	16,9	1,65	abs.	11,3	0,27	0,10	9,8	66,9
160	90	0,8	0,2	16,9	2,17	0,31	11,5	0,13	abs.	12,9	68,4
200	90	0,8	0,2	16,9	1,97	0,47	11,3	0,2	abs.	11,7	68,4

Table 2

The NX Industrial Catalyst Enlarged Tests Results in the Butindiol-1,4 Hydrogenation Process. The Test Conditions: The Raw Materials Volume Flow Rate – 1 l./h., the Hydrogen Flow – 3 NM/h

The duration, h	The reactor temperature, t, °C	The initial raw material composition, % mass			The hydrogenation products composition, % mass			The product yield from the initial one			
		BID	BAD	Total in water solution	Butanol	BAD	BED	BID, %		BID + BAD, %	
								Butanol	BAD	Butanol	BAD
80	90	14,93	32,30	47,23	0,52	42,65	0,18	3,5	69,3	1,1	90,3
80	90	same	same		1,06	43,05	0,15	7,1	72,0	2,2	91,1
112	110	«»	«»	«»	2,13	42,53	0,18	14,3	69,1	4,5	90,0
110	110	15,36	28,07	43,43	2,11	35,89	0,18	13,7	50,9	4,9	82,6
208	110	same	same		1,91	32,92	0,13	12,4	31,6	4,4	75,8
256	120	17,17	32,65	49,82	2,57	38,30	0,09	15,0	32,9	5,2	76,9
288	120	same	same		2,78	34,14	0,34	16,2	8,7	5,6	68,5

Table 3

The SKN-39 Industrial Catalyst Enlarged Tests Results in the Butindiol – 1,4 Hydrogenation Process

The tests duration, h	The reactor temperature, t, °C	The weight hour space velocity, h ⁻¹	The hydrogen flow, nm ³ /h	The BID concentration in the in initial raw material, %	The hydrogenation products composition, %					The initial BID product yield, % mass	
					Butanol	OMA	BAD	BED	BID	Butanol	BAD
24	80	0,6	1,0	14,3	0,11	abs.	13,7	0,16	0,04	3,1	97,7
80	80	0,6	1,0	14,4	0,12	abs.	14,3	0,07	0,02	4,3	99,4
112	80	1,5	3,0	13,9	0,10	abs.	13,7	traces	traces	5,3	99,1
160	80	1,5	3,0	30,0	0,17	abs.	27,7	traces	abs.	7,3	92,5
248	60	1,0	0,2	15,0	1,67	abs.	14,4	traces	abs.	11,1	96,0
320	100	1,0	0,2	15,0	1,20	0,27	13,0	0,26	0,25	8,0	86,9

Note: BAD – butanediol-1,4; BID – butynediol-1,4; BED – butenediol-1,4; OMA – oxibutyl aldehyde.

So, it can be seen from the Tables 1–3 data, that the selectivity by the butanediol-1,4 at the butynediol-1,4 hydrogenation on the SKN-39 alloyed catalyst has been made up 86,9%, which is 18% higher, than at the MNX industrial catalyst. So, the selectivity by the butanediol is equal to 68,4%, under the similar conditions of the last catalyst work. For all this, the SKN-39 catalyst work duration has been made up 320 hours, while the MNX industrial catalyst operation time is much less, that is why, it has been made up only 200 hours. The butynediol-1,4 hydrogenation products chromatographic analysis has been shown, that the butanol yield, having had the production by – product, with the hydrogenation process duration increase, to the greatest extent, is being increased on the MNX (e.g. nickel/kaolin)

and the HX (e.g. nickel/Cr₂O₃) catalysts. So, at the process duration, which is equal to 288 hours, the butanol yield on the NX catalyst has been made 16,2, and on the SKN-39 – 8,0%. At the same time, the butanol yield on the MNX catalyst is being increased up to 30,6% at the butynediol hydrogenation during 200 hours. So, the tests have been shown, that the butanol yield is being grown much slower, e.g. from 2,3 up to 8,0%, at the working with the SKN-39 alloyed catalyst. Having compared the SKN-39 alloyed catalyst data with the MNX industrial catalyst, it is clearly observed the first catalyst advantage. Their application in the production is quite able to be increased the process selectivity by the butanediol for 18–27%, and its stability in 1,5–2 times. So, the SKN-39 catalyst is possessed a higher hydro-

generating capacity, than the MNX industrial one. The γ -hydroxybutyric aldehyde has been absent, and the butenediol – the intermediate product, and the butynediol – the raw materials have been, or have been absent, at butynediol-1,4 hydrogenation at the alloyed catalysts with the hydrogen low flow in the hydrogenation product. At the same time, in the hydrogenation product, having obtained after the butynediol-1,4 hydrogenation, the γ -hydroxybutyric aldehyde, the BED, and the BID have been present at the industrial catalyst.

Thus, the process performance is being increased in 1,5–2,0 times, the selectivity – for 15–30% at the butynediol hydrogenation at the SKN-39 catalyst, and the end product has a higher quality (e.g. the product purity is being increased by, at least, for 2–3%, in comparison with the MNX industrial catalyst).

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*Materials of Conferences***RECEPTION OF ECOLOGICALLY CLEAN DIESEL FUEL BY THE OZONOLYSIS METHOD OF MIDDLE-DISTILLATE OIL FRACTIONS**

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The diesel fractions of the «Zhanazhol» deposit oil and commercial diesel fuels have been chosen as the object of researching. Physical and chemical characteristics of the researching object are defined: density at 20°C – 798,6 kg/m³, Iodic number – 28,88, S – 0,1002%, (°C) T_{filter} – (-36,1), T_{turbid.} – (-31,0), T_{freez.} – (-42,2), Fractional composition: (°C) 10% – 147, 50% – 217, 90% – 275. The cetane index (by formula) – 51,7, the cetane index (by n-anogram) – 51,5.

Thiophene compounds and polycyclic aromatic structures in their composition demanding a high pressure and the hydrogen pressure hinder to effective process of such diesel fractions hydroforming.

In our opinion, in connection with above mentioned, there is actual searching of alternative ways of simplification and optimization of the given kind of raw materials reprocessing, i. e. ways which largely would allow to cut expenses on them ennoblement, by way of the specified components (sulphurous compounds, olefins, polycyclic aromatic hydrocarbons) transfer in other classes compounds which can be valuable products for the further reprocessing. Preliminary ozonizing of raw materials can be one of such methods.

The temperature and ozone specific expense influence to physical and chemical characteristics of diesel fuels are defined.

Generalization of the received data on physical and chemical characteristics was spent in comparison with the data on direct hydrogenation and ozonolysis of diesel fractions. With increase of an ozone-air mixture rate the cetane number raises: 51,9 < 52,6 < 54,5 < 54,6 < 54,8 < 54,9 < 55,01 < 55,02 < 55,05. Conversely, in the process of ozonizing the density decrease is observed: 0,803 > 0,801 > 0,800 > 0,799 > 0,798 > 0,797. Iodic number, accordingly, in initial diesel fuel – 28,8, after hydrogenation – 28,0, and after ozonizing has considerably decreased – 26,4 (0,125 l/min, 30 min) > 22,0 (0,5 l/min, 60 min) > 26,4 (0; 1,24 l/min, 30 min). The improvement of diesel fuel fraction composition is observed in connection with alteration of cetane number. At ozonizing initial temperature of boiling of all diesel fractions has in-

creased, °C: 147 < 160 < 167 < 169 < 171 < 174 < 179, and the density, on the contrary, decreases: 0,803 > 0,801 > 0,800 > 0,799 > 0,798 > 0,797. Iodic number decreased after ozonizing – 21,2.

As the results of researching show, the content of sulphur decreases from 0,1 to 0,04 weight. % at realization of ozonizing process in optimum conditions (0,125 l/min, 60 min) on Ni-Re catalyst

Further the cycle of experimental researches on an establishment of ozonizing process parameters influence on change of diesel fuels functional groups is spent. Initial composition of once-run diesel fraction and commercial diesel fuels taken by the object of research have defined by the method of infrared spectroscopy. The IR-spectrum of once-run fraction from a «Zhanazhol» deposit is determined in the following absorption areas: 3000–2800 cm⁻¹ interval (alkanes), 1460,29 cm⁻¹ interval (arenes), 1377,63 cm⁻¹ (methylbenzenes), 722,55 cm⁻¹ (cis-dienes). The IR-spectrum of commercial diesel fraction is determined in the following absorption areas: 3000–2800 cm⁻¹ interval (alkanes), 1377,41 cm⁻¹ (methylbenzenes), 812,63 cm⁻¹ (alkylchlorides), 722,48 cm⁻¹ (cis-dienes), 699 cm⁻¹ (alkylbromides), 740,98 cm⁻¹ (cis-dienes). Analyzing composition of synthetic diesel fuel we have found out that hydrocarbons of normal structure which nuclear number is equal C₁₄–C₁₅ and C₁₂–C₁₃ is included into its composition together with C₁₀–C₂₄ hydrocarbons.

Thus, the conducted researches have shown possibility of preliminary transformation of the once-run diesel fraction basic components in compounds of other classes under the effect of ozone that will exert positive influence on the process of diesel fuels hydroforming.

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THE «KENDERLYK» DEPOSIT SLATE OXIDATION BY THE NITRIC ACID AND THE AIR OXYGEN

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The present work is devoted to oxidation (by the air and the nitric acid) of combustible slates of the «Kenderlyk» deposit which are notable for big ash content (up to 75%). The enriched slate with organic mass (SOM) on the order of 53–55% was used for oxidation.

The characteristic of the flotation concentrate: humidity – 0,7%; on a dry concentrate, %: ashes – 47,3; volatile matters – 45,3; general sulphur – 1,0; carbon – 42,8; hydrogen – 6,5.

The oxidation was spent in the three-necked round-bottomed flask with the 1 liter capacity supplied with the reverse refrigerator, thermometer and a mixer on interchangeable ground glass joints. In the beginning 60% nitric acid was infused (on the basis of kerogen oxidation to amber acid), and then a concentrate entered by portions at continuous interfusion of suspension by a mixer then electroheating has on and temperature of a reactionary mix was lead up to 90°C. Duration of experience was from 6 till 8 hour. Experiences were spent as with preliminary extraction of high-molecular matters of acidic character from organic mass of slate by boiling with 10% solution of alkali during 3–4 hours, and without it. At small time of oxidation insoluble acids were formed which were situated on the surface of the acidic solution in the form of the resin substance which were exposed to the further oxidation.

96,3% of SOM are oxidized at processing of the enriched slate by nitric acid during 8 hour. 85,7% of high-molecular acids (soluble in water alkali), about 1,9% of a benzene extract, 12,4% of an etheric extract and 24,1% of an n-butyl alcohol extract are formed at that. The exit of volatile acids in all experiences makes less than 1% that point at soft conditions of process, i. e. on deep destruction of organic matter of slates.

The oxidation of Kendrylyk slate by air oxygen was spent in a column of bubbling type. In the end of experience unoxidized slate and a mineral part has separated from soluble products of oxidation by the filtration, washed out by water, dried up and their exit has defined. Soluble products of oxidation (salt of organic acids and surplus of alkali) were neutralized by hydrochloric acid to pH = 2.

Filtered, laid-down in a bottom «high-molecular acids» has dried and their exit has defined. Volatile acids with water steam has distilled from a filtrate, and the remainder has extracted by ethylacetate. An exit of oxidation products (on oxidized SOM) is following (%): High-molecular acids – 48,2; Volatile acids – 7,8; Nonvolatile acids (an ethylacetate extract) – 34,5.

The volatile acids from a water solution was extracted by the sulfuric ether. The extract was dried, and the ether was distilled. The driven out acids were dispersed on rectifying column under atmospheric pressure. Almost 80% of acetic acid has been received as a result of rectification. The others 20% fall on propionic, isobutyric, isovalerianic and enanthic acids.

In such a manner it is shown that at SOM of Kendrylyk slate oxidation by nitric acid and air oxygen high-molecular, middle-molecular and low-molecular acids are formed. Volatile acids basically

consists of acetic acid. The exit of oxidation products depends on reaction conditions.

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THE ASSIGNMENT TO HAZARD CLASS (TOXICITY) OF INDUSTRIAL WASTE CHEMICAL ORIGIN DESIGN BY THE ESTIMATED METHODS

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The collection, accumulation, storage, waste transportation safe conditions in the buildings, on the objects' territory, in the surrounding environment are defined by the hazardous waste class, by the packing method, with due regard for the aggregation state, and the cargo safety. The hazardous waste class (e.g. the grade) for the surrounding environment, the human surrounding environment, and the human health are also taken into account at the challenges dealing with the opportunities and the technologies (e.g. the methods) of their handling, processing, use, disposal, neutralization, and location. In addition, the set for further withdrawal of the hazard class has become the basis for the fee standard establishing for the waste units disposal.

The hazardous waste class (e.g. grade) establishing procedure for the surrounding environment (e.g. hereinafter – SE) is practically such the complex and the controversial solvable challenge, which inevitable has been become the intractable disputes cause between the economic entities and the corresponding economic players, having defined the hazardous waste class, and also by the state bodies of the enforcement authorities, having coordinated the already obtained results and their findings.

Thus, the whole complexity and the ambiguity of this procedure is associated with the «Hazardous Waste Assignment Criteria, Classified as the Dangerous Classes for the Surrounding Natural Environment», methodological apparatus, having approved by the MNR Order of Russia, dated from 15.06.2001, №511 (hereinafter – the Criteria), and «The Sanitary Rules for the Hazardous Class Determination of the Production and Consumption Toxic Wastes» SR 2.1.7.1386-03, having approved by Resolution of the RF Chief State Sanitary Doctor, dated from 16.06.2003, №144 (hereinafter – SR 2.1.7.1386-03). So, according to the first normative and the regulatory document (e.g. the Criteria), the wastes, depending on the negative impact extent on the SE, have already been divided into the five classes of the risk: from the extremely dangerous ones (e.g. the I-st class) up to practically almost non – hazardous ones (the V-th class). Then, according to the second normative and the regulatory

document (e.g. SR 2.1.7.1386-03), the wastes, according to their toxicity degree on the surrounding environment and the human health, have already been divided into the four classes: from the extremely dangerous ones (e.g. the I-st class) up to the low – hazard ones (e.g. the IV-th class).

According to all these documents, it has been provided, that the hazardous wastes class definition is carried out by the estimated and (or) by the experimental method, having accredited for these purposes by the organizations. So, the division into the classes of the hazard is carried out by the quite different and the various criteria – by the ecological ones in the Order №511 and by the toxicological ones in the SR 2.1.7.1386-03 (e.g. for the surrounding environment and the human health).

Moreover, it has not been determined the correlation between the ecological and the toxicological standards in none of the normative and the regulatory document for the calculation method, which is manifested in the Wi setting: the ecological risk extent factor of the i -th wastes component for the first document, and the component hazard extent coefficient for the second document. So, the primary indicators system, in the first case, is provided for the 19 positions, having reflected the risk value (e.g. the wastes hazard extent ratio for the SE). There are – up to the 23 ones in the second document, which the most complete and true and fair is reflected the risk value (e.g. the cumulative hazard index).

The Federal Classification Wastes Catalogue (e.g. having approved by the RF MNR Order, dated from 02.12.2002, №786) together with the amendments thereto, dated from 30.07.2003, №663 is marked, among the most significant existing documents, within the framework of the current legal – normatively and handling treatment with the production and the consumption wastes. So, this document has been generated, as at the Federal level document, where the existing differences among the RF subjects are not considered in the technological processes and the nature conservation, and the environmental issues regulations.

A number of the industrial wastes the hazard class is required the regional substantiation, because of the extreme climatic – naturally peculiarities and the characteristics features of the region. As it is well known, the Tyumen region – is the only region of Russia, having extended (e.g. together with its autonomous districts) from the Arctic Ocean in the North up to the Southern state border, that having caused to the quite various and the different climatic – naturally peculiarities and the characteristics features: the Arctic and the sub – Arctic climate in the North, and the moderate one – just in the Center and the South of the region. From this point of view, the hazard class study a number of the industrial wastes heat power engineering and its industry is of the interest, with due regard for the technological processes in adherence to the Federal requirements established, and, if necessary, its adjustment to the region's conditions.

Within the framework of the existing work, the material has been chosen for the hazard class to be assessed and to be analyzed, which is the organic nature representative – the HEPS (e.g. the heat electric power station) industrial waste, having generated in the production, as the cooling systems refrigerant – the ethylene glycol remnants, which has been lost all the consumer properties. In accordance with the GOST (e.g. the State Standard Specification) 28084-89, «The Fluids, Having Cooled the Low – Freezing» cooling fluids (e.g. hereinafter – CF), by its main parameter – the necessary resistance to the extreme low temperatures, having characterized by the crystallization commence temperature, are made of the several types of the industry: the CF-K, the CF-65, and the CF-40. In addition the ethylene glycol coolant, the anticorrosive, the antifoaming, the stabilizing additives and the dyes stuff are added into the CF.

The ethylene glycol optimum concentration in the cooling fluid is made 50–60% (e.g. the recommended ones for the ethylene glycol working ratios applications – from 35 up to 70%). The other components concentrations – are the water (e.g. \approx 40–50%), the modifying additives (e.g. 2–5%), and the dye stuff (e.g. the low dose). So, the ethylene glycol and the water mixture is quite different by the fact, that its crystallization temperature is quite depended upon these both components ratio. Then, it is significantly lower at the mixture, than, separately, at the water and the ethylene glycol. The lowest value, that is the freezing temperature, is corresponded to the composition, in which by the mass of the ethyl glycol is 65%, and the water is 35%. So, the ethyl glycol and the water mixture in the 52:47 proportions has already been adopted for the wastes assignment to the hazard class (e.g. the toxicity) in the South of the Tyumen region.

So, this type of the wastes choice has been based on the fact, that the Federal Law implementation №89 «On the Production and Consumption Wastes» by the Head Office of the GN and OOC MNR of Russia for the Khanty – Mansiysk Autonomous District the Order, dated from 16.06.2004., №75–7 «On the Approval of the Approximate Component of the Hazardous Wastes Composition, Having Presented in the FWCC, which Are Not Subjected to the Class Risk Confirmation for the Surrounding Environment», which this type of wastes is not included in, has been published, and it is operated today. In addition, the waste is the specific one, and it, moreover, is presented the very serious and the severe toxicological and the environmental hazard, and as for the surrounding environment, well as for the human health, and it also is created the challenges in the matters of the economic – technically regulation: the utilization (e.g. method) technology choice, and the payments calculation for the hazardous wastes disposal.

Thus, the ethylene glycol is presented itself the viscous, which is quite similar with the glycerine, the colorless liquid, which, in addition to the freeze-

ing temperature point depression, it is resulted in to be increased the CF boiling temperature, that it is the additional benefit in the cars use in the warmer seasonal months. So, the concentrated ethylene glycol is the toxic, the $MPC_{s.f} = 5,0 \text{ mg/m}^3$, $MPC_w = 1,0 \text{ mg/l}$ (e.g. c.-т.). It has the narcotic effect. If ingested inside, it can cause the chronic poisoning with the subsequent injure to the vital – important human organs (e.g. it is in effect on the blood vessels, the kidneys, and the whole nervous system). So, the lethal dose at the single oral administration is made up 100–300 ml ethylene glycol. (e.g. 1,5–5 ml per 1 kg of the human body weight). There are, moreover, the suspicions on the carcinogenic effect possibility of the ethylene glycol, that is why, the works on its filling just into the circuit cooling system and its further utilization, and the necessary disposal are efficiently conducted by the experts, the specialists, and the professionals.

So, it was found, according to the presented data by FWCC, that the ethylene glycol remnants and residues, which had been lost all the consumer properties, are described and characterized by the estimated method, as the third class of danger wastes. Moreover, it will also be required the necessary calculation carrying out for the hazard class determination of the production and the consumption toxic wastes. Thus, the results of the estimated determination of the hazard class (e.g. toxicity) of the wastes from the thermal power plant (TPP) technological process, having situated in the South of the Tyumen region, will be allowed to be drawn the conclusion on the regional technological processes and the nature conservation, the nature protection, and the environmental issues assignment by the Federal requirements, in terms of these types of the wastes treatment.

All the necessary calculations have already been conducted for this purpose, according to the estimated methods of the Order №511 and the SR 2.1.7.1386-03 on the specific class of the hazard (e.g. toxic) wastes determination of the already selected industrial wastes of the Tyumen HEPS-1.

The wastes assignment to the class for the surrounding environment by the estimated method is carried out on the basis of the K indicator, having characterized the hazardous wastes degree during the surrounding environment impact, having calculated by the substances indicators sum, having made

up the (K_i) wastes, where K – the hazardous wastes degree index for the SE. So, the wastes components list and their quantitative content are installed by the composition of the raw materials and its processing technological processes, or by the quantitative chemical analysis results. Then, the K_i index of the waste component hazardous degree for the SE is calculated by the following formula 1:

$$K_i = C_i/W_i \quad (1)$$

where C_i – the i -th component concentration in the hazardous wastes (e.g. kg/kg of the wastes); W_i – the environmental risk degree factor of the i -th wastes component – the conditional indicator, which is numerically equal to the wastes components amount, below the value, which it does not have the negative impacts upon the SE.

Their environmental risk degrees for the various and the different natural surrounding environments are established for the W_i factor determination for each component of the wastes. According to the established degrees of the wastes components environmental risk in the different and the various natural surrounding environments range, the relative parameter of the wastes component risk is calculated for the SE (X_i), where X_i – is the relative parameter of the wastes component risk. The W_i factor value is quite depended upon the X_i and the Z_i ones, where Z_i – is the unified relative parameter of the environmental hazard.

Thus, the assignment to the hazard class of the production and the consumption toxic wastes by the estimated method is carried out on the basis of the K index, having reflected the hazardous wastes total index at the impact upon surrounding environment and the human health, also, having calculated by the substances indices sum, that are made up the wastes (K_i), i.e. analogously to the expression by the formula (1). So, for the whole list of the components wastes constituents the coefficient calculation of the W_i wastes component risk degree is already carried out quite without the Z_i intermediate parameter, and directly through the X_i , where X_i – is the average parameter of the wastes component hazard.

The recommended ranges comparison, in terms of the K index, in assignment to the hazard class, according to the Criteria and the SR 2.1.7.1386-03 has been shown in the Table 1.

Table 1

The Compliance with the Key Acting Estimated Methods for the Specific Hazard Class

The Order № 511, dated from 15.06.2001		The SR 2.1.7.1386-03	
The wastes hazard class	The degree index of hazardous wastes for SE	The waste hazard class	The wastes hazard total index
I	$10^6 \geq K \geq 10^4$	1	$K > 50\ 000$
II	$10^4 \geq K \geq 10^3$	2	$50\ 000 > K > 1\ 000$
III	$10^3 \geq K \geq 10^2$	3	$999 > K > 100$
IV	$10^2 \geq K \geq 10$	4	$K < 100$
V	$K < 10$		

Within the framework of the carried out hazard class determination (e.g. toxicity) of the ethylene glycol residues and the remnants by the estimated

method, having lost the consumer properties, the following values have already been established, having given in the Table 2.

Table 2

The Ethylene Glycol Residues and Remnants Hazardous Class Comparison, Which Has Been Lost the Consumer Properties, Having Obtained by the Estimated Methods, and Having Been Established by the FWCC

	The Document, confirming the wastes assignment to the hazard class		
	The Order № 511	The SR 2.1.7.1386-03	FWCC
The wastes hazard class	IV	2	3

So, it has been found, in accordance with the established estimated methods of the departmental documents, according to the hazard class and the wastes toxicity definition, that the K index resulting value is not confirmed the assignment of the K studied wastes to the third class of the risk for the surrounding environment, and, at the same time, it is referred the wastes to the second class of the toxicity for the surrounding environment and for the human health.

In order to be confirmed the hazard class, having obtained by the estimated method, it is recommended the obligatory procedure of the experimental method, which is consisted in the environmental toxicity laboratory study of the analyzed samples with the biological objects application, that are made it quite possible to be determined the envi-

ronmental wastes toxicity under the controlled reproducible conditions. So, the estimated valuation results of the hazard class (e.g. toxicity) ethylene glycol residues and remnants, having lost the consumer properties and its characteristics just from the technological process of the Tyumen HEPS-1, are shown the discrepancy for the regional technological processes, the nature conservation, and the environmental issues in the aspect of the Federal requirements, in accord of the reliable assignment to the risk class of the wastes indicated type on the given territory.

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PASSIVE-ACTIVE OSCILLATION CONTROL FOR HIGH-RISE STRUCTURES

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The oscillation control system for high-rise constructions presupposing structural rigidity adjustment is proposed. Passive elements – diagonal links with hydraulic dampers. They supplement an active part of a control system, increasing reliability of control with construction oscillations. In the active system the oscillation control is executed by electric hydraulic actuators. The active system comprises a subsystem of measurement and estimation of state variables and of identification of disturbing effects at incomplete information. Control subsystem providing optimal the control law. Mathematical model of the object with built-in control links and electro-hydraulic actuators (EHA) have been set up. For formation of the optimum control law the theory of variation calculus is used. Effectiveness of the proposed vibration control system under seismic impact on the structure and at different design concept of passive-active communication has been studied.

Keywords: high-rise structures, oscillation control, seismic and wind loads, electric hydraulic actuators

For suppression of undesirable fluctuations of high-rise constructions we use a control system with additional links.

The oscillation control for high-rise structures is formed on the basis of requirements to the systems of extinguishing oscillations of civil engineering structures [1]

Passive elements add to the active system increasing the reliability of the total construction control system. In the active system the oscillation control is executed by electric hydraulic actuators. The active system comprises a subsystem of measurement and estimation of state variables and of identification of disturbing effects at incomplete information. Control subsystem providing optimal the control law.

Let's consider a high-rise structure, equipped with additional connections (Fig. 1). Stress-deformation state of the structure is described by means of the differential equation system in partial derivatives. By means of variation methods (eg. the finite element method)) the problem of researching the stress-deformation state is reduced to the system of ordinary differential equations. For a general disturbing effect case the structure's movement is described through the following equation [2]:

$$\begin{aligned} \mathbf{M}\ddot{\mathbf{q}}(t) + \mathbf{K}(t)\dot{\mathbf{q}}(t) + \mathbf{H}(t)\mathbf{q}(t) \\ = \mathbf{B}_F\mathbf{F}(t) + \mathbf{B}_R\mathbf{R}(t), \quad (1) \\ \mathbf{q}(t_0) = \mathbf{q}_0, \end{aligned}$$

where \mathbf{M} , \mathbf{K} , \mathbf{H} – are the inertial, dissipative and stiffness matrixes of the object; $\mathbf{q}(t)$ – vector of generalized coordinates of the structure; $\mathbf{F}(t)$, $\mathbf{R}(t)$ – determinate vector of disturbing and controlling effects respectively; \mathbf{B}_F , \mathbf{B}_R – are distribution matrixes of disturbing and controlling efforts in the construction respectively.

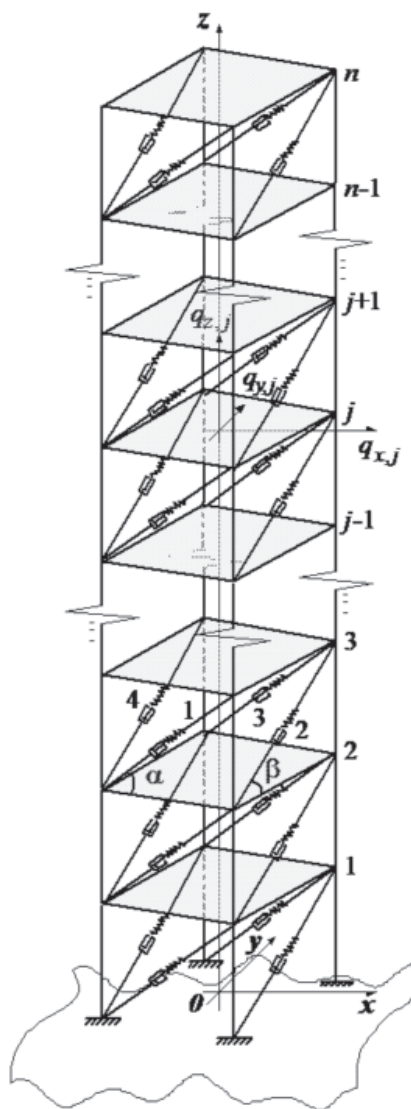


Fig. 1. Design of a high-rise structure equipped with passive-active connections located on all sectional views

A mathematical model of the electric-hydraulic actuator complex is described by the differential equation [2]

$$\mathbf{E}\ddot{\mathbf{R}}(t) + \mathbf{G}\dot{\mathbf{R}}(t) + \mathbf{D}\mathbf{R}(t) = \mathbf{N}\mathbf{U}(t), \quad (2)$$

where \mathbf{E} , \mathbf{G} , \mathbf{D} , \mathbf{N} are diagonal coefficient matrixes; $\mathbf{U}(t)$ a stress vector, given to the actuators inputs.

Combination of equations (1) and (2) allows to obtain a close system of differential equations of the controlled structure

$$\dot{\mathbf{X}}(t) = \mathbf{A}\mathbf{X}(t) + \mathbf{B}_x^F \mathbf{F}(t) + \mathbf{B}_x^U \mathbf{U}(t). \quad (3)$$

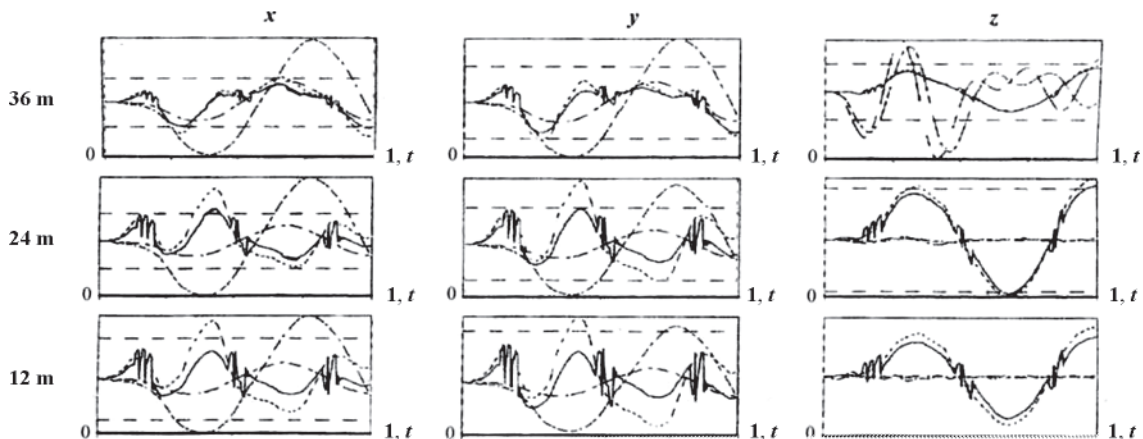


Fig. 2. The comparative analysis of passive and active damping of one period of fluctuations:

- level of admissible fluctuations;
- construction with system of rigid communications;
- construction with system of the rigid communications equipped «a hydraulic spring»;
- .-.-.- construction with system of the communications equipped hydraulic damper with a throttle;
- construction with system of is passive-active communications

Vector of optimal control stresses $\mathbf{U}(t)$ is defined from quadratic functional minimum

$$2\Phi = \mathbf{X}^T \mathbf{V}_3 \mathbf{X}|_{t_1} + \int_{t_1}^{t_2} \varphi(\mathbf{X}, \dot{\mathbf{X}}, \mathbf{U}) dt \rightarrow \min,$$

where

$$\varphi(\mathbf{X}, \dot{\mathbf{X}}, \mathbf{G}) = \mathbf{X}^T \mathbf{V}_1 \mathbf{X} + \mathbf{U}^T \mathbf{V}_2 \mathbf{U} + 2\mathbf{L}^T (-\dot{\mathbf{X}} + \mathbf{A}\mathbf{X} + \mathbf{B}_x^F \mathbf{F} + \mathbf{B}_x^U \mathbf{U});$$

$V_1(t)$, $V_2(t)$ is a nonnegatively definite symmetric matrix, $V_4(t)$ – a positively definitely symmetric matrix.

The solution is obtained in the form

$$\mathbf{U}_{\text{opt}} = -\mathbf{V}_2^{-1} (\mathbf{B}_x^U)^T \mathbf{L};$$

$$\frac{d}{dt} \begin{bmatrix} \mathbf{X} \\ \mathbf{L} \end{bmatrix} = \begin{bmatrix} \mathbf{A} & -\mathbf{B}_x^U \mathbf{V}_2^{-1} (\mathbf{B}_x^U)^T \\ -\mathbf{V}_1 & -\mathbf{A}^T \end{bmatrix} \begin{bmatrix} \mathbf{X} \\ \mathbf{L} \end{bmatrix} + \begin{bmatrix} \mathbf{B}_x^F \mathbf{F} \\ 0 \end{bmatrix}$$

using boundary conditions [5]

$$(\mathbf{L} + \mathbf{C}^T \mathbf{V}_3 (\hat{\mathbf{z}} - \mathbf{C}\mathbf{X}))|_{t_2} = 0;$$

$$\mathbf{L}(t_2) = \mathbf{V}_3(t_2) \mathbf{X}(t_2).$$

Numerical experiment

Numerical study of control system is presented by the example of a high-rise struc-

ture – tower-type headgear. A mass reinforced concrete tower-type headgear erected in the sliding form 120 sm. high and plan sizes 21×21 m was subjected to seismic impact with oscillation strength of 7 grades with direction cosines $\cos x = 35^\circ$, $\cos y = 55^\circ$, $\cos z = 45^\circ$ relative to global coordinate system. Impact frequency resonates with the structure's main vibration tone. Control system sensors and additional links are set on the marks 12, 24, 36 m, providing its observability and controllability relative motion of the tower-type headgear on the mark 36 m by axes x exceeds allowance by 8 times, by axes y – 6 times, by axes z – by 1,5 times; on the mark 24 m by axes x – 7 times, by axes y – 6 times, by axes z – 1,3 times; on the mark 12 m by axes x – 6 times, by axes y – 5 times, by axes z – doesn't exceed.

Conclusions

Analysis of numerical modeling outcomes provides the following conclusions:

– using rigid links and links equipped with «hydraulic spring» alternates frequency characteristics of a building and allows to avoid resonance by reducing vibration amplitude but it does not protect the structure from failure;

– using passive links with hydraulic vibration absorber changes the frequency characteristic of the structure reducing vibration amplitude significantly, That being provided, the links maintain serviceable condition and the building does not collapse. As a result of reducing general link rigidity the required full vibration suppression of the multidimensional structure is not achieved;

– using active links reduces vibration amplitude of the structure down to allowance level and maintains the building's integrity vibration amplitude significantly.

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*Materials of Conferences***ANALYSIS AND RESISTANCE ENSURING TO MECHANICAL INFLUENCE OF ELECTRONICS STRUCTURES MOUNTED ON VIBRATION ISOLATORS (ASONIKA-V)**

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Method for automated synthesis of electronic structures on vibration isolators, resistant to mechanical influence.

The basis of this method is an electronic model (EM) of electronic structures that is stored in a PDM-system ASONIKA-UM, which is part of ASONIKA. Electronic model is a single space of parameters and variables of the model range. It is reflecting the design and technological implementation of the individual parts or the electronic structure in general. EM is the result of design and comprehensive research of electronic structure features by means of mathematical modeling which is carried out, in turn, within the information («electronic») collaboration between developers at any stage of product's life cycle using CALS-ideology. An important component of the method is a reference database that stores the characteristics of typical vibration isolators and materials of the structure.

The proposed method allows for the automated synthesis and analysis of electronic structures on vibration isolators in order to ensure their resistance to mechanical influence:

1. On the basis of three-dimensional electronic structural model is to build a model structures in the subsystem ASONIKA-V.

2. Entering experimental characteristics obtained during the research of electronic structures using an automated shaker.

3. Identification of vibration isolators' unknown parameters on the basis of the experimental characteristics of structure.

4. Entering vibration isolators parameters. At this stage, the automatic import of the parameters obtained from the identification or selection of standard vibration isolators from the reference database (DB). At this stage, dependency from the temperature parameters can be adjusted using the results of the thermal calculation in the subsystem ASONIKA-T.

5. Structure optimization stage. At this stage, the structure synthesis is automated to meet the requirements specified in the technical documentation (TD).

6. Parametrical optimization. At this stage, based on the use of optimization techniques, the automated selection of vibration isolators' mechani-

cal properties occurs, which is needed to meet the requirements of the TD.

7. Structural synthesis of the structure. At this stage, the vibration isolators' automatic variation and location of their coordinates occurs in order to meet the requirements of the TD.

8. Multi-level vibration insulation is used in case of inability to meet the requirements of TD as a result of the above methods of finding the best embodiment. At this stage in an interactive mode changes are made in the design of electronics.

9. Analysis of the resulting design and obtaining the calculation results in the form of graphic dependences of the acceleration amplitudes and the frequency displacements or exposure time. At this stage, the calculation results can be obtained for the transmission to ASONIKA-M subsystem.

10. The analysis of results and decision making. If the received electronic design characteristics do not meet the requirements of the TD, then changes are made to the electronic model, then the process of analysis and design synthesis repeats.

The organization of an automated subsystem ASONIKA-V.

Based on the above-described method of the electronic structures synthesis, an automated subsystem ASONIKA-V has been developed. This subsystem is designed to analyze the mechanical characteristics and synthesis of cabinets structures, racks and blocks electronics, mounted on vibration isolators, under the influence of harmonic vibration, random vibration, shock loads, linear acceleration, under the influence of acoustic noise, as well as complex mechanical influences and decision-making on the basis of the mechanical characteristics in order to ensure structures stability of electronic to mechanical stress. The design may include a variety of elements in the form of rectangular parallelepipeds with different dimensions and can also be applied to multi-level vibration isolation. According to the results, the subsystem user can obtain output information on the accelerations and displacements of structural elements of electronic on vibration isolators.

Program implemented problems of parametric and structural synthesis:

1) the possibility of optimal choice of the coefficients of mechanical losses (damping), and stiffness vibration isolators on all axes;

2) the possibility of optimal choice of the coordinates of the location and number of vibration isolators.

The main condition is not exceeding the allowable accelerations in the structure (usually the allowable accelerations of electronic components with different mechanical influences). Implemented

the problem of identifying the unknown mechanical properties of vibration isolators with computer measuring shaker.

Computer modeling of mechanical processes in electronic structures on vibration isolators is necessary for:

- to verify the stability requirements of the electronic structure on vibration isolators under specified mechanical conditions;
- to identify the opportunity to reduce the weight and the dimensions of electronic structure on vibration isolators;
- to improve the electronic structure's stability to mechanical influences by setting the parameters of vibration isolators, their number and location coordinates;
- to create a program of laboratory and acceptance testing of electronic structures on vibration isolators and to verify whether it will pass those tests.

Automated subsystem is expedient to use in the development of electronic structures that work under the influence of vibration, shock and acoustic noise in a wide range of frequencies.

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AN AUTOMATED SYSTEM FOR ENSURING THE RELIABILITY AND THE QUALITY OF THE EQUIPMENT (ASONIKA)

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An automated system for ensuring reliability and quality of the equipment (ASONIKA) can help realize computer-aided design and an integrated computer simulation of highly reliable radio electronic means (REM) of moving objects in accordance with the requirements of CALS-technologies at the stages of engineering-production-exploitation.

Operation of onboard REM is characterized by combination of rigid external factors that act simultaneously, which leads to a systemic failure. During testing, such failures are difficult to detect since there are no stands that would allow to fully recreate simultaneously electrical functioning processes, the accompanying thermal, mechanical, aerodynamic, radiation and other environmental effects, technological effects of random variation parameters, aging, corrosion and other degradation factors. The problem is complicated by the fact that modern REM include advanced microelectronic products with certain physical and technological features, which should also be considered in the complex mathematical modeling. All of these factors and interrelated effects must be properly taken

into account during the technological engineering that can only be performed by a computer. In this case, the causes of system failures can really be pre-identified and eliminated and high reliability of the REM is provided.

ASONIKA is designed to solve four major problems existing in the development of modern REM:

1) the problems of preventing possible failures during the operation in the early stages of engineering due to the complex modeling of heterogeneous physical processes;

2) the problems of human safety when flying on airplanes (prevention of crashes) due to complex automated analysis system based on the control of the aircraft created an electronic model for all types of external destabilizing factors, including those in critical conditions;

3) the problems of reducing time and costs of the engineering due to availability of equipment offered to a developer by software and the adequacy of the modeling results;

4) the problem of automating workflow, and creating an electronic model of a product offered by the integration of software tools within the PDM-system storage and management of engineering data and product lifecycle management (equipment).

ASONIKA – Russia's first automated system for complex modeling of physical processes in the electronic equipment that is recommended to replace the testing of electronic equipment modeling in the early stages of engineering, which allows you to create competitive equipment in the shortest possible time and with minimal costs.

The developer of the system ASONIKA is «Scientific school of modeling, information technology and automated systems». The founder and leader of the scientific school is Prof. A. Shalumov. The basic principle of the scientific school – unity of 4 components: Education – Science – Manufacturing – Business. Scientific school has published over 300 books, manuals and articles.

ASONIKA has no analogues in Russian Federation. The information about any foreign analogues is missing from the press.

ASONIKA system is used in many Russian companies that are developing electronic devices. Use of ASONIKA in the engineering and the technical expertise of prototype electronic means allows to reduce the complexity of the project research (in some cases up to 35–40%), improve the quality of the samples (above all – their reliability because of early detection and elimination of preconditions to failure, associated with the irrational schematic and engineering decisions), cost savings by reducing the amount of work needed to create and to study the models, reduce the volume of all types of tests (up to 10–15%).

The methodological basis for solving assigned tasks is developed scientific principles of mathematical field modeling theory and processes of different physical nature, interacting with each other

in a single heterogeneous environment, and system methods of sensitivity theory.

Within the automated system ASONIKA, special software package is implemented that creates the electronic (virtual) structure of developed REM layout, which fills this structure with results of problematic subsystems (subsystems can simulate the thermal and mechanical processes in equipment, analyze the reliability, and also allow integration with known systems of the topological design of printed circuit boards and known CAD-systems).

The software package controls the display of model experiments results on the geometric model, which is part of the electronic layout, and also converts the electronic layout after it is processed into ISO 10303 STEP format. The data included in the electronic model is used in later stages of the REM's life cycle.

The ASONIKA system currently consists of 8 subsystems:

- subsystem analysis of the mechanical effects on the REM three-dimensional structures – ASONIKA-M;
- subsystem analysis and resistance to mechanical damage of the REM structures, installed on vibration isolators – ASONIKA-V;
- subsystem analysis and thermal characteristics of the equipment structures – ASONIKA-T;
- subsystem analysis of thermal and mechanical effects on REM printed circuit assemblies structures – ASONIKA-TM;
- subsystem of automated filling cards of the radio-frequency component (RFC) operating modes – ASONIKA-R;
- subsystem of REM reliability analysis based on actual RFC modes – ASONIKA-B;
- radio-frequency components and materials reference database on the geometrical, physical, mechanical, thermal, and electrical reliability parameters – ASONIKA-DB;
- subsystem of REM modeling management during engineering – ASONIKA-UM.

ASONIKA system includes the following converters with known CAD:

- the system modeling integration module of electrical processes in PSpice (as part of OrCAD) and subsystems ASONIKA-P, ASONIKA-B (module integration with systems such as Mentor Graphics, Altium Designere is under development);
- system integration module of PCAD, Mentor Graphics, Altium Designere, OrCAD printed circuit assembly engineering and ASONIKA-TM subsystem;
- 3-D model integration module created in the systems such as ProEngineer, SolidWorks, Inventor and other IGES and STEP file formats and ASONIKA-M subsystem.

The development of RECs electromagnetic compatibility subsystem is under way – ASONIKA – EMC and possible development of REM radiation resistance subsystem – ASONIKA – RAD.

The structure of the automated system ASONIKA provides that in the design process, in accord-

ance with the requirements of CALS-technologies, based on the subsystem data management during modeling ASONIKA-UM (PDM-systems) and with using simulation subsystems, the formation of electronic model products occurs.

With the help of a special graphics editor, electrical circuit is introduced, which is stored in a subsystem ASONIKA-UM project database and is sent as a file to the analysis system of electrical circuits PSpice (OrCAD), Mentor Graphics and Altium Designere and to the system placement and routing of printed circuit boards PCAD, Mentor Graphics, Altium Designere, OrCAD. PCAD system output files (in the PDIF format) and Mentor Graphics, Altium Designere, OrCAD (in the IDF format) are stored in the ASONIKA-UM subsystem. They are sent to the systems such as ProEngineer, SolidWorks, Inventor and others for creating schematics and saved in the ASONIKA-UM subsystem. 3-D models of REM cabinets and blocks, created in the systems such as ProEngineer, SolidWorks, Inventor and others (file formats IGES and STEP) can be also sent to the ASONIKA-UM subsystem, which are sent from it to the subsystem ASONIKA-M and ASONIKA-V to analyze mechanical processes in REM cabinets and blocks, in the subsystem ASONIKA-T and to analyze thermal processes in REM cabinets and blocks. As a result of simulation, stress, displacement, acceleration and temperature in cabinets and the blocks structures are stored in the ASONIKA-UM subsystem. Printed circuit assembly blueprints and specifications for them, as well as files in the PDIF and IDF formats transferred from the ASONIKA-UM subsystem into the ASONIKA-TM subsystem for a comprehensive analysis of thermal and mechanical processes in printed circuit assembly. In addition, the temperatures in the nodes are sent, which are obtained in the subsystem ASONIKA-T, as well as acceleration support received in the ASONIKA-M subsystem. Received as a result of a simulation, RFC temperature and acceleration are saved in the ASONIKA-UM subsystem. RFC list, files with the RFC electrical characteristics, RFC temperatures and accelerations, the results of the electromagnetic and radiation analysis obtained in ASONIKA-EMC and ASONIKA-RAD subsystems are transferred from the ASONIKA-UM subsystem into ASONIKA – B (analysis reliability subsystem). Received as a result REM reliability indexes are saved in the ASONIKA-UM subsystem. RFC list, files with the RFC electrical characteristics, RFC temperatures and accelerations are sent from the ASONIKA-UM subsystem into the ASONIKA – R subsystem (subsystem of operating modes card formation). Received as a result maps of the operating modes are saved in ASONIKA-UM the subsystem.

The system is aimed at the REM developers. With this purpose in the ASONIKA-M and ASONIKA-TM subsystems, special interfaces have been developed for input of standard structural equipment such as cabinets, blocks, printed circuit as-

semblies, which greatly simplify the analysis of physical processes in the REM. If a user is building a model of a complex cabinet's or block's mechanical processes in the usual finite-element system, for example, ANSYS, he would have to first undergo special training and gain experience that would take about a year, and then for a few hours enter the model. You do not need to undergo special training in ASONIKA system; you just need to enter in accessible constructor language that is represented in the diagram. Entering the same complex cabinet can be carried out within an hour. Thus, a full comprehensive analysis of the cabinet on the thermal and mechanical effects for each RFC (we get acceleration and temperature for each element) can be completed within one day.

ASONIKA-M (subsystem analysis of volumetric REM structures on the mechanical effects) allows the analyzing of the cassette, the cordwood and the cylindrical type blocks, cabinets, and radio electronic means and to carry out calculations of the following types of mechanical effects: harmonic oscillation; random oscillation; impact; linear acceleration. As a result of simulation, we can obtain:

- 1) acceleration dependence on the frequency and the time at the checkpoints and structure nodes;
- 2) displacement, deflection, acceleration and strain of the construction block sites and cabinets;
- 3) the deformation of blocks and cabinets;
- 4) the acceleration at printed circuit assemblies fastening points required for further analysis up to each REM in the ASONIKA-TM subsystem.

ASONIKA-V (subsystem analysis and ensuring resistance to mechanical effects of REM structures installed on vibration isolators) is designed to analyze the mechanical characteristics of the REM cabinets, racks and blocks structures, installed on vibration isolators, under the influence of harmonic oscillation, random oscillation, shock loads, linear acceleration, with effects of acoustic noises and for making a decision on the basis of the mechanical characteristics in order to ensure the stability of the equipment under mechanical loads. The subsystem has a special graphical user interface for structure on vibration isolators input. The subsystem allows for the identification of the vibration isolators parameters, as well as the optimization of their parameters in order to reduce structural loads. As a result of simulation, structure acceleration on vibration isolator's dependence on the frequency and the time can be obtained.

ASONIKA-T (subsystem analysis and thermal characteristics of REM structures) allows us to analyze the following types of structures: micro assembly, radiators and heat sinking bases, hybrid-integrated modules, cordwood blocks and cassette structures, cabinets, racks, as well as arbitrary REM structures. The subsystem allows you to analyze the stationary and nonstationary thermal conditions of the equipment, operating at the natural and forced air convection, both at normal and at reduced pres-

sure. During the analysis of arbitrary structures, selected isothermal volume temperatures are determined and graphics are displayed of temperature dependence on time for nonstationary thermal conditions.

ASONIKA-TM (subsystem analysis of REM printed circuit assembly structures on thermal and mechanical effects) allows you to analyze REM printed circuit assembly and to calculate:

- 1) stationary and nonstationary thermal conditions both at normal and at reduced pressure;
- 2) the following types of mechanical impact: harmonic oscillation; random oscillation; impact; linear acceleration; acoustic noise.

The subsystem has a special graphical user interface for structural printed circuit assembly input. As a result of a simulation, we can be obtained:

- 1) acceleration dependence on the frequency and the time at the checkpoints and structure nodes;
- 2) maximum temperatures, acceleration, and stress areas on printed circuit assemblies and radio-frequency components;
- 3) the vibration modes of printed circuit assemblies on their own frequencies;
- 4) radio-frequency components' maps of thermal and mechanical modes.

ASONIKA-B (subsystem REM analysis and reliability) allows you to analyze cabinets, power, printing nodes, RFC and perform the following tasks:

- 1) determination of reliability of RFC;
- 2) justification for and evaluation of reservation REM.

The subsystem supports:

- 1) The passive reservation with a constant load;
- 2) actively loaded reservation;
- 3) active unloaded reservation;
- 4) actively facilitated reservations.

As a result of simulation, we can obtain: the operational failure rate, the probability of failure-free operation and REM mean time between failures. The subsystem allows you to import data structures from other computer-aided design (CAD) systems. The subsystem allows you to import RFC thermal and electrical characteristics from other ASONIKA subsystems. Supplemental data base radio-frequency components (RFC) and the materials on the geometrical, physical, mechanical, thermal, and electrical reliability parameters – ASONIKA-DB provides information:

- 1) the parameters of materials;
- 2) the parameters RFC. ASONIKA-DB consists of main and supplementary tables.

The main tables contain the following information:

- 1) the material parameters of the printed circuit assemblies, load-bearing structures, the RFC output and varnishes (adhesives) used in the installation RFC on the circuit boards: mechanical, thermal, admissible, the temperature dependence;
- 2) the optical properties of radio-frequency component construction;

3) RFC parameters: RFC classes and groups; types of RFC and specifications; full conditional entries of RFC; the parameters in the full conditional entry and their possible values; the installation options RFC on the printed circuit board; RFC model installation options; RFC geometric, mechanical, thermal, electrical, reliable, available options, RFC images on a plane and in space;

4) the mathematical model for calculating the values of the RFC operational failure and the coefficients values of the reliability model;

5) the vibration isolators parameters: the coefficients of stiffness, damping, and etc. Additional tables are created.

Additional tables can contain numeric, string, logical, text, graphics and functionality dependency parameters of the RFC.

ASONIKA-UM (subsystem management modeling during the REM engineering) allows for integration of CAD, embedded in the companies – Pro/ENGINEER, SolidWorks, Inventor, Mentor Graphics, Altium Designere, OrCAD, ASONIKA and etc., and manages data transfer between the subsystems during modeling in the process of REM structural engineering. The subsystem integrates with any PDM-system used in the company. During engineering, the subsystem allows to generate a comprehensive model of REM within mathematical models of thermal, electrical, aerodynamic, mechanical processes and mathematical models of REM reliability and quality.

Realization of the described integration marked the beginning of the development and implementation of CALS-technologies in the companies of electronic and instrument industries. Practical and innovative results are as follows. Integration software allows REM composite computer-aided design, based on simulation of complex physical processes. Language of user interface with software is as close as possible to the language of REM developer. The familiarization with the proposed programs requires a relatively short time. When implemented, a sufficiently high rate of modeling problem solving and significant savings of material means is attained by reducing the number of tests. Increased REM reliability and quality, engineered on the basis of the proposed integrated CAD.

Information consistency of the whole system provided at a level REM electronic model, in which information is represented as a set of information objects and relationships between them, regulated by ISO 10303 STEP, with no duplication of information. In this case, there is a need only in the interfaces between each individual subsystem and ASONIKA-UM subsystem.

These interfaces provide conversion of REM information objects electronic model, describing the original data for the target subsystem, in the project files of the subsystem and vice versa – converting project files of the original subsystem in REM information objects electronic model and their in-

teractions, regulated by ISO 10303 STEP, providing unambiguous presentation of information in an electronic model of REM.

This solution of the information consistency provides the flexibility of REM ASONIKA's system structure. Thus, during the update, replacement of existing subsystems, and the addition of new subsystems in this structure, it is necessary to change the interfaces of integration with the ASONIKA-UM subsystem that needed to be replaced or introduced into the structure. Complexity of the interfaces is defined by used as components through CAD REM software systems.

The purpose of application of the ASONIKA system is to increase the efficiency of the structural units of the company, to shorten engineering and development time of highly technological REM, and to increase reliability developed REM.

Thus, the application of the ASONIKA system will be your transition to a new level of information technology that will expand the range of products, reduce time it takes a new product to the market, reduce the number of defects and the production costs.

Suggestion:

1. The application of ASONIKA in the electronics industry companies and in universities.
2. To provide consulting services to electronic industry companies with modeling of electronic equipment on the exterior mechanical, thermal, electromagnetic and other effects with the help of ASONIKA.
3. To organize the training of specialists for working with ASONIKA system.

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COMPARATIVE EVALUATION OF TENSION THAT ARISE IN NATURAL STONE DURING ITS DESTRUCTION WITH LIQUIDS, PLASTIC SUBSTANCES, AND GADS

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To evaluate the degree of oscillation of crack that is formed in fragile environment from a straight direction, comparative research to define tension that arise in its peak and in different distances from it. Marble has been selected as the destructed material. The problem was solved considering three possible ways to impact it: with fluids, plastic substances, and also with gads trough spurs and cracks that are described by similar geometric parameters. The following data was used in the calculation:

– pressure that is necessary to create in a spur to initiate and continue the destruction process (no less) – 45 MPa;

- spur radius – 25 mm;
- length of the formed crack – 0,2 m;
- utmost stretching tension for marble – $\sigma_p = 20$ MPa;
- utmost cramping tension for marble – $\sigma_c = 160$ MPa;
- coefficients of friction against a crack walls: liquids – 0; plastic substances – 1; gads – 0;
- coefficients of a crack filling: liquids – 1; plastic substances – 0,6; gads – 0.

The objective of our calculations was to define horizontal σ_x and vertical σ_y stretching tensions. The goal was being solved using the necessary systems of differential equations of the second order that were realized in means of computer modelling Comsol Multiphysics 3.5a.

The main differential characteristics of destruction of a fragile environment by liquids are an absolute filling of cracks by the destructing matter and equal pressure degrees at all points according the law of Pascal. Hermetization of a spur collar was not considered. The calculations show that the destruction of marble with liquids goes under maximum horizontal pressured up to 102,5 MPa, and vertical – up to 110 MPa. Maximum horizontal oscillation equals ± 20 mm, and vertical – ± 75 mm per each 200 mm of the formed crack length.

The schematics of destruction of a fragile environment with plastic substances is characterized by partial filling of the formed crack with them and different pressure along its length that decreases from the peak point in accordance with the logarithmic law. Hermetization as a spur collar was not considered. The calculations show that destruction of marble with plastic substances goes under maximum horizontal pressure up to 88 MPa, and vertical – up to 110 MPa. Maximum horizontal oscillation equals ± 14 mm, and vertical – ± 75 mm per each 200 mm of the formed crack length.

The schematics of destruction of a fragile environment with gads is characterized by an absence of crack filling and impact upon the destructed object only in points of contact with the gad. In this case no destructing matter fills a spur and a crack, formed with a gad. The calculations show that destruction of marble with gads goes under maximum horizontal pressure up to 102,5 MPa, and vertical – up to 110 MPa. Maximum horizontal oscillation equals ± 20 mm, and vertical – ± 75 mm per each 200 mm of the formed crack length.

On the foundations of the circle of works we can conclude that:

1. During the destruction of marble through spurs by short cracks (up to 200 mm) with liquids or gads vertical (up to 110 MPa) and horizontal (up to 102,5 MPa) pressures that arise in a fragile environment and also oscillations of the formed cracks from their straight direction in vertical (± 75 mm) and horizontal (± 75 mm) axis are same.

2. In case of destruction of marble through spurs by short cracks (up to 200 mm) with plastic substances horizontal pressures that arise in a fragile environment decrease by 14,1% (down to 88 MPa), and oscillations of the formed cracks from the straight horizontal direction decrease by 30% (down to ± 14 mm).

3. The lowest degree of horizontal pressure that arise in a fragile environment (down to 88 MPa in marble) that is destructed with plastic substances through spurs explains the minimal interval of oscillations of the formed cracks from a straight direction in vertical axis (down to ± 14 mm), compared to usage of liquids and gads for the same purpose.

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*Materials of Conferences***STATISTICAL ANALYSIS
OF THE DEVELOPMENT OF BEEKEEPING
IN THE CATEGORIES OF FARMS**

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Placing beekeeping in agricultural areas draws a special interest in terms of developing main directions beekeeping advancement. Therefore, a comparative analysis of the impact of area differences upon the development of beekeeping has been carried out in terms of agricultural organizations and households according to the data of Bashkortostan republic.

Typological grouping was taken at the first stage, and it has shown us the impact of area differences upon the efficiency of beekeeping production in agricultural organizations.

According to the grouping data, it has been established that only 48 of 54 districts of the republic are involved into beekeeping. About 36% of bee-families of agricultural organizations are concentrated in by-Ural plain, 32% – in the Northern forest-steppe, 20,8% – in Southern forest-steppe, and 6,6% – in North-eastern steppe. Gross production of honey to zones correlates directly with the number of bee-families, and the output of honey per bee-family shows us an opposite dependence. Thus, the highest honey output per bee-family was achieved in mountain-forest area, the second place goes to agricultural organizations of trans-Ural steppe.

The second stage was devoted to studying area conditions upon the efficiency of honey production.

The lowest production costs were registered in agricultural organizations of Mountain-forest area, and high – in agricultural organizations of North-east forest-steppe. In area terms production costs first of all depends on bee-families productivity.

Prices for honey in area terms testify for the market legislations. In Northern forest-steppe area with a high market share of honey low prices and a good profitability level was registered. An opposite dependence is typical for agricultural organizations of Mountain-forest area.

In order to study an impact of area differences upon the output of honey for households, a typological grouping was taken in terms of areas of Bashkortostan republic.

Northern forest-steppe area (I) of RB includes 14 districts, 80710 bee-families (5760 per a district). Honey production per area equaled only 3611 t, including 257,9 t per a district, and 44,7 kgs per bee-family.

North-east forest-steppe area (II) includes 5 districts. The number of bee-families equals 18466, including 3693 per a district. Gross honey production equals 850, 170 t per a district, 46 t per bee-family.

Southern forest-steppe area (III) includes 11 districts. The number of bee-families in this area is only 40634, 3694 per district. Gross production of honey for forest-steppe area equals 1647 t, 149,7 t per a district, 40,5 kgs per bee-family.

A maximum number of districts was registered in by-Ural plain (IU) – 17. The number of bee-families per this area equaled 55967, 3292 per a district. Honey production per all by-Ural plain area equaled a total of 2348, 138,1 t per a district, 41,9 kgs per bee-family.

Agricultural area of trans-Ural steppe (U) includes 4 districts. The number of bee-families here equals 5285, 1321 per a district. Honey production equaled totally 194, 48,5 t per a district, 36,7 t per bee-family.

Mountain-forest agricultural area (U1) of RB includes only 3 districts. Here the number of bee-families equaled 5660, 1887 per a district. Honey production equaled a total of 220, 73,3 t per a district, 38,9 t per bee-family.

Totally RB includes an average of 54 districts, 206728 bee-families, a district of the republic includes an average of 3828 bee-families. Honey production of the whole republic equals 8870 t, 164,3 t per a district, 42,9 t per bee-family.

The comparative analysis of area differences upon the output of honey in households and agricultural enterprises allows us to conclude:

1. The main production of honey is concentrated in areas I-IV.

2. Area differences impact an output of honey less for households, and more – for agricultural organizations.

3. According to honey output per bee-family in terms of households and agricultural organizations opposite legislations were revealed. Thus, agricultural organizations of Mountain-forest area and trans-Ural steppe reached the highest level of honey output per bee-family, while households of these areas showed the lowest indexes, and, quite opposite, agricultural organizations of North-east forest-steppe showed the lowest indexes of honey output, and households – the highest indexes of productivity.

4. The received data testify for large resources to broaden honey production in agricultural organizations of all areas of the republic, especially – trans-Ural steppe and Mountain-forest area.

5. Agricultural organizations possess significant reserves to increase bees' efficiency with organization – economic factors, both in area terms and compared to households.

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**OPTIMIZATION OF PHYSICAL
PROPERTIES OF GROUND IN FIELD
CROP ROTATIONS OF VARIOUS
SPECIALIZATION**

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Intensification of agricultural production, introduction and active usage of ground cover of black earth soils, irrational usage of different techniques of soil treatment is accompanied with destruction of structure, formation of a bigger part of blocky and largely-blocky fractions and dust, degradation in water-physical characteristics. Eventually, all that has a negative effect on growth and development of cultural plants, their productive ability decreases. And though generally sharp alterations in physical conditions of black earth are registered only during the first years after ploughing up (Y.I. Cheverdin, 2009), a quasi-balanced condition is established and temps of the soil structure destruction slows gradually (O.A. Chesnyak, G.Y. Chesnyak, 1968). In terms of significant increase in anthropogenic strain over agrocenosis, structural-aggregate composition of black earth suffers significant qualitative and quantitative alterations.

The research was completed within long-term stationary tests of the laboratory of ecological-landscape crop rotations of GNU Voronezh НИИСХ Россельхозакадемии in 2008–2010. Common mid-heavy hard-loamy black earth served as the soil of the tested area. Humus content in the layer of 0–40 cm equaled 6,5%, general nitrogen – 0,29%, general phosphorus – 0,21%, general potassium – 1,8%, easy-hydrolyzed nitrogen – 63,2 mg/kg, the sum of the absorbed bases – 68,6 mmole(equal)/100 g of soil, pH_{KCl} – 7,1. The test field was located on a territory with a slight inclination up to 10 of north-west exposition.

Fields of crop rotations with different duration of esparcet usage served as research objects. Crop rotations were the following: **rotation 1** – black fallow – winter wheat – sunflower – barley – pea – winter wheat – corn – barley – buckwheat – spring wheat (control), **rotation 2** – black fallow – winter wheat – barley + esparcet – esparcet – winter wheat – sunflower, **rotation 3** – black fallow – winter wheat – barley + esparcet – esparcet – esparcet – winter wheat – sunflower, **rotation 4** – pea – winter wheat – sunflower – barley + esparcet – esparcet – winter wheat – barley, **rotation 5** – pea – winter wheat – barley + esparcet – esparcet – esparcet – winter wheat – spring wheat – barley.

Studying alterations in physical characteristics of soils under impact of esparcet of different use period in field crop rotations with different saturation of crops was among the objectives of our research.

Research results. Structural content of the studied soils in different variants of crop rotations is

non-homogenous. It is linked, first of all, with different level and intensity of anthropogenic strain, and also environment-regulation role of each specific produced crop. In our case bean component had a significant influence upon the structural composition. It served as soil structure enhancer. And long-year bean culture – esparcet played a special part in the studied crop rotations.

The completed research of structural-aggregate condition in different kinds of crop rotations allow us to state some definite legislations. Qualitative indexes of the structure can be generally characterized as non-typical for the black earth according to all its parameters. However, analysis of the received data shows a general degradation of indexes of structural-aggregate condition under one-year crops. These alterations were conditioned by a high content of blocky aggregates. Under barley contents of blocks (fractions of more than 10 mm) altered in ploughing layer of soil in general from 8,4 to 19,0% depending on type of crop rotation. In under-ploughing horizon the part of blocky aggregates was higher and equaled 15,5–35,7%. In grain-fallow-ploughing rotation where ploughing crop served as a precedent of barley higher content of blocky fractions was typical. The part of puerescent fraction in all crop rotations was practically the same and did not depend on the type of rotation. It altered within 1,7–6,2% with higher values in root-inhabited layer.

Changes in correlation of cultures in structure of crop rotations reflected in alterations of part of each fraction in forming agronomically-valuable soil peds. Grain aggregate of size from 1 to 5 mm are a dominating fraction. Regardless the fact that the major part in contents of structural separates of size from 1 to 5 mm, differences in variants were insignificant. In the higher soil horizon in grain-fallow-ploughing rotation under barley that served as a precedent for beans, part of these fractions was so small the smallest and equaled 55,2% in average during the years of research. Bean grass had a positive impact over physical characteristics, especially in links of rotation without clean fallow. In grain rotations the part of soil peds with size of 1–5 mm increased up to 61,4–62,5%.

Mezoaggregates with soil fractions of size 5–10 mm were in a submissive condition and their quantity oscillated within 11,3–15,8% and it practically didn't depend on the type of rotation, excluding the grain rotation with one field of esparcet. The lowest content of this fraction was registered here (7,3%).

The most noticeable alterations were registered for the blocky (> 10 mm) part of the structure. In grain rotations with 1 and 2 fields of esparcet a decrease in lump fraction by 1,1–2,2 was registered. Part of the puerescent fraction for all types of rotation was relatively the same.

Alteration and regulation of structural content in soil profile during an intense agricultural production is one of the most important and hard-regulated factors that define dynamics of a soil productivity. This indicator is relatively stable. However, many

researches point out into alteration under impact of agric-technical methods. In crop rotations usage of bean long-year grass has led to an improvement in soil structure. It was conditioned by processes of coagulation of soil fractions. Therefore, data on the impact of bean component over redistribution and correlation of aggregates carries the most significant practical interest. Under one-year bean crop (pea), like under esparcet of the first year of use, the maximum part in structure of separate soil peds belonged to aggregates of size 1–5 mm.

During the branching period (growing of vegetative mass) of esparcet, mezoaggregates have become the most sensitive against impacts of the produced crops. Under one-year crop of esparcet contents of fractions of size 1–5 mm equaled 55,7–59,3%. Under two-year period of usage their part decreased down to 47,0–49,5%. At the same

time, an increase in soil fractions of 5–10 mm from 10,5–16,9 to 19,5–22,3%. Besides, an expected decrease in lump aggregates in grain-grass crop rotations took place. On contents of pulverescent fraction no significant changes were registered.

Introduction of long-years bean grass into a structure of crop rotations leads to a decrease in size growth of an average-weighted size of dry aggregates (Dc), in other words, blockiness, while preserving a very low average-weighted diameter of aggregates after watering (Dm) (table). At the same time entropy of distribution of dry aggregates (Hc) and watered aggregates under esparcet increases on the following crop. Combined with changes in Dc and Dm it means that redistribution in qualitative content of structural separates, decrease in part of pulverescent and grain fractions, and increase in mezo-fractions takes place in dry condition.

Average-weighted diameter (Dc) of soil fraction, dry sorting, 2008–2010

Crop rotation	Soil horizon	Barley, maturity	Esparcet, growth of vegetative mass	Esparcet, ploughing-up	Pea, full maturity	Winter wheat, discharge into pipe
Grain-fallow-ploughing	0–10	4,14	–	–	3,32	3,08
	10–20	4,12	–	–	4,51	3,66
	20–30	5,17	–	–	4,78	4,54
	30–40	5,07	–	–	5,17	5,77
	0–40	4,62	–	–	4,44	4,26
Many-field grass with one field of esparcet	0–10	4,05	3,21	3,16	–	4,45
	10–20	4,60	5,03	4,76	–	4,62
	20–30	4,74	5,13	4,55	–	5,37
	30–40	5,57	4,35	5,03	–	5,23
	0–40	4,74	4,43	4,37	–	4,91
Many-field grass with 2 fields of esparcet	0–10	4,39	4,22	3,92	–	4,13
	10–20	4,82	5,21	5,00	–	4,26
	20–30	4,89	4,74	5,52	–	4,56
	30–40	5,44	5,26	5,53	–	4,62
	0–40	4,89	4,86	4,99	–	4,39
Grain with one field of esparcet	0–10	3,35	3,93	3,52	–	3,82
	10–20	4,32	4,67	4,29	–	4,45
	20–30	5,33	4,81	4,67	–	5,96
	30–40	6,22	4,62	4,29	–	5,48
	0–40	4,80	4,51	4,19	–	4,93
Grain with two fields of esparcet	0–10	3,52	4,20	4,19	–	4,62
	10–20	4,96	4,78	4,97	–	5,30
	20–30	6,08	4,62	5,10	–	4,69
	30–40	5,73	4,23	4,93	–	4,98
	0–40	5,07	4,46	4,80	–	4,90

With similarities in general trends, crop rotations with many-year grass have a higher stability and ecological flexibility against an intense anthropogenic impact in comparison with grain-fallow-ploughing crop rotations. It is reflected by the fact that bean component provides not only for stabilization of humus condition, but more by

an optimization of ploughing layer of the black earth.

The work was submitted to International Scientific Conference «Present-day problems of science and education», Russia (Moscow), 27-29, February, 2012, came to the editorial office 10.04.2012.

*Materials of Conferences***MORFOGENESIS OF THYMUS
IN WHITE RAT**

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I study development of thymus in white rat, including 30 embryos of 12–21 days, the 10 newborn's (1st day) and 20 rats of 1–3 month, on serial histological sections, staining by hematoxylin and eosin, azur-II and eosin, and total preparations. Definitive thymus is the association of two embryonic thymuses, right and left. These 2 classic lobes of thymus are false lobes which form secondary unpaired organ. Each of the 2 classic lobes is divided on the true lobes. I find many true lobes of thymus with different sizes, about 4 right and 4 left – cranial, middle, caudal and dorsolateral. The cranial lobe narrows in cranial direction and can rise up on the neck along trachea. In situ thymus has shape of bulb or cone, but after preparation it looks like pitchfork. False lobes of thymus remind the deformed cones.

The paired anlage of thymus is determined about embryonic neck. Lympho-epithelial tapes of right and left thymuses grow in caudal direction and descend into thoracic cavity on 15th day of the rat embryogenesis. Caudal ends of the thymuses lean against base of heart and widen on the both sides. In result magistralizing thymic branches of internal thoracic arteries sink into the right and left thymuses with their division on the cranial, middle and caudal true lobes. Internal thoracic artery gives off pericardiophrenic artery. It and soname vein with phrenic nerve passes in caudal direction moreover in ventral side from root of lung. These bundle separates small dorsolateral secondary lobe from each caudal lobe of thymus in white rat of second month old. Lungs limit the lateral growth of the thymic right and left false lobes. Therefore they go round the nerve-vascular longitudinal bundles from dorsal and then from lateral side.

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**RESEARCH OF INFLUENCE
OF THE CORPUSCULAR AGENT OF SOLAR
ACTIVITY ON THE HUMAN ORGANISM**

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Work corresponds to the contents of the project of the International program named «Global changes». The program directs to the research of

communications between of the geosphere and biosphere. The realisation of program is begun at 90-th and proceeds at the present time. The founder of the heliobiology A.L. Chizhevsky wrote about impossibility of study of the human organism separately from environment [Chizhevsky A.L. 1934]. The concept of environment has extended to an immense space because of discoveries of a magnetosphere, of a solar wind and of interstellar wind. The stream of charged particles deforms a geomagnetic field at interaction, changes the sizes of magnetosphere as a whole and the sizes of structural magnetosphere areas, causes the magnetic storms. The work purpose is a statistic check of a heliobiological communications in the middle-latitude region removed from of auroral geophysical zones. The subject and object of research are inhabitants of Murom in Vladimir region. An initial material for research: the medical data of the station of «First medical aid» in Murom and the geophysical data of the geomagnetic observatory of Borok in Yaroslavl region and the data of the International data centre. Both points Murom and Borok are located approximately on the same geomagnetic meridian 111° and have approximately the identical geomagnetic latitude 53°. The data of Station «First medical aid» contain the registration of the call time of first medical aid because of attacks of cardiovascular and nervous diseases. The geophysical information includes data about magnetic storms (time of the beginning, duration of the storm, type of the storm), data about indices of magnetic activity (planetary magnetic three-hour-range Kp -indices), data about chromospheric flashes on the Sun and recording of geomagnetic pulsations. The irregular geomagnetic pulsations (of the types Pi1B-rPi2, Pi1B-rPip, Pi1C, IPDP) [Sterlikova I.V. 1987] and the regular geomagnetic pulsations of the type Pc1 (pearls) at frequency range crossing with biorhythms of the human body are chosen from variety of geomagnetic pulsations. The recurrent magnetic storms and the magnetic flash storms are considered in the article. The reaction of a human organism to the corpuscular agent of solar activity depends on storm type: immediate (with the storm beginning) reaction in a recurrent storm and reaction with a delay from one and a half to two – three days in a storm of the flash character (accompanied by the chromospheric flash on the Sun). It is, as a rule, secondary, but more intensive maximum. The primary maximum is connected also with the storm beginning. It is found that the best correlation take place between the beginning of a magnetic storm on one hand and the attacks of nervous diseases (a vascular dystonia, a bronchial asthma) and the attacks of cardiovascular diseases (of hypertension type) on the other hand. The chronic ischemic heart disease patients feel ap-

proach of a magnetic storm some days before its beginning. The number of calls of first aid is above, than it take place in the storm beginning. This fact may be explained by decrease in geomagnetic activity before a storm. The analysis of dependence of attacks of illnesses from geomagnetic pulsations has shown that the greatest number of calls of the first medical aid was necessary for the moments of absence of pulsations within previous six hours at last. The six-hour interval corresponds to time of the inertness magnetosphere. The received result is in the consent with results of the Australian scientists [Buxton J.R., et.al. 1987] who have achieved easing of a syndrome of Parkinsona at rabbits owing to influence on their brain by artificial pulsations in a frequency range an alpha of a rhythm of biopotentials of a brain. It is necessary to notice that an alpha the rhythm 7–13 Hz is inherent for a rabbit, for a cat and for the person. Therefore the results received on rabbits, can be quite applicable to the human. However, the further researches are necessary to use nonconventional treatment methods of diseases successfully. The article reports about heliobiological communications in the geomagnetic middle latitudes. The received results may be explained by the resonans of high-frequency geomag-

netic pulsations in the natural resonator – plasmasphere [Sterlikova I.V., Ivanov A.P., 1997]. Murom is located in a projection of the plasmasphere on a terrestrial surface under certain geophysical conditions (the Kp-index above 5). Therefore Murom feels on itself whims of the space weather arising in the plasmasphere .

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Short Reports

**TRANSMURAL MIGRATION
OF LYMPHOCYTES FROM SPECIAL
MICROVESSELS INTO MARGINAL ZONES
OF SPLENIC PULP IN WHITE RAT**

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Introduction. Spleen is the organ which filters blood, eliminating old or damaging erythrocytes from blood flow. Thus this is secondary lymphoid organ checking normal cellular composition of peripheral blood [1, 6]. However up to now it is unknown how spleen functions: either branchings of penicillar arterioles end into sinusoids and veins – closed blood circulation [4, 5], or blood flows out nodular arterioles straight in splenic red pulp, from which then passes into sinusoids – unclosed blood circulation [7–9]. Perhaps, in collapsed spleen blood circulation is closed, but in extended spleen it is unclosed, because blood flows in the pulp through wide intercellular chinks of sinusoids [3]. It is unknown too how splenic white pulp is formed, how lymphocytes get to here. Brought up a proposal [2], that branches of penicillar arterioles, ending capillaries, about which periarteriolar macrophage sheaths lie, are homologues of postcapillary venules with high endotheliocytes in lymph nodes which are not discovered in splenic pulp.

Materials and methods. I study construction of spleen in 10 white rats of 2–3 months old of both sexes. After fixation in Buen fluid or in 10% neutral formalin it is prepared serial sections of the spleen with thickness 7 mkm, staining by picrofuxin or azur – II-eosin.

Results and discussion. Spleen is build as lymph node: hemopoetic tissue is surrounded by capsule, which sends trabecules into parenchyma, the largest – about hilum. Trabecular arteries give off branches into the parenchyma and trabecular veins get tributaries from it. Unlike lymph node, splenic parenchyma loses lymphatic sinuses and is mainly myeloid tissue (red pulp), lymphoid tissue (white pulp) surrounds some pulp branches of trabecular arteries on their some extent and is embedded into splenic red pulp as small seats – periarteriolar lymphoid sheaths. They thicken in distal part with formation of splenic lymphoid nodules. In their thickness there are central arterioles. Splenic lymphoid nodules have shape of pear or octopus, because they narrow, stretch and often branches out in direct of splenic red pulp. In thickness of distal shoots of lymphoid nodule (or postnodular periarteriolar lymphoid sheaths) central arterioles lose muscular coat. Such metarterioles give off numerous branches with to a far more diameter, dencer and very basophilic walls – penicillar arterioles. They have construc-

tion of precapillary or magistral capillary and are surrounded by periarteriolar macrophage sheaths. On one side these sheaths fuse with postnodular periarteriolar lymphoid sheath, but on another side adjoin to sinusoids and splenic cords of red pulp. Thus this area of splenic parenchyma, intermediate between white pulp and red pulp, can be divided on two narrow marginal zones: in white pulp – periarteriolar lymphoid sheaths (central part), in red pulp – periarteriolar macrophage sheaths (peripheral part). There is no rigid, always even line of demarcation between proper red pulp and its marginal zone: sinusoids very often pass in the marginal zone driving a wedge between its neighbouring periarteriolar macrophage sheaths. Penicilli may be bare, without macrophage covering, and straight, avoiding sinusoids, flow into collective venules of proper red pulp (capillary shunts of M. Knisley). Thus, penicillar arterioles and their branches end either in sinusoids, or in collective venules. Some penicillar arterioles are extended significantly, their endothelium is thickened (Fig. 1). Into and next to such endothelium there are lymphocytes, which make uneven and broken chain. Transmural migration of lymphocytes from penicillar arterioles into marginal zone of red pulp may be induced by antigens – products of destruction of old or damaging erythrocytes. They penetrate into red pulp through very thin endothelial walls of extended sinusoids, which accept widen penicillar arterioles with thickened endothelium. Chains of lymphocytes next to penicilli fuse into postnodular periarteriolar lymphoid sheaths which unite in splenic lymphoid nodule. On edges of lymphoid nodule, beginning from its distal shoot (marginal zone of splenic white pulp), are defined postcapillary venules (Fig. 2). They look like sinuses surrounding lymphoid nodules in lymph node, get tributaries from thickness of splenic lymphoid nodule and neighbouring red pulp, pass along edges periarteriolar lymphoid sheath and flow into collective venules of red pulp. There are lymphocytes into and next to endothelium of marginal postcapillary venule.

Conclusion. Results of my investigation allow me to agree with opinion of M. Knisley about closed blood circulation into spleen [4, 5]: branchings of penicillar arterioles end into sinusoids and venules. But construction of sinusoids changes with connection of functional state of spleen: during venous congestion sinusoids widen and their very thin endothelial walls still more thin and thin out. Then blood flows into splenic red pulp through wide intercellular chinks into endothelium of sinusoids [3]. Controversial ideas apply to microcirculatory bed in intermediate zone of splenic parenchyma, and more exactly – marginal zone of splenic red pulp.

It is absent in International histological terminology, in difference from splenic white pulp. But just in this nameless zone there are connections of high special microvessels of splenic pulp – penicillar arterioles, which compare with postcapillary venules in lymph node [2], and sinusoids. I find widen penicillar arterioles with high endotheliocytes in marginal zone of splenic red pulp and postcapillary venules in marginal zone of splenic white pulp. Lymphocytes migrate through walls of these special splenic microvessels.

Thus spleen functions probably as ant-current haemomicrocirculatory system of penicillar arterioles and sinusoids attached to tissue channels as collaterals of their communications where opposite currents of lymphocytes and collapsed erythrocytes interact. Postcapillary venules in marginal zone of splenic white pulp can function as penicillar arterioles only in ant-current haemomicrocirculatory system of marginal zone of splenic red pulp or as postcapillary venules with high endotheliocytes in lymph nodes.

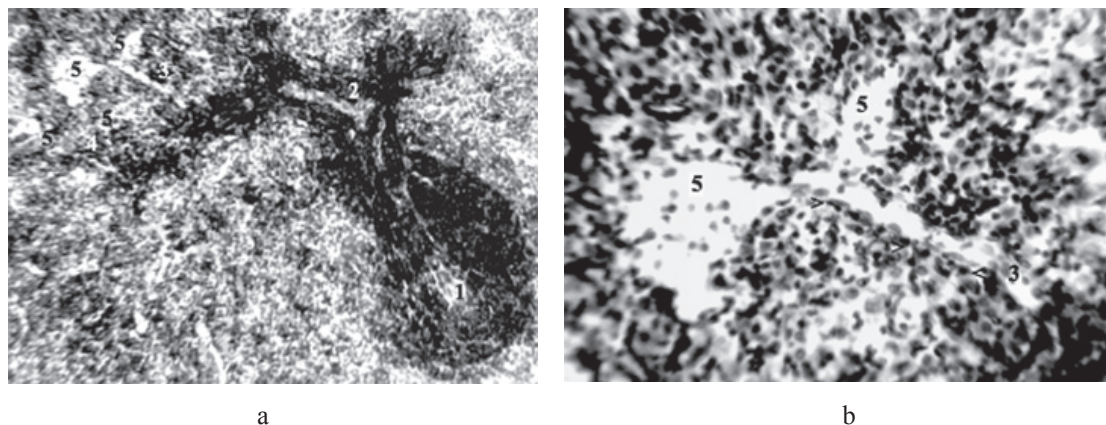


Fig. 1. Spleen of white rat, histological section:

1 – central arteriole of lymphoid nodule; 2 – bifurcation of metarteriole into postnodular periarteriolar sheath; 3,4 – active, wide and reserve, narrow penicillar arterioles; 5 – sinusoids. Arrows direct on chain of lymphocytes next to and into wall of active penicillar arteriole. Ferrous hematoxilin and picrofuxin staining. Light microscopy, magnification: a – 80 X; b – 300 X

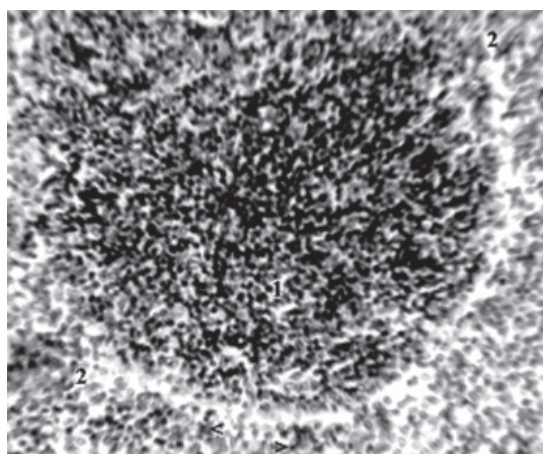


Fig. 2. Spleen of white rat, histological section:

1 – lymphoid nodule; 2 – postcapillary venule. Arrows direct on chain of lymphocytes next to and into wall of postcapillary venule. Ferrous hematoxilin and picrofuxin staining. Light microscopy, magnification: 300 X

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*Materials of Conferences***GEOECOLOGICAL ASPEKTS
FOR MINERAL RESOURCES
EXPLORATION OF THE ULUG-KHEM
RIVER BASIN (TUVA)**

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The problems of geoecology of commercial exploration of mineral resources in basins of the Ulug-Khem river and its tributaries Piy-Khem and Kaa-Khem rivers on the territory of Tuva are discussed. An influence of natural erosion and technogenous disruption on objects, contained heavy and toxic geochemical elements, has to be taken into account. Retrospective analysis and prediction of anthropogenous stress impacts, resulted from conducting of geological works in ore fields of Ag-Bi-Cu-Ni-Co-As, carbonatite, gold-ore, gold placer, rare-earth-rare metal, polymetallic, coal and chrysotile-asbestos deposits are given. Ecological advisability of utilization of wastes of «Tuvacobalt» and «Tuvaasbest» plants and sand-clay refuse of prospector's gold extraction have been considered. Data on radioactive pollution of Tuva territory have been presented. Each object revealed in Tuva contain a specific set of toxic elements. Although the distribution of anomalous endogenic concentrations is of low density and total area of districts of elevated contents of environmentally dangerous components occupies no more than 0,0001% of the Tuva territory, the availability of natural stream-forming sources and realms of their accumulation required special ecological-geochemical studies.

It is well known that Cd, As, Hg, Be, Pb, and Cr are most hazardous for the human habitat. Solis, proluvial-alluvial deposits, and rocks in most of ore regions of Tuva are enriched in these toxic elements. The Ulugoi ore cluster is a source of Cd, S, and Pb. The Khovu-Aksy, Ulatai-Choza, Chergak, Kyzyl-Oyuk, and Askhatiingol ore fields are sources of As, Sb, Cu, Co, and Ni. The rare-metal and lithium-fluorine deposits of the Sangilen deposit supply Be, B, F and natural radionuclides U and Th. The chromite-bearing ultrabasic rocks of the Kurtushibinskii, Agardag, Kaa-Khem ophiolite belts are sources of Cr and V. The barite-cinnabar ores of the Terlig-Khaya, Arzak and Chazadyr deposits, mercuric gold of quartz-veined, sulfosalt-sulfide, and copper-molybdenum-porphyrific deposits, and products of amalgamation in wastes of sand-clay refuse of prospector's gold mining accumulated from 1856 to present date are main sources of Hg in environments of basin complexes of the Ulug-Khem, Piy-Khem, and Kaa-Khem rivers and their tributaries [1].

Degree of landscape complexes pollution by heavy metals, toxic elements, and natural and artificial radionuclides has been evaluated in the course of study of mountainous zones and intermountain basins on the territory of Tuva and adjacent regions of Mongolia [2]. Contents of artificial radionuclides Cs-137 and Sr-90 in soils, forest falls, and mosses have been determined as one of the ecological-geochemical researches. High density stratification suggests that the territory was repeatedly polluted by radionuclides. The geochemical studies of natural complexes permit us to make a conclusion that the most of the Tuva territory is radiation undangerous for human habitat today. Some regularities of anomalous concentration of toxic elements in natural environments have been revealed. Association of anomalous contents of Hg to the basin complexes was most conspicuous. Mercury anomalies have been studied in details with collecting heavy concentrate samples of large volume. It is established that the elevated Hg concentrates in soils, formed upon prospector's working off planted by forest vegetation, follow regenerated gold-bearing placers which magnetite jets in the near-bedrock part of sand-clay refuse are enriched in products of amalgamation with fine and dispersed gold untrapped earlier. The similar feature of mercuric gold concentration in the lower, near bottom part of the placer-forming dump of adit was established at Kyzyl-Chadr Au-Cu-Mo-porphyrific deposit and for a regenerated pay dirt worked out by system of underground exploitation minings in the bed and lower terrace ridge of the Soruglug-Khem river basin [3]. Technologies and technological complexes for recovery of products of amalgamation and free gold untrapped earlier from sand-clay refuse of old prospector's working off at minimum losses of useful components and compliance with international standard of environment protection have been elaborated in Tuvian Institute for Exploration of Natural Resources.

More than 86 million cubic meters of removal rocks (chrysotile serpentinites) and wastes of asbestos enrichment were accumulated as a result of commercial exploration of richest chrysotile-asbestos loads of the Aktovrak deposit in the Alash-Khemchic interfluvium. It is evident that imperfect extraction of chrysotile-asbestos from serpentinites and intense pollution of agricultural lands and basin complexes of the Khemchik river valley by technogenous wastes have serious environmental impacts. A geotechnology of environmentally safe complex hydro-acid processing of chrysotile serpentinites and utilization of wastes of asbestos pneumatic enrichment with production of high value commodity products has been elaborated under di-

rection of V.V. Velinskii [4]. These products are ultra-pure silica gel (silica filler) and amorphous SiO₂ for production of fiber glass optics and automobile cord, periclase for lining of open-hearth and steel furnaces, medicine gypsum, unsorted microasbestos for production of superlight heat resistant composite materials, and sulfide-chromite-magnetite concentrate contained elements of platinum group. Technologies for production of magnesium binder being almost as good as Portland cement in quality for use in one-story construction were elaborated in Institute.

A large body of veined mass containing arsenides and sulfides was accumulated in adit dumps of the Khovu-Aksy deposit. More than 1,5 million cubic meters of wastes of hydrometallurgical conversion were stored in burial reservoirs of «Tuvacobalt» Plant. The results of revision works on evaluation of quality and reserves of technological wastes of cobalt production suggest that it is appropriate and required to recover the wastes. It is established that concentrations of As (3,5–6,4%), Co (0,14–0,24%), Ni (0,15–0,29%), Bi (0,01–0,02%), Ag (24–98 ppm), Cu (0,14%), Zn (0,11%), and Au (60 mg per ton) are very high. The burial reservoirs contained more than 2000 ton of Co are an artificial deposit. Hypochlorite-ammoniac-carbonate method and experimental technological equipment for deep processing of enrichment wastes were elaborated in Tuvinian Institute for Exploration of Natural Resources, Siberian Branch of the RAS. It is possible to organize production of high value commodity products (crude Co, Ni, and Cu, cathode Ag, sulfopone, Co salts, and pigments) and recovery of As as thiosulfide and other nontoxic compounds and preparations [5, 6]. We emphasize that more than 50 thousands ton of As environmentally hazard to the basin of the Elegest and Ulug-Khem rivers are accumulated in the burial reservoirs. Ecological catastrophe can occur at washing out the burial reservoirs by showers or destruction as a result of seismic events and so on.

The geoecological state of human habitat and spatial-temporal distribution of heavy metals and toxic elements can be evaluated and reasons of their accumulation and distribution can be analyzed using methods of Earth's sciences. The experience of conducting of geoecological investigation strongly suggests that it is necessary to combine field, stationary, and distant methods for obtaining information about environment changes in response to natural processes of degradation and human activity.

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*Materials of Conferences***CLIMATIC FEATURES
OF HYDROCARBON MATERIALS
TRANSPORTATION
IN NIZHNEVARTOVSK REGION**

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Nizhnevartovsk Region lies in a temperate climate zone. According to A.A. Grigorieva and M.I. Budyko's climate zones classification, it's characterized by humid climate with temperate warm summers and severe snowy winters. Climate of the region is characterized by prolonged winters, continuous snow covers (200–210 days), short mid-season periods, late frost in spring and autumn, short frost-free periods (100–110 days), short summers (70–90 days) [3, 4].

Temperatures in the region fluctuate prominently both seasonally and daily. When analyzing temperature factor, it's necessary to consider average maximum temperatures, duration and frequency.

Analysis of oil pipeline accidents and their relationship to an average annual air temperatures showed that the number of accidents is greater during the years with comparatively cold weather. For example, in 2006 an average annual air temperature was determined as 3, 2°C (with absolute minimum of –50,9°C on January 12), a number of accidents grew to 1678; in 2009 with an average annual temperature of 2,8°C (absolute minimum of –44,8°C on December 28) there were 2206 accidents. During periods of warm weather, a number of accidents was on the decrease, for example in 2003 with an average annual temperature of 1°C there were 543 accident, in 2005 an average annual temperature reached 0,16°C, number of accidents – 598. There were years when there was an increase in a number of accidents despite air temperature level (2007 – average annual temperature – 0,2°C, accidents – 1399; 2008 – average annual temperature – 0,3°C, accidents – 1260) and vice versa, (2010 – average annual temperature – 2,1°C, accidents – 820).

Since 2006 the Nizhnevartovsk region faced a growing number of oil pipeline accidents (2006 – 1678 accidents). In 2007, 1399 accidental spills were registered on the territory of the Nizhnevartovsk region, with contamination area covering 452,4 ha [1]. In the same way, in 2008 there were 1260 accidents and about 820 accidents

in 2010. Thus, «TNK-BP Management. Ltd» oil-fields presented highest accident risks in the Nizhnevartovsk region [2, 5]. The largest number of accidents in the Nizhnevartovsk region 2206 (or 45,9%) was registered in 2009. The final conclusion is that the accidents are mainly caused by internal and external corrosion.

The coldest month between 2003 and 2010 was January with the temperature of –34,9°C in 2006. Average monthly temperature in January is –20,8°C. The warmest month of the year is July with an average monthly temperature of + 17,9°C. Absolute maximum of air temperature can be observed in July – +33°C (July 8, 2007). In autumn, during average monthly temperature changeovers, a number of accidents usually increase. For instance, the average monthly air temperature in October is 0,1°C (changeover of daily temperatures is +5°C, 0°C), about 109 accidents can be observed during this period.

Soil temperatures are very dependent on atmospheric temperatures. That is why, changing of soil temperature regime results in changes of oil contamination area and its effects.

Minimal atmospheric and soil surface temperature levels also affect pipeline accident rate. During 2003–2010, more accidents occurred when minimal soil surface temperatures dropped to 47–54°C.

Humidification of the Nizhnevartovsk region area depends solely on moisture carried in the air from the west. Annual precipitation trend refers to continental type [3, 4]. Maximum precipitation amount accounts for summer months. Average precipitation amount between 2003 and 2010 in Nizhnevartovsk amounted to 459,9 mm. During several years it might diverge from the norm. Minimal precipitation was registered in 2005 (336,6 mm, number of accidents – 598), while 2007 pertains to a record amount of rainfall – 731,8 mm. There is no direct connection between the accident rate and rainfall amount, however unsteady and heavy rainfalls might cause washing-outs in trenches, damage of oil pipelines and might lead to other negative consequences.

Snow cover in the Nizhnevartovsk region appears in October or early November. During some years snow cover started to appear at the end of September. Loss of snow cover occurs in late April to early May. Period of winter lasts for 6–7 months [3]. Average snow cover depth makes from 23,6 cm (2010) to 72 cm (2003). There is a direct,

inverse connection between snow cover depth and pipeline accident rate: the deeper the snow cover, the lesser the number of accidents.

Reasoning from all the previously stated facts, it may be concluded that accident frequency depends not only on a single nature or climate features, but on a complex of such.

It's very important to conduct studies of environmental resources as they might help make use of favorable climate factors and prevent negative influence over pipeline transport.

Pipelines, main ones in particular, should be a subject to increased wear and corrosion resistance in different climate conditions. Under destructive effects of certain atmospheric conditions and aggressive environments, such as deformations, soil movements, damage of underwater crossings, nearness of groundwater occurrence, prolonged periods of cold weather metal structures gradually lose their initial characteristics and qualities which might eventually lead to an accident.

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*Materials of Conferences***THE FINANCIAL POLICY OF RUSSIA:
ANALYSIS OF INSTITUTIONAL
CHOICE OF SOCIETY**

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The most important achievements of national reforms in the way of the formation conditions of civilized market relations are the state's desire to preserve social security for the population. The question about effectiveness and appropriateness of state paternalism in this area not find definitely a positive response from specialists in this field. Opinion polls and statistic also reveal a negative attitude of the population to transformations of market-oriented direction. People think that the state represented by all its institutions responsible for a number of negative manifestations of the market and should take measures to overcome them. Thus, the results of research, G.G. Sillaste, there are a range of objectives requiring intervention by the authorities, which reflects the Table 1.

Table 1

Objectives for the solution of which,
according to the Russians, necessary
to focus government activity¹

Problems to be solved by the government	% respondents
State control over prices and reduction prices	47
The fight against corruption, privatization of state property	36
Providing affordable housing	36
Availability rates on credits	34
Fiscal regulation	33
Strengthening of the ruble, increasing his status	33
Strengthening law and order	29
Financial support for agriculture	26
Control over payment of arrears of wages, pensions, allowances, scholarships	22
The financial support of public enterprises and government officials	18

The negative socio-economic impact of the accelerated transition to a market economy a very negative affected on quality of life in Russia. These

¹ Sillaste G.G. Economic Sociology. M.: Alpha-M, Infra-M, 2012. P. 437.

aftermath have led to great human, material, financial and moral losses. The vast majority of the population experienced the severe social consequences of unprepared transition to a market economy, undue hardship and changed his opinion on the question: what is more important – democracy or order. In the early 1990s, influenced by economic and political freedom, more than 80% of Russians considered more important democracy and freedom of speech. A completely different picture observed at the end of 2000 – according to 75% respondents important – this is the order that is supported by the state, rather than economic freedom². These data clearly characterize the prevalence and awareness of the majority of population of negative socio-economic impact of solution and methods of their implementation by the Government in the economic, social and financial spheres.

At the economic mechanism there interconnection between variety financial decision-making and social consequences. The increase in negative social and economic consequences of government decisions ultimately should lead to a correction of its earlier decisions and eliminate the negative consequences of such decisions. Behavioral models, exploring the reactions of the people, his attitude and willingness to support reform in the state, largely associated with confidence government in the correctness of the reforms. In the views of the Russian population, and many Eastern European countries dominated the view of the adverse effects of free market economy and reduce state regulation of the processes in society³. Government institutions performing management of financial and economic mechanism is important to consider the opinion of the population and take informed action, relying on public support.

More specifically, the negative social and economic phenomena that accompany a market economy and particularly evident in periods of economic downturns are shown in Table 2.

Elicitation directions of dynamics of the main indicators confirms the prevalence of pessimism in society and such character of such changes maybe eliminate or reduce only by government regulation. The effectiveness of state regulation depends on the complexity and scale of the task and the ability of regulators effectively perform their functions. Equally important is the state's ability to effectively manage regulating credentials, including the timely and accurate choose instrument of management and apply them professionally. At Russia the market imperfection generates multiple externalities that

² Yearbook of the «Public Opinion-2000». All-Russian Public Opinion Research Centre, № 12, 2000.

³ Polishchuk L. Corporate social responsibility and government regulation. Questions of Economics, № 10, 2009 P. 12.

complicate and extend the range of tasks of economic and financial regulation. Information asymmetry in the domestic economy is also very high, partly due to rapid economic and social change, in part – due to lack of transparency in the private and public sectors. At the same time, the practice of state regulation causes considerable criticism on apropos improper use of regulatory instruments, corruption and incompetence. At the same time, similar regulator as a powerful and large-scale in the country yet. The only mechanism that could work in this direction is not formed in Russia, corporate socially responsible sector. The need for informal mechanisms has increased due to increased centralization of administrative and fiscal authority in Russia. Regional and local authorities are responsible for economic development and welfare of the territory, while their budgets and official regulatory functions somewhat reduced. The idea of attracting business to the development of infrastructure, co-financing of social programs would reduce the gap between the authority and responsibility and get a new source of funds. The main reason for the reluctance of business to participate in projects and programs on their own initiative is the imperfection legislation in matters of tax regulation and insecurity of property rights. The reverse side of these issues is the possibility of pressure on domestic companies from the outside, that is used by the authorities to enforce the involvement of business in the financing of socio-economic programs and projects. In addition, the cause of the vulnerability of property rights in Russia, their lack of legitimacy in the eyes of public opinion: the privatization of the 1990 years and the subsequent redistribution of wealth in society are considered as deeply unfair, which casts doubt on the reliability of property rights. Fragmentation of society, the income gap, diametrically opposed interests of its members – all this say about the inability to act collectively in the common interest, that is, the low rate of social capital. Norms of behavior, values, the effectiveness of public organizations in the community creates the demand for socially responsible behavior by all its members, including – business.

Russia lacks modern social capital, which is confirmed by sociological studies. The Soviet past is not cultivated civic initiatives, and a radical and largely chaotic changes post-Soviet period highlighted the care of their own economic well-being and had a negative impact on solidarity and trust in society. The weakness of civil society in Russia does not allow to count on his leadership in the processes of social responsibility, on the deficit to the lack of public participation in these processes indicates deep gap between the submission of the population about desirable priorities and actual priority areas of social investment by Russian companies, as well as widespread doubts about the appropriateness of the requirements towards private enterprises and state to be socially responsible.

Structural features of the Russian economy, the diversity and complexity of socio-economic problems in the country, and limited capabilities government regulation and public sector creates conditions for the demand of the society on the formation of socially responsible business, which could be overcome and gradually smooth out the manifestation of econocide and externalities of a market economy.

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THE ROLE OF THE BRAND MANAGEMENT IN THE PROMOTION OF VLADIMIR REGION (RUSSIA)

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We have done the analysis of the place and role of the branding strategies in the promotion of the Vladimir region as a tourist destination. Nowadays the market dictates its own terms, as a result the new brands can currently become a powerful resource to help the Vladimir land to implement the desire to attract more and more tourists. The article investigates the main factors which in the nearest past hindered the development of tourist activities. The lack of funding of the tourist programs and projects, the changing of the priorities in the regional policy of the territory have changed the image of Vladimir as the capital of the Golden Ring, the well known tourist route. That's why brand orientation could be a strategy of survival for this tourist destination. The study includes the

Table 2

Econocide

Indicators	Dynamics
The level income of population	Reduction
The magnitude of savings	Reduction
Access to education	Reduction
Access to health and health care	Reduction
The level of consumer prices	Growth
The labor market (unemployment)	Growth
Creditomania	Growth
Socio-economic status of families	Deterioration
The crime rate	Growth
Maladjustment of the population	Deterioration

basic theoretical concepts of brand and branding of tourist destinations, city marketing, formation of the positive image and promotion of the territory.

The benefits of study are in the attempts to suggest the ideas of renovating the current image of Vladimir and to attract the city managers' attention to establishment of cooperation between the stakeholders, formation of the new tourist products, marketing activities. These branding steps will contribute to the further regional tourism development.

The concept of tourism is difficult to be determined. In fact, there are so many definitions of tourism as those that deal with this phenomenon which significantly celebrates contemporary society. It is a part of our lives, it is hard to find someone who has never been a tourist.

Indicator for the differentiation policy of the tourist product should be a system of motives that runs on tourist spending. But, despite of tourist preferences, it is not pointless to offer the nature, history and culture of specific tourist destination, and use them for the promotion of tourism and local population life quality improvement. Tourism can provide many benefits to the territory. It can create new jobs, foster an entrepreneurial base, generate local tax revenue, stimulate capital investment, facilitate infrastructure improvements, protect cultural and natural resources, and build tourist area pride (Messer, 2004).

The Necessity of Creating a New Brand of the Town of Vladimir

The Vladimir land is the centre of Russia, the region of old towns and ancient monasteries, motherland of many outstanding persons, national men of genius and heroes. The region pays much attention to tourism development and keeping rich cultural and historical heritage. In the late 60-s Of the 20th century the famous tourist route «The Golden Gate of Russia» started its history. Since that time Vladimir has been called the capital of the Golden Ring. This has become a new brand for the ancient town of Vladimir. The development of the tourist infrastructure including the sights, hotels, museum expositions, transport park has been increasing from year to year. But financial crisis and political instability in Russia of the end of the 20th century have become serious factors which hindered the development of the tourist route. The lack of funding of the tourist programs and projects, the changing of the priorities in the regional policy of the territories have changed the image of Vladimir as the capital of the Golden Ring.

Nowadays Vladimir must not live in the glory of the past but work hard at the creation of the new image which could contribute to the development of new products or branding existing ones,

especially in the field of tourism as the most profitable field. In modern conditions of tourist business, many domestic destinations considered perspective within the development of local brands. Therefore, it is necessary to analyze the character of implementation of local brand in the tourist business.

Branding is perhaps the most powerful marketing weapon available to contemporary destination marketers confronted by tourists who are increasingly seeking lifestyle fulfillment and experience rather than recognizing differentiation in the more tangible elements of the destination product such as accommodation and attractions (Morgan et al., 2007). Most destinations have superb five-star resorts and attractions, every country claims a unique culture, landscape and heritage, each place describes itself as having the friendliest people, and high standards of customer service and facilities are now expected. As a result, the need for destinations, as well as for the Vladimir region, to create a unique identity – to differentiate themselves from their competitors – is more critical than ever.

Brand and Branding of Tourist Destinations

In the Dictionary of Business Terms, the brand is explained as «a sign, symbol or word by which the different products or services are determined. Brand is a broad term that includes all the brand names and trademarks» (Kotler, Armstrong, 2004).

According to Rita Clifton, a brand is: «a mixture of tangible and intangible attributes, symbolized in a trademark, which, if properly managed, creates influence and generates value» (Clifton, Maughan, 2000).

This definition truly captures the essence of a brand, and highlights the importance of brand management. Branding is about creating «value», both for customers, and for the destination. This value stems from the products and services that companies create and bring to the market, but extends further to encompass added values derived from factors such as the brand-customer relationship, the brand's emotional benefits and its self-expressive benefits.

Tourist destination branding is a method of revealing the specifics of an environment, it makes the implementation of the tourist facilities and is presented to tourists. Tourist loyalty to a brand is reflected in the ability of the destination to content visitors' experience which is in line with their expectations (Blashenkova, 2011).

A destination brand is a brand related to defined geographical region that's understood by tourists as a unique entity, with a political and legislative framework for tourism marketing and planning. Destinations are amalgams of tourism

products, offering an integrated experience to the consumers. This amalgam of tourism products and services offered by a destination is consumed by tourists under the brand name of the destination during their period of staying (Buhalis, 2000). Brands incite beliefs, evoke emotions and prompt behavior. They have social and emotional value to users and speak to them (Kotler and Gertner, 2002).

Marketing of a city, or marketing of a territory – is a conscious promotion of a particular territory as a place for the implementation of various projects, its advantageous «sell» to investors, tourists, new residents, etc. This may be as about a whole country, a developed industrial city, and about a small town. Such marketing is used successfully in many European countries such as Finland, Britain and Germany.

The Formation of the Positive Image of the Territory

The most acute problem facing the leaders of the regions and businesses is how to form a positive image of the territory.

Experts suggest three approaches:

1. Exploitation by regional companies, real or mythologized historical events that have occurred or are alleged to have occurred at a certain time on this territory. This is about the origin of traditions, claiming that it appeared, was preserved and developed something unique and attractive, for example, in crafts, customs. Thus, the historical and cultural information systems are created, which form the image-making landmark system. However, these even completely mythologized images must be supported by reality.

2. Development of a brand, symbolizing the attractiveness to consumers of services and related products. This process in the presence of well-known attractions, natural features, infrastructure development associated with their operation, provides significant revenue to the regional budgets. This approach may be effective in the absence of raw materials and industrial resources, or transportation benefits. In this case, the brand can develop as a tourist, health, educational, etc.

3. Presentation of the region as an attractive object for investors. Attracting factors – the availability of promising enterprises in terms of investment and business linkages (industrial, oriented on natural resources exploitation, cultural), the potential of the tourism industry (including fishermen, hunters, «extreme») and its infrastructure (Gunare, 2009).

Images of the regions and regional industrial brands are interdependent. The first help the formation and capitalization of the second, which, in its turn, often even as competitors, «spin» the first. Once a land becomes the owner of a number of strong brands, marking the real or mythological

characteristics of the region, there is a synergistic effect – generated value of a higher order, creating a positive image of the region as a whole – the symbolic capital. The image of Vladimir as an ancient capital of Russia, the famous centre of old Russian white stone architecture of the 12th century is the world known brand. The Golden Gate, the Assumption and St. Dmitry Cathedrals have become the well recognized symbols of Vladimir.

To attract tourists, along with advertising and PR, it is equally important to use the marketing appeal, that is, architectural monuments, historical places, etc. Thus, according to the Regional Tourism Development Strategy such towns of the Vladimir region as Vladimir, Suzdal, Yuryev-Polsky, Murom, Alexandrov, Gorokhovets and Gus-Khrustalny were included in the new local tourist route «Small Golden Ring of the Vladimir Region». The increasing level of competitiveness of the regional tourist product is provided by state support in the framework of the regional programme of tourism development, Small Golden Ring started in 2005 for creating new excursion facilities and promotion of the regional tourist product in specialized print media and at the largest international exhibitions and tourmarkets.

Futurologists predict that people will be increasingly involved in active leisure, providing an opportunity to try new experiences and there will win a region that is able to offer «the unique experience». Event tourism has currently become a powerful resource to help to implement the desire to attract tourists. In the Vladimir region such festivals as «Bogatyrskie Zabavy» (ancient Russian athlete contest), «Cucumber Holiday», «Geese Fights», «Russian Fairy Tale Festival» have become very popular and traditionally are held every year. In July, 2012 for the first time the Festival of Vladimir Cherry was organized in Vladimir. There is an idea to create a new brand for the town of Vladimir based on the image of the unique cherry variety grown in the Vladimir land and called after it.

If we believe that the territory – is the brand, it should be glamorous, stylish, eye-catching. Accordingly, based on the needs of the region, businesses can participate in various projects related to cultural heritage. Investment in commercial projects impact on improving the image of the territory and the image of the organization, participating in or organizing special events. It's possible to restore historical sites or «invent» new attractions (Makatrova, 2011). Thus, in Vladimir there is a lack of unusual and unique museum exhibitions. The monopoly of the State Vladimir-Suzdal museum-reserve hinders the appearance and development of the private museums in Vladimir.

But nowadays it is so important to engage more tourists and, therefore, money by a large number of cultural and recreational activities, attractive places of interest.

Conclusion

The rich in cultural terms place should have the critical mass of cultural events – from one-off festivals to the regular activities of cultural organizations. On the other hand, the architecture blends old and new in an urban environment, freely dispensing with visual contrasts. Such a creative approach enriches identity, creates originality, instills confidence, fills with new strength and adapts to modern conditions of territories, their traditions, myths, history. If you use holidays, parades, carnivals and festivals to attract visitors, the cumulative effect of such activities is expanding in terms of tourism, culture, creating an image by specifying the territory of new prospects.

Creating a positive image of the territory inside and outside – is not spontaneous, but long-term, systemic activity, which requires a conceptual approach, coordination and continuous monitoring of results. In the structure of the city management there should be organized special services, which are supposed to create a favorable background for the formation and development of the territory image, responsible for the formulat-

ing a branding strategy, establishing the cooperation between the stakeholders, accumulating the efforts for the further promotion of the Vladimir region.

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Materials of Conferences

**PALAEOENVIRONMENTAL
INVESTIGATIONS AND
RECONSTRUCTIONS IN NORTHERN
RUSSIA USING SUB-FOSSIL CLADOCERA
(BRANCHIOPODA, CRUSTACEA)**

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We study subfossil remains Cladocera (Branchiopoda, Crustacea) from lakes, located in different regions of Russia (Northern Karelia and Northern-eastern Siberia). According to the Cladocera abundance in the lake sediments, they were divided into three groups: Dominant taxa (> 50% in each sample), Subdominant (from 25–50%) and Seldom (< 25%) taxa. Determined their biotopic and zoogeographic accessory, calculation of indexes of species diversity, community evenness, also statistical analysis with identification preferences species for hydrological parameters. Our analysis allows to obtain a more complete picture of the species composition cladocerans community, unlike regular sampling over several vegetative seasons using standard hydrobiological methods, as in the sediments are species living at different times of the year.

The purpose of our study is to analyze Sub-Fossil Cladocera community, typical for conditions in the region of White sea, Central Yakutia and the lake sediments of reservoirs along the coast of the Laptev Sea.

This goal was achieved by follows:

1. Comparison of ecological and limnological conditions of the studied regions, based on hydrochemical parameters.
2. Determination of species composition and selection of dominant species Cladocera community.
3. Determination of indexes of species diversity, community evenness, zoogeographic, habitat characterization, statistical analysis.
4. The reconstruction of palaeoecological conditions on the basis of Cladocera. Comparison of the obtained data with the reconstructed parameters of the other palaeoecologists.

The material for this study submitted by surface sediment samples from 18 lakes in Bolshoy Lyakhovsky island, soil sample from the slope of Oyogos Yar, sediments from 24 Central Yakutia lakes and 55 lakes on White sea region.

Results

In general, most of the lakes are small, shallow and were formed by thermokarst processes with maximal depths of about 4 m. Ion concentrations show that cation compositions for lake waters are dominated by Ca²⁺ and Mg²⁺. We found differences in hydrochemical composition. So in the Central Yakutia lakes observed high salinity, while in the northern meltwater ponds observed decline in salinity. Al ion content higher in waters of the B. Lyakhovsky island, compared with those in C. Yakutia. Reservoirs in B. Lyakhovsky island also have high rates of Fe, compared with reservoirs C. Yakutia.

Among the leading species, common to all sampling sites in the region of northern-eastern Siberia, it should be noted *Chydorus sphaericus*, *Alona guttata*, *Bosmina longirostris*. We saw, that the composition of the dominants was similar, but it was replenished in reservoirs of C. Yakutia by species such as: *Alonella nana*, *Bosmina longispina*. In taxonomic terms Cladocera highest species diversity typical for lakes in C. Yakutia (34 taxa). While in the waters along the coast of the Laptev Sea, 20 species – in the lakes of the B. Lyakhovsky island and 9 – in Oyogos Yar.

According to zoogeographic zoning, the bulk of the cladocera community, typical of present-day conditions, were types, characterized by universally geographical habitat distribution, except for lakes on White sea region, where exists Northern species.

After analyzing the zooplankton belonging to certain biotopic zones, it should be noted, that the major part of found species, belonged to the littoral, but for the lakes on White Sea region typically presence of littoral-planktonic taxa.

The values of Shannon's index (H) range from 0,90 to 2,75 in samples from the island of B. Lyakhovsky and from 2,64 to 2,7 in Central Yakutia waters, and for the lakes on White Sea region: 2,04–2,97. It indicates the presence of relative diversity of the cladocerans community and characterizes the investigated waters as contaminated. The values of Pielou's index range from 0,35 to 0,87 in samples from the Laptev Sea coast lakes and from 0,6 to 1,0 in samples from Central Yakutia waters, and for the lakes on White Sea region: 0,41–0,91, indicating an equable distribution of species in the cladocerans community.

We revealed significant differences between the preferences of species for certain environ-

mental conditions using an analysis of variance (ANOVA). The data for this analysis was abundance of fossilized remains each taxon found in investigated waters from northeast of Yakutia. Using statistical analysis we revealed significant differences between the selected groups in abundance of certain species and values of the hydrochemical parameters corresponding to the species-specific preferences for abiotic conditions of hydrobionts.

We have found evidence of paleoclimatic changes in the investigated northern-eastern Siberia region, based on our own results and on the data of hironomids, pollen, radio-magnetic and other tests.

Among the distinctive features, that characterize the fossil lake, situated on a hillside of the Oyogos Yar, the most interesting findings are the fossilized remains of genus *Bosmina*, which were not found in modern sediments of the region. The boundary of genus *Bosmina* distribution area at present lies just southward and is located on the

boundary of the tundra-forest-tundra. According to chironomid analysis the reconstructed July temperature exceeded 13 °C. The modern July temperature in the Oyogos Yar is approximately 9 °C. Due to data, obtained from Oyogos Yar investigators Russian-German expedition Lena 2002: the change in temperature indicators led to the displacement of the distribution boundary of woody vegetation about 270 km compared with the modern situation. According to our own data and other palaeoecologists data, we can conclude that there was open areas of tundra interspersed with patches of steppe and grasslands in the Oyogos Yar 150–300 thousand years ago.

Thus it confirms the need to use palaeoindicators to create reconstructions of paleoclimatic changes in the Russian North.

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*Materials of Conferences***THE FREEDOM OF RESEARCH
BY THE HIGHER EDUCATIONAL
INSTITUTION AS AN ASPECT
OF INTEGRATION PROCESSES
IN EUROPE AND KAZAKHSTAN**

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The article studies the aspect of the forming integration processes during the recent years. It describes an analysis of the development of east-European integration and growth in scientific-technical potential cooperation of countries that finally leads to their mutual dependence and completeness. Along with that the article studies an aspect of integration of different types of educational institutions into scientific-educational megacities of continental, inter-region, and state significance. An idea of the importance of part of large international projects and funds in solving problems of the world and European science integration is pointed out.

A characteristic of the higher school of Kazakhstan of the XXI century is given in the article, specifically of its innovative direction. These priorities are described in Kazakhstan national programme documents within the article. Programme measures and events that efficiently use scientific potential of universities and can solve the problem of freedom of scientific researches and integration of European and Kazakhstan science are described.

The article defined the directions of developing integration and freedom of scientific research. Also, it studies barriers against researchers' collaboration with their European colleagues.

Integration processes have been an integral part of geopolitical situation that is being formed in different regions of the world during the recent years. Along with such phenomenons as globalization, regionalization, terrorism, processes of integration obtain a larger scale. Like globalization, for example, integration processes are inevitable, though hard to predict.

Free movement of information and idea provide for destruction of stereotypes that is especially important in terms of modern integration.

As West-European integration develops, scientific cooperation of scientific-technical potential of separate countries and regional complexes grows as well as cooperation of education, training scientific staff, realization of discoveries and inventions, efficiency of their usage that enters an integration (regional) stage in Europe. Integration in Western Europe actively involves scientific area, education, researches by educational institutions, it develops processes of realization of scientific-technical

potential of Western Europe. In other words, mutual dependence, completeness of countries grows stronger. Thus, it all leads to a development in West-European integration as a dynamic process.

A trend to integrate different types of higher educational institutions (under the aegis of classic university) into scientific-educational metropolises of continental, inter-regional, and state significance can be observed all over the world. Consolidation of universities with industrial complexes takes place in different countries. Thus a base for scientific studies and training unique specialists for modern firms and enterprises is formed [1].

Large international projects and funds obtain certain significance in solving problems of European and Worldwide science integration:

- EURICA, its objective is to carry out coordination of research by countries of Western Europe;
- ESPRIT, a project that implies joining efforts of European universities, scientific-research centers, computer firms in creation of new information technologies;
- EUROPEAN SCIENTIFIC FUND (ESF), as association that unites 68 organizations – members that carry out scientific-organization activity in 24 countries of Europe. European scientific fund coordinates all-European scientific initiatives in order to support scientific research of higher level. European scientific fund supports the following main types of activity: research seminars; scientific networks, European scientific conferences; scientific programmes [2].

In 2009 an international project «Technologies of informational society for open knowledge in countries of Eastern Europe and Central Asia» (IS-TOK-SOYUZ) started [3]. Its objective is to reveal new possibilities for scientific cooperation between countries of EU, Eastern Europe, and Central Asia, including Kazakhstan, in the area of ICT.

In these terms we would like to admit that in December 2001 the 20th meeting of the Council of education by Integration Committee EurAsEC took place. Ministers of education of the EurAsEC discussed strategic problems of cooperation between states-members of Eurasian economic community in the area of education and general recommendations in creation of a single Eurasian educational space were produced.

Higher school of Kazakhstan, as an integrator and flagship of the system of continuous education of the country entered the XXI century in state of rapid changes in terms of globalization in field of higher education. Integration of the higher education system into the world educational society is a national priority. Bolognese process was indicated as the vector of its development, according to the

Concept of education development in Kazakhstan Republic.

A strengthening of innovative direction in state scientific-technical policy defines a need for the corresponding transformation of the objectives of international cooperation between Kazakhstan Republic and other countries of Europe in field of science and technology: a transfer of the attention from «classic» scientific-research works towards mainly problem-directed search and applied studies, joint commercialization of the results of scientific-technical activity.

By the day, Kazakhstan Republic and other countries of Eastern Europe and Central Asia, not being members of EU and states, associated in the 7th Frame programme of EU on science and technological development for 2007-2013 (FP7), are included into the membership of partner countries of EU in international cooperation (International Cooperation Partner Country – ICPC) with regard to realization of FP7. Such state allows researchers from Kazakhstan take part in joint scientific projects with their European colleagues and receive grants of EU in FP7 [4].

These priorities find a confirmation in national programmes and documents. In the Concept of development of education in Kazakhstan Republic to 2015 integration into the world education society is defined as an objective for the development of Kazakhstan education for forming a national model of multi-level continuous education that is integrated into the world education space and satisfies need of a person and society [5]. And further – «the main trend in development of higher education is ... providing for innovative development, integration with an intense scientific-research activity, close relations between institutional research and social needs on the foundations of improving educational and information technologies» [5].

The same idea on the necessity of an integration is put into another, no less important document – State programme of education development in Kazakhstan Republic for 2011–2020 that has been confirmed by an Order of the President of Kazakhstan Republic N. Nazarbayev of the 7th of December 2010 № 1118 [6]. Particularly, among the objectives it points out an integration into the European space of higher education through bringing the content and structure of higher education in correspondence with parameters of the Bolognese process.

Obligatory and recommended parameters of the Bolognese process will be fulfilled: a classification of the republic institutions depending on their realized education programmes and volumes of the ongoing scientific-research activity will include: national research universities, national higher educational institutions, universities, academies, and institutes. Conditions for gradual provision of autonomy to institutions will be created. Since 2015 national research universities will receive autonomy, separate scientific-research institutes will be

transferred to leading research universities with a right of legal independence. As well, mechanisms will be created to define basic institutions for making the following innovative structures: business-incubators, industrial parks, centers of commercialization of scientific developments and technologies. Since 2016 scientific research within prior branches of economy in order to create highly-technological and science-intensive production will take place, cooperation with partner-universities and foreign scientific centers will be established [6].

As a result, a significant scientific potential of universities will be used more efficiently in order to broaden fundamental and applied research, its complexity and practical results will increase, and, obviously, all these programme measures will solve problems of freedom of scientific research and problems of integration of institutional science of Europe and Kazakhstan.

We can define direction within the studied problem, specifically, development of integration and freedom of scientific research.

1. Broadening of the network of scientific-research unions that are created through uniting the most productive institutional scientific groups and providing them with necessary resources and funding on a competitive basis [7], [8].

2. Participation of institutions in competitions for receiving joint international grants and orders for research and development, providing mutual scholarships, international programmes and projects.

3. Creation, development and prior support of a network of leading research universities as the biggest scientific-educational organizations

Speaking of barriers that complicate researcher's cooperation with their European colleagues, we can outline the following:

1. Negative points that are linked to the present mechanism of coordination in collaboration in scientific research.

2. Differences in classification and terms.

3. Insufficient informational openness of local competence for Europe and necessity of their additional promotion (through networks, technological platforms, and other instruments).

4. Communication problems (language barriers, culture of e-mail communication, mentality, etc), including lack in knowledge of partners' psychology.

5. Differences in procedures of funding projects, and, therefore, – a negative transition of concepts regarding procedures and mechanisms of realizing projects within national model for interaction with European partners.

6. Insufficient development of co-financing mechanisms of joint projects.

7. Insufficient motivation of researcher's to take part in European programmes (advantages of such participation are not always understood).

8. Undeveloped connections with colleagues from European countries [4].

Nevertheless, definite steps are made towards integration into Europe are taken.

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PROFESSIONAL COMPETENCE OF SPECIALIST AS AN INTEGRAL CHARACTERISTIC

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The article studies professional competences and their interpretations, for example, mastering knowledge, skills, and abilities; constructs of standards' projecting; efficient usage of abilities, integrated combination of knowledge, skills, and settings; readiness and ability to act reasonably, etc.

Besides, the very idea of academic competence is studied, such competences are also called applied.

Further we provide different approaches of authors towards the understanding the essence of professional competence and its formation. A relation between professional competence and pedagogic skills has been revealed.

Nowadays scientific literature provides definitions of different competences: professional, general and key, academic, special, etc.

Professional competence is defined as:

- mastering knowledge, skills, and abilities that are necessary to work in a specialty with a simultaneous autonomy and flexibility in terms of solving professional problems, developed collaboration with colleagues and professional impersonal environment;

- constructs of projecting standards that represent «elements of competence» that include: activity criteria (measure of quality); area of implementation, required knowledge;

- efficient usage of skills that allow one to carry out professional activity productively according to

the requirements of his workplace. In this case competences go beyond the frame of professional triad «knowledge-skills-abilities» and include informal and formal knowledge and know-how (behavior, analysis of facts, making decisions, processing information, etc). [1];

- integrate combination of knowledge, skills, and settings that allows one to carry out professional activity in modern labour environment [2];

- readiness and ability to act reasonably in accordance with requirements of a business, solve problems independently and in a methodically organized way, evaluate the results of his activity [3].

Professional competences are oriented towards a profession.

Some outline academic competences that are defined as mastership in methodology and terms that is typical for a certain areas of knowledge, understanding of its actual system relations, and realizing its axiom limits [4]. These concepts are also called applied, and related skills, correspondent methods and technical means that are typical for subjective areas are referred to them [3].

Pedagogic science studies the idea of «professional competence» as a totality of skills and knowledge that define the efficiency of work; an amount of skills to solve a problem; combination of personal characteristics; vector of professionalization; unity of theoretical and practical readiness to work; ability to carry out complex, culture-defined types of activity, etc. Such «wide» definition of this concept, as we think, is linked to its integrative characteristic that allows us to transform and study its meaning from different point of view.

Professional competence as a professional readiness and ability of a labour subject to carry out tasks and responsibilities of everyday activity is studied by K.A. Abulkhanova-Slavskaya who pays a great significance to specific-applied knowledge of a specialist, as «they serve as a basis in forming the whole professional competence». Structural components of a competence are also professional positions, for which a person's orientations play an important part. They unite a system of needs – dominants, values, goals, prevailing systems of sense motives that are fixed in life goals, settings, prospects, urges, plans, and active work to achieve them; individual psychological characteristics of a person that define his individuality, way of activity, behavior, and acmeological invariants of a specialist that, being inner stimulants, define his need for active self-development, productive realization of his creative potential in work and move towards personal peak of professional perfection.

M.A. Choshanov put the following definition of professional competence: «If we try to define the place of a competence in the system of levels of professional mastership, it occupies an intermediate place between routine and perfection. First of all, a competence implies continuous refreshment of knowledge, mastering new information in or-

der to use it successfully in definite terms, in other words, mastering operative and mobile knowledge. Secondly, a competence is not simply possession of knowledge, but more a potential readiness to solve problems consciously, thus, a competence includes both substantial (knowledge) and procedural (skills) components. Depending on circumstances, a competent specialist can use a method that is most suitable for the conditions and time. Flexibility of a method is the second important characteristic of a competence. Thirdly, a competent person can select the optimal solution among a multiplicity of those, reasonably reject the incorrect, argue both effective and ineffective methods, in other words, a specialist must possess critical thinking. Thus, the concept of a competence includes the following main characteristics: mobility of knowledge, flexibility of a method, and criticality of thinking». A competence is a step, higher than diligence and lower than perfection.

Most authors consider a definite amount of professionally-necessary knowledge, skills, abilities, deep awareness in questions of upbringing and training a necessary element of professional activity of a pedagogue. Different dictionaries interpret mastering knowledge that allow to judge something, an area of questions in which a subject possesses an idea, experience as a competence (latin – *competo* – achieve, correspond, fit).

V.A. Sitarov defines professional competence as a complex formation that is provided by variation, optimization, and efficiency of constructing training-educational process.

Building professional competence of a pedagogue is the topic of a research by S.I. Ferkho who defines it as a complex personal formation, essence of which should be explained through the unity of cognitive, behavior, and motivation areas of a person's development [119].

Authors of the textbook «Pedagogy» V.A. Slastenin, I.F. Isayev, A.I. Mishenko, and E.N. Shiyanov claim that professional competence of a pedagogue represents the «unity of his theoretical and practical readiness to carry out pedagogic activity», while the basis of a tutor's competence structure is formed by numerous pedagogic skills that characterize this readiness. Scientists consider psychological-pedagogic and special (subjective) knowledge (theoretical readiness) to be necessary, but sufficient condition of professional competence. Much of it, particularly theoretical-practical and methodic knowledge, is a supposition for intellectual and practical skills and abilities. Pedagogic skill is a totality of continuously-developed actions, part of which can be automated (skills), that are based on theoretic knowledge and directed towards solving problems of development of a harmonic person. Such definition of the essence of pedagogic skills underlines the leading role of theoretical knowledge in forming practical readiness of future tutors, the unity of theoretical and practical training, multi-

level character of pedagogic skills (from reproductive to creative), and possibility to perfect them via automatization of separate actions.

Thus, V.A. Slastenin, I.F. Isayev, A.I. Mishenko, and E.N. Shiyanov present us a model of professional competence of a tutor as a unity of his theoretical and practical readiness. Besides, as we have already outlined, a special attention is paid to pedagogic skills that are split into four groups by the authors.

1. Skills to «transfer» the contents of an objective upbringing process into definite pedagogic problems: studying a person and a group to define the level of its readiness for an active mastering new knowledge and projecting the development of the group and separate students at the basis of this analysis, outlining a complex of educational, upbringing, and developing problems, their definition, and outlining the dominant problem.

2. Skills to construct and ignite logically-finalized pedagogic system: complex planning of educational and upbringing goals, rational selection of the contents of educational process; optimal choice of forms, methods, and means of its organization.

3. Skills to outline and establish relations between components and factors of upbringing, carry them out: creation of the necessary conditions (material, moral-psychological, organizational, hygienic, etc.); activation of a scholar's personality, development of his activity that transforms him into a subject of training from an object; organization and development of mutual activity, provision of link between school and environment, regulation of outer non-programmed interactions.

4. Skills to account and evaluate results of pedagogic activity: self-analysis, and analysis of educational process and results of a tutor's activity, definition of new complex of dominant and secondary pedagogic problems

V.P. Simonov describes competence of a tutor as a readiness to carry out his professional functions, harmonic unity of social settings and psychological-pedagogic training. Knowledge of a subject, erudition, and pedagogic (methodical) mastership he outlines as the main in characteristic of a pedagogue's personality. And, the scientist puts the following sense into the concept of «pedagogic mastership»:

- an ability to solve problems of training, upbringing, and development in a dialectic unity;
- an ability to draw attention of students and interest them with a studied material;
- an ability to consider an age and psychological peculiarities of students, as well as the level of their development and provide an individual and differential approach towards them;
- an ability to build his relations with students on basis of human, democratic ideas;
- an ability not to get lost in front of the most difficult and unexpected questions from students;
- an ability to combine theory and practice in teaching a subject;

- an ability to use novelties of headmost pedagogic science and technics in one's practice;
- an ability to master one's tool of labour – speech, a word;
- an ability to think critically and have a clear active civil position;
- an ability to diversify one's classes, avoid cliché in their organization.

Diversity of the existing ideas on the essence and the content of the concept «professional competence» allow us to claim that there is no unity in this question, and it defines differences in defining its structure.

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THE ROLE OF INFORMATIONAL TECHNOLOGIES IN FORMING INFORMATIONAL-COMMUNICATIVE COMPETENCE OF FUTURE SPECIALISTS

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Originating in the Republic of Kazakhstan democratic change caused the need to find effective ways to transform various aspects of society, its social institutions, including higher education system. To implement the State Programme for the Development of Education of the Republic of Kazakhstan for 2011–2020, approved by Decree of the President [1], the transition to e-learning is put first priority – providing education with highly qualified personnel. Plays an important role training and skills development, the formation of a high level of information competence. The processes of globalization, the rapid development of information technology and communications systems, as well as the transformation of social and economic nature, by which the society of industrial production has become a society of information science and changed the structure of the international labor market and new requirements for the competence and skills.

Against the background of these changes, higher education plays an increasingly important role and becomes the key to successful self-realization of man in modern society.

Today, the industrial sector of the republic, recovering on the basis of new advanced technologies, in dire need of a new formation specialists with broad expertise and fundamental knowledge for the implementation of breakthrough projects in the state, business and services. The message was 01/27/2012 President of Kazakhstan Nursultan Nazarbayev to the people of Kazakhstan said: «... It is necessary to increase computer literacy, including through various incentive programs. I urge all of Kazakhstan actively develop information technology. This should be ...» [2].

In today's globalized world the development of information technology leads to new ways of using Internet resources. Currently, the world has seen consistent and steady movement toward an information society, which aims to create the best conditions for maximum self-realization of each person. The grounds for such a process is the intensive development of computer and telecommunications technologies and the creation of advanced information and educational environment.

These factors lead to the need for active use of Internet resources in education. The introduction of information technology in the educational process is an increasingly prominent place in the teaching of not only the natural and mathematical, but also the humanities. Informatization of education is directly linked with the development of telematics – a single computer system of the media, bringing together computer networks, television, satellite communications, which allow the creation of local, professional, regional and global information systems. The leader among the telecommunications technology has become the worldwide Internet network. Today, a variety of multimedia tools empower teachers to optimize learning the language, make it an exciting process of discovery unknown world of English language and culture.

The use of information technology in teaching English enables future specialists environmentalists have access to a wide range of contemporary information to develop various skills. The use of computer tools and information sources on the Internet contribute to the development of high-level information and communicative competence, the formation of professional thinking in English, increasing the motivation to study subjects Kazakhstan clearly defined benchmark for entry into the world educational space, and is modernizing the educational system in the context of international requirements. The driving forces of innovation processes taking place in higher education in Kazakhstan, are adapted to the internal labor market and the desire for it to enter the global educational system as a full member. We need constant adaptation of educational programs to the demands of the labor market. In

performance criterion laid ready for practice and a real competitive graduates.

At the present time, information technologies have significantly changed all aspects of human existence and, apparently, to the greatest extent, it is a significant improvement in the performance of intellectual work. To date, each competent person of a profession should be possible to effectively use information technology in their professional activities. One of the major challenges facing the system of training of future specialists, is to improve the training of students with current trends in the development and use of information technology in professional activities. Throughout the world, clearly there is a tendency to use the computer as an essential means of studying the individual scientific disciplines. One of the most revolutionary advances in recent decades, which greatly affected the educational process in the world, was the creation of the global computer network known as the Internet, which literally means «international network». Use of cyberspace (cyberspace) for training purposes is a completely new direction of the general didactics and methodology of private as well as the changes affect all aspects of the educational process, from choosing the methods and style of work, ending with a change of requirements for academic level of students [3].

Modern trends in the modernization of educational programs require the introduction of active learning. It is to such methods include the use of Internet sources. Theoretical significance of the research is determined, first, that the informational – communicative competence implies the existence of a future specialists knowledge, skills, style of thinking that will provide the necessary social adaptation to the changes and ensure its competitiveness in the labor market, and secondly, the need improve the methodological and didactic organization of the process-oriented professional training of future specialists, and thirdly, the objective need of modern society in the training of future specialists can be integrated into the global information space, and fourthly, the trends of the national educational policy. Scientists say that human knowledge is processed them educational information, the added cash to the mental experience [4]. Body of knowledge on ways and means of collecting, processing and transmission of information to obtain new information about the object under study, using software and hardware is information technology [5]. Information technology, providing access to information through the Internet, contribute to the organization of independent work of students. The use of Internet resources (educational software using graphics, multimedia technology, etc.) provides the student with new opportunities for independent learning, contributes to the development of visual thinking and provides information at a higher level of understanding.

The use of information technology occupies an important place in teaching not only math, natural

science, but also social and humanities. However, as noted by contemporary researchers in the field of distance learning and mixed (V.M. Vilotievich, M. Monks, Vladimir Yudin), their use is generally done without reliance on didactic concepts, is often fragmentary and inconsistent, often reduced only to the transfer of educational information. It should be noted that the future specialists understanding of the universal methods of solving problems, developing skills to apply knowledge to new situations depends, to a greater extent on the nature of his intellectual activity, activity, performance feedback, professional direction of the professional activity, and to a lesser – on how to material data carrier operates a student. The idea of the educational-governmental organization of work and independent work of future specialists using information technology can be rejected by the teacher and future specialists are not accepted because of an incomplete accounting of pedagogical patterns that underlie the learning process in any of his organization.

In article D.T. Rudakova [6] the principles of e-learning, the impact of the information environment on the development of the content of cognitive activity, as well as in the work, and E.B. Mikhailova [7] the formation of professional foreign language competence of students of engineering specialties using the tools of information and communication technologies. Information and computer technology in teaching English language of future specialists very efficiently, as the didactic function of this technology are broad. This is due to the fact that computer technology to gather information multichannel, and therefore significantly increases the volume of information received, and the quality of learning. The increasing introduction of new information technologies in educational process of the International Kazakh-Turkish University by A. Yasawi, one of the pressing problems of training specialists of international level is the task of developing methods of using Internet technology in forming the information and communication competence of future professionals electricity. How the information system, the Internet offers its users a variety of information and resources. The basic set of services may include: electronic mail (e-mail); newsgroups (Usenet); video conferencing, the ability to publish their own information to create its own home page (homepage) and placing it on the Web-server, access to information resources: Reference Directories (Yahoo!, InfoSeek/Ultra Smart, Look Smart, Galaxy); search engines (Alta Vista, Hot Bob, Open Text, WebCrawler, Excite); online conversation (Chat). The use of information technologies in teaching foreign languages allows future specialists to have access to a wide range of contemporary information to develop various skills.

Information-communicative competence is regarded by us as a system of informational resources required to build an effective communicative action in the range of situations of professional interper-

sonal and intercultural interaction. The communicative act of a professional includes the analysis and assessment of the situation, the formation of the operational objectives and actions, the implementation of the plan or its correction, evaluation of effectiveness. Hence, information-communicative competence – the ability to successfully use the English language, to act with it on the basis of practical experience, skills and knowledge in solving professional problems. Information-communicative competence of future specialists should include the power of cognitive-activity, creativity, and behavioral and emotional components that are generated in the process of language training with the use of complex linguodidactic resources and interactive tools, linguistic and informational support. Since forming the basis of information and communicative competence is competence-based approach, then it is established the relationship between enjoyment and learning of English. The use of language and its study include human actions in the implementation of which it is developing a number of competencies: general and communicative. They provide a solution to problems in various conditions, taking into account the various constraints and implemented in the activities and actions aimed at the perception of the texts in connection with certain topics and areas of communication and the use of appropriate strategies. Accounting for these processes are communicants leads to further development and modification of these competencies. The available information support enables student learning the basics of the computer at the initial stage of training, and then become power users of application programs, to master skills. You can also add that the main activities in shaping the information and communication technologies with the use of the Internet is to work with Web sites designed to teach English, the use of the Internet as a source of authentic materials about the culture of the country the language is spoken; of web forums or telecommunications projects and the use of Internet technologies to develop and implement a web quest projects. Web design is the result of a combination of design techniques with the capabilities of the Internet and can be effectively integrated into the process of learning English. Web projects, being the kind of complex tasks require a teacher, project manager, a high level of subject expertise and information, and on learning – skills for working with information and information technology. Using the assignments based on Internet technology in teaching English language learners requires an appropriate level of proficiency [8].

At the present stage in the International Kazakh-Turkish University Yasavi, particularly in the specialty 5B071800 – electricity in the classroom of English used new methods of using information and computer technologies that are opposed to traditional learning. Available in the Engineering Faculty of Education ICGS them. A. Yasavi com-

puters (5 Comp. Classes), multimedia devices (3 m/projector and screen, 5 interactive. Boards) allow to train students with the optimal load on a computer.

In the process of formation and Info-communicative competence of students in the specialty «Power» are very active interest in information and computer and Internet technology, the Internet, in this case acts as an excellent means to develop their creative abilities. The main advantages of using the Internet – technologies are increasing interest in learning, developing independence, the development of responsibility and commitment. In order to teach future professionals electricity communicate in English, you need to create a real, real life situations that will stimulate the study of the material, and to develop adequate behavior.

In order to successfully train future professionals elektotoenergetiki English, the teacher should arouse interest in the subject studied and regularly maintain it. In this connection there arises the problem of full and careful study of ways to get information.

Since there is currently active is the type of transition to the information society, the computerization of education is seen as a necessary condition for the development of personality in modern etape. Vazhno to the classroom English language learners feel the beauty of language.

For this purpose, you can use different active forms and methods of work. Communicating in real language environment provided by the Internet, students find themselves in these situations. Involved in addressing a wide range of meaningful, realistic and achievable interesting tasks, students learn spontaneously and adequately respond to them, which stimulates the creation of original expression, but not a template manipulation language formulas. Internet has endless information capabilities. The information system offers Internet users a variety of information resources: web pages of all newspapers around the world in English, country sites, encyclopedias. Students in the practical training of English language works, using the computer dictionaries as well as regional studies on the sites that make it possible to obtain useful information about life and culture of the country the language is spoken. Also on the Internet you can find many sites devoted to learning foreign languages. The most positive in the use of the Internet is its information content, as well as his role is great in motivating learning, and, consequently, the effectiveness of training. Students visually represent themselves, for what they need good language skills. All of this is developing autonomy in language learning, information forms, linguistic and communicative competence of future professionals, promotes the development of analytical skills.

In the process of using Internet technology is changing and the role of the teacher, whose main task – to support and guide the development of individual students and their creative research. Rela-

tionships with students based on the principles of cooperation and joint work. In these circumstances, inevitable revision of existing today, forms of organization of educational work: an increase in independent individual and group work of students, a departure from the traditional classes dominated by explanatory and illustrative method of teaching, increase the practical and creative work and research the nature of the search. The above is the basis for the formulation of priorities that follow from the requirements of informatization of higher education in the aspect of training of future specialists of Power:

1) to improve the process of preparing the future of Power Systems based on the use of Internet technologies in higher education, the revision of the organizational forms of educational activities, develop a package of training and procedural documentation, taking into account the specific features of professional experts of Power;

2) to study issues of the preparatory process for the future of Power methodology and how-forming qualities of a specialist, characterized by the ability to develop and optimize the use of modern information technology.

Future professionals must be competitive in the labor market demand. Therefore, the aims of education are determined primarily on the basis of the curriculum requirements for skills and knowledge and the requirements of the society to develop and foster a new generation. Future professionals must be able to own, operate actively, make decisions, flexible to adapt to the changing conditions of life.

We reaffirm the fact that the analysis of scientific sources and teaching them to practice in IKTU by A. Yasawi, the department «Electric» shows that the use of Internet technologies in teaching English language of future specialists is of great importance and promotes informational-communication competence of future specialists. Scientific and practical research will be continued and at this stage of our research we conclude about the significance and relevance of using information and computer technology in forming the information and communication competence of future professionals the power industry, the modernization of the educational process, updating the content of the subject of English for future specialists, which accordingly affect the change in the professional training of electric power.

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PROBLEMS OF PREPARATION OF FUTURE TEACHERS ON NATURAL SCIENCES

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It is known that at every stage of the society development there appear its own requirements to the level of education and culture of a personality and moral values. The aims of schools and institutes of higher education are changing and, accordingly, there are changes in a pedagogical paradigm, representing the most important principles and the adequate constructive means for the decision of educational problems. The new educational orientations were internationally acknowledged in the 90-s of the XX-th century and were accepted as working programmes of UNESCO. In the report to the Rome club «No Limit to Teaching» there were formulated conceptions about the principal types of teaching in the broad sense – as the process of the increase of experience either individual or social – cultural. To these types of teaching we refer: *supporting* and *innovative* teaching [1].

«*Supporting teaching*» is the process and the result of such educational activity, which is directed to the support, reproduction of the existing culture, social experience, social system that is traditionally inherent in either school or institute of higher education teaching.

«*Innovative teaching*» is the process and the result of such educational activity, which stimulates the innovational changes in existing culture, social environment. Such type of teaching (in education) besides supporting the existing traditions stimulates the active response to the problem situations either for a separate individual or the society.

Nowadays the system of education includes both of these types of teaching and is characterized by the tendency of transition from pedagogy of authoritarianism to the pedagogy of cooperation, turning to a person as the most important value. And the introduction of the scientific term “human capital” became the major moment in the change of views on education as applied to the social-economic development of humanity. The cognition of the significance of education and educational level of the

citizens of the country as a «strategic resource» of any state was the most important factor of reforming either secondary or higher education, the necessity of its adaptation to speedy changes in the society and the conformity of the system of education to the strategic plans of social and economic development of the country.

Large-scaled reforms in the system of education of the Republic of Kazakhstan are stipulated in the laws of education of RK [2], in «Conception of the Development of Education of RK till 2015» [3] and other normative Acts. Integration processes arising at different levels of modern civilization touched upon the sphere of education and that is witnessed in the Lisbon convention, Bologna declaration the followers of which became not only European states [2].

Integration of the system of higher education of Kazakhstan into the world educational space is one of the long-term strategic priorities. The principal condition of integration of our country into the world educational space is the adaptation of the Kazakhstani educational system to the Regulations of the Lisbon Convention and Bologna declaration, that presupposes the 12–13 year school education that is the admission to a higher education, introduction of credit units ECTS – European Credit Transfer System, transition to an integral system of training of highly skilled staff: Bachelors, Masters of Science, Doctors of Philosophy, etc.

New conceptual approaches presuppose the development of such schools and institutes of higher education, which will be able to influence the positive social and economic advance of the society effectively, and the main accent in them is made on the development of a personality, his/her thinking in emotional, esthetic, resolute, intellectual spheres, revealing the creative potential of a person, his/her socialization, the qualities which must be revealed in any sphere of his/her professional activity.

Let us consider the aims and objectives, put forward by the state programme of the reformation of the education of RK:

- renewal of the contents and structure of education;
- improvement of educational-methodical and scientific provision of the educational process;
- integration of education, science and production;
- strengthening of the ecological training of students;
- introduction of new pedagogical information technologies;
- increase of social status of the pedagogical professions;

The achievement of the ultimate general aims, the most important priorities of a new educational policy of RK depend on each of them, that is:

- improvement of the quality of teaching and upbringing of students;

- conformity of the system of education with the strategic plans of the social-economic development of the country.

How long will it take to achieve these priorities? What are the most urgent problems, the decision of which will accelerate the advancement to the ultimate aims of today's plans? Let's discuss this.

At present the plans of the government are concentrated on the broad-scale innovational transformations, first of all, in the industrial –production sphere, its diversification, introduction of new technologies and others.

Are there enough highly skilled, competent specialists with fundamental natural-science education, who are able and ready to realize the planned transformations effectively in our country? The answer is evident. Acute deficit of competent specialists of engineering-technical staff either of higher or secondary professional level is observed in all post-Soviet territory. The reasons of such situation became well-known. For the formation of a highly skilled, creative staff potential it will take not some years but dozens of years and their training should start from school, from the early age, that is a trivial axiom, which, in our opinion, must be imperative and the most important component in the conception of the development of education of RK till 2015.

Any reforms in education assume changes inside the pedagogical system of training and upbringing, the functioning of which is defined, in particular, by the most important principles of didactics.

And as we know, any activity in didactics, including educational, is constructed on the basis of the structure of the activity (A.N. Leontyev) [4], including the aim – the motive-contents (means) – results, that are the basis for the appearance of different pedagogical systems (PS). Any PS is an interconnected combination of invariant elements, and the theory of the variation education requires maximum components of the pedagogical system and such, in our opinion, is the pedagogical system, suggested by L.V. Zagrekova and V.V. Nikolina [5]. The components of this PS are as follows:

- aims of teaching and upbringing;
- students;
- teachers;
- Contents of teaching and upbringing;
- Means of teaching and upbringing;
- Forms of the organization of teaching and upbringing;
- Pedagogical processes (processes) of teaching and upbringing.

Undoubtedly, the main components of any PS, which fulfill the role of «carrying support», are **teachers and students**, who set definite aims and are eager to realize them. Only the tandem of a teacher – students are real functionaries of the process of teaching and upbringing to which from year to year higher demands are made.

It is the **teacher, pedagogue-scientist** who is the quintessence of any educational system, **the practical executer of the most important conceptual approaches** in the sphere of teaching and upbringing. Transition to market relations, which caused revolutionary changes in social life in the last dozen of years, led to the swift fall of pedagogical professions having no high rating. Thus, as it had been before, the problem of training and forming of competent pedagogical staff on natural science disciplines, in particular, is still an urgent one.

Realization of the next priority of the educational policy of RK – the improvement of the quality of teaching (education) is also facing the problem of improving the quality of training the teaching staff. Dependence of the quality of education on the quality of training a teacher is either proved by statistic data or from practice [6, 7]. Professional-pedagogical education as the sphere, closely linked with the preparation of a young generation to life in conditions of continuous education, must take the responsibility in solving the most important tasks of the realization of modern educational tendencies in the development of the society. A key figure in this sphere, a teacher, was and is remaining a competent professional teacher, who possesses all the arsenal of means of teaching and educating the pupils, a creative personality capable to develop the motivation of learning and cognitive interests of the pupils in the conditions of the whole pedagogical process, the personality striving for the improvement of his/her professional knowledge and skills [8]. In our opinion, there is a certain dependence of the level of practical mastering of knowledge and skills of the organization of the process of the development of the cognitive interest of students on the effectiveness of the professional-pedagogical training of the graduates of pedagogical institutes of higher education. It is quite dialectical that for the real improvement of the quality of the level of the system of education (teaching) it is necessary to have the adequate staff potential of teachers, the quintessence of any pedagogical system.

In the course of the research with the aim to improve training of future teachers to the development of the cognitive interest of students there was developed and introduced the elective course for the students of pedagogical specialties «Development of the cognitive interest of students to fundamental sciences» in the educational process [9].

The aim of the course is the formation of preparedness of future teachers to their forthcoming pedagogical activity through mastering special professional-pedagogical knowledge about the ways of activation of school teaching, practical skills of their effective application in practical conditions of a comprehensive school.

The objectives of the course include acquaintance with basic directions of the activation of the process of teaching students the basics of fundamental sciences, development of skills and habits

of choosing the most suitable methods and organizational forms of teaching for their educational subject, the formation of reflexive skills of defining the degree of their effectiveness aimed at improving the quality of teaching and also the skills to apply a creative approach to this process.

The programme of the elective course consists of two modules, each of which contains interconnected theoretical and practical parts. The contents of the course is constructed on the basis of the module technology of teaching which allows not to lead the process of training of future teachers to a simple reproduction of some information of knowledge from a teacher to a student on the development of the cognitive interest of students. It is important to teach future teachers to get necessary knowledge independently, to direct their searching, i.e. to realize motivated management of their training. Module teaching as a special pedagogical technology helps to solve this task effectively.

The elective course «Development of the cognitive interest of students to fundamental sciences on the basis of the module technology is worked out for 1 credit (30 class hours and 15 hours for the individual students' work)».

We represent as an example the contents of some studies on the developed elective course. First of all, we'll consider the planning of studies of different organizational forms (lecture and a practical class) on module 1 «Pedagogical basics of the development of the cognitive interest of students».

Theoretical studies (lecture)

«Urgent problems of the activation of the educational –cognitive activity of students and the development of motivation to the study of fundamental sciences».

Issues for the study:

1. Ideas of modernization of the educational system of the Republic of Kazakhstan in the context of integration in the world educational space. Ways of the solution of the most important task of the educational policy of the Republic of Kazakhstan at the current stage: improvement of the quality of teaching through the development of the cognitive activity of schoolchildren.

2. Urgent problems of the activation of the educational-cognitive activity of schoolchildren in the integral pedagogical process of a comprehensive school.

3. Qualitative education as a guarantee of the future. The role of the cognitive interest for the qualitative education.

4. Development of the cognitive interest of schoolchildren and their motivation to the study of fundamental sciences.

5. Necessity of the preparation of teachers to the development of the cognitive interests of schoolchildren. Pedagogical mastery of a teacher as a necessary condition of improving the level of the cognitive activity of the pupils.

6. Practical studies

«Development of the cognitive interest of the pupils in the integral process of teaching the fundamental sciences in the unity of educational and developing functions».

Practical assignments:

1. On the basis of the analysis of scientific literature, pedagogical and methodical literature reveal the psychological-pedagogical aspect of the process of the development of the cognitive interest of pupils.

2. Build the matrix of ideas (comparative characteristics of homogeneous phenomena in the works of different authors) about the essence of the cognitive interest, characterizing the point of view of different pedagogues-researchers on the problem of the development of the cognitive interest of schoolchildren of the end of the XX-th and the beginning of the XXI-st century.

3. Study «The Conception of a Higher Pedagogical Education of the Republic of Kazakhstan», clear out the essence of re-orientation of pedagogical institutes of higher education on the preparation of the teachers of a new formation, get acquainted with the results of the researches about the real state of training of the pedagogical staff in the Republic of Kazakhstan and with the facts, negatively influencing it. Formulate the objectives of a professional-pedagogical education of teachers taking into account the necessity of their preparation to the development of the cognitive interests of schoolchildren.

4. Study «The Conception of Continuous Pedagogical Education of the Pedagogue of a New Formation of the Republic of Kazakhstan», get acquainted with the requirements, principles, the system and mechanism of the work of the system of the continuous pedagogical education. Work out a plan of self-education for the improvement of professional knowledge, skills and habits on the development of the cognitive interest of pupils towards their subject.

5. Carry out the pedagogical research and clear out the reasons of the decrease of the cognitive interest of the pupils towards fundamental sciences.

Introduction of the developed elective course into the system of professional education of future teachers gives the opportunity to create special conditions for their preparation to the development of the cognitive interest of schoolchildren. The course meets the requirements of future teachers in acquiring professional-pedagogical knowledge, its deepening and broadening due to the growing role of the intensification of teaching in school educational practice, provides improvement of their professional-pedagogical preparation to the development of the cognitive interest of the pupils to fundamental sciences. This is promoted by the use of various forms of conducting the studies while doing the elective course, systematic character and purposefulness of the students' work while mastering the contents of the elective course, their involvement

in the process of conducting seminars, discussions and practical studies on mastering knowledge and skills of the organization of the pedagogical activity for the improvement of the level of the cognitive activity of pupils.

Thus, on the today's agenda the problem of training the pedagogical staff namely in natural sciences, the pedagogues of a new formation, able on the basis of innovative technologies of teaching to develop the cognitive interest of schoolchildren to natural sciences: physics, chemistry, astronomy, biology, remains urgent. It is obvious, that not a single brilliant super-pedagogue will be able to develop the cognitive interest to fundamental sciences effectively without the educational laboratories and subject cabinets corresponding to modern equipment requirements, without measuring instruments, reagents, audio-visual and other means, composing didactic complexes.

According to the above-stated, we think that the most important strategy of the Ministry of Education and Science, of all the government of RK and the society as a whole in the sphere of secondary and higher education today there must be a rise of the prestige, reputation of the pedagogue, stimulation of the youth's interest to pedagogical professions and natural sciences. Our country, which has achieved great success in its successful progressive development for the sake of every man and all people during its independence, has a lot of possibilities for this.

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*Materials of Conferences***ENGLISH PHONETICS FOR ESP
LEARNING AND TEACHING PURPOSES**

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Martin Hewings has underlined the growth of ESP (English for Special Purposes) activity in to-day's world and has highlighted a number of trends, which will presumably have a continuing influence on how ESP develops over the next decade or so. The trends the scholar names are the following: *internationalization, specialization, growth of Business English, continued influence of genre analysis, corpus analysis and SFL, the effect of English as an international language* (Hewings 2002). What is more, Martin Hewings seems to be one of the few researchers in the field of ESP who consider phonetics of oral speech essential for ESP learning and teaching purposes.

In the present research ESP terminology has been analyzed from the phonetic point of view: how the phonetic (accentual) form is reflected in the pronunciation dictionaries and how the terms are actually pronounced by native and non-native speakers. Accentual characteristics of economic terminological units researched in the dictionaries and the experimental data show their complex character determined by several variation factors.

As it appears from the analysis of the experimental corpus of binary word-combinations found in the language of economics the most numerous group of them is represented by the nominal terminological units. Morphological, word-building, semantic, recessive and other factors can strongly influence their accentual patterns. Prosodic characteristics of such terms are very much varied. There have been established several accentual patterns of the terminological units at issue. According to authoritative pronunciation dictionaries (EPD and LPD) there have been discovered 9 types of accentual variation of the binary nominal word-combinations. The accentual variation of English terminological units presents a lot of difficulties to the Russian learners of English being mainly guided by the word stress patterns of their native (Russian) tongue which has a limited number of degrees of stress (no secondary or tertiary stress) as compared to several degrees of word-stress in the target (English) language. As a result, Russian students tend to have either two strong

stresses on both parts of the binary nominal terminological unit, or make the first element of it too prominent while the second part of it is reduced too much. The analysis of phonetic stress variables has demonstrated that in the speech of EFL students terminological word compounds are characterized by a limited number of patterns, both on the paradigmatic and syntagmatic levels of speech production, whereas in the standard native English pronunciation the accentual patterns of such terminological units are more varied. The differences between native and non-native performance can be quantitative (number of stresses within a word) and qualitative (accent placement and degree of word-stress).

Native speakers employ the rules of stressing English words and word combinations automatically whereas non-native speakers cannot be guided by intuition alone. The results of this research show that Russian learners of English tend to simplify the stress patterns of English economic terms using one and the same model all the time with the prominence placed randomly within the accentual pattern of a word-combination. They avoid using several degrees of stress within a compound word. Distortions of stress-patterns ruin the rhythmical pattern of a sentence and thus cause the ruin of prosodic continuity and coherence of an utterance. Our interviews with the students show that they feel frustrated at not finding the pronunciation of special (economic) terms in the references they are using. This fact makes designing of pronunciation dictionaries for ESP highly compelling.

There is one more important problem at issue which cannot be overlooked in the use of English for Specific Purposes on the intercultural level of communication. Foreign learners' competence in the use of a foreign language is very much connected with his ability to speak fluently and with the proper accent. Here the term «accent» is understood as «the cumulative auditory effect of those features of pronunciation which identify where a person is from, regionally or socially» (Crystal 1995: 2). Differences between accents spoken by different groups of people (with different language backgrounds) may be systematic, structural, selectional and realizational (Laver 1994). They are possessed by a majority of this or that accent group. An accent can be regarded as a marked variation of speech constituting a unified entity and betraying the non-native origin of the speaker (in the case of a bi-lingual contact) which can be detected both

in the segmental and the suprasegmental characteristics of oral speech. Most importantly, accents are voice characteristics that immediately attract the attention of people in every day professional communication and influence them, both personally and socially.

Foreign accent in business communication is a topic that has scarcely been touched upon in the general study of the effectiveness of human interaction. However, the success of oral communication is much dependent on the evaluation of a personality, his intelligence, educational background, and his voice. A listener's impression of voice characteristics may affect such crucial areas of social interaction as job opportunities, boss – office-worker relations, international business, etc. The foreign accent 'syndrome' is rather a complicated case of language deficiency. It can't be cured overnight. The inferiority complex accompanying the speaker with a foreign accent makes him/her self-conscious in speech communication, which is a serious drawback, especially in business communication.

The communicative effect of an individual's accent upon a native speaker can be either positive or negative. The quality of speech supplied by the label «foreign accent» can be regarded as one of the cases of speech variation determined by the influence of the mother tongue and revealed through the deviation from the «pattern», which is, in our case, the pronunciation norm of English. The study of interference effects resulting from the overlap of the two prosodic systems (the primary language prosodic pattern and the target language prosodic pattern) presents a lot of data showing a certain prosodic model of accented speech containing both the universal and the specific features of the foreign learner's error performance. Ignoring these differences in the phonetic form may cause serious misunderstandings in the process of professional communication between native and non-native speakers. The social effect of one's voice and pronunciation idiosyncrasies is of great importance. A marked (broad or slight) foreign accent can influence one's life career in many ways (Honey 1989).

The teaching of English pronunciation in a non-native classroom includes a thorough error analysis with a special reference to the effect produced by their foreign accent upon a partner in professional communication, upon the general result of such communication. The «contaminated» portrait of a bilingual speaker belonging to a different speaking community marks him/her in many ways, which may be both obvious and hidden. They deserve to be researched with the aim of making a professional's English adequate for

achieving the desired communicative effect of professional interaction. Since many Russian University graduates nowadays start their business careers in international business they are often facing the three most important problems of effective communication: to be adequately understood (which means to have a good enough standard of English with a minimum degree of Russian accent), to be able to understand the many varieties of English spoken by the representatives of foreign firms (that is to be aware of the diversity of English accents) and, finally, to adequately react to accented speech (especially it refers to telephone talks). Improving one's vocal impression and oral performance is one of the ways to reduce the damage and become a more effective communicator in international or multicultural settings of the modern world.

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SOCIONIM AS A COGNITIVE PRESENTATION OF REALITY

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A study of American geographical and place names reveals some general classes: those embodying personal names, chiefly the surnames of pioneers or of national heroes; those transferred from other and older places, either in the eastern states or in Europe; Indian, Dutch, Spanish, French, German and Scandinavian names; Biblical and mythological names; names descriptive of localities; and names suggested by the local flora, fauna or geology. The names of the first class are perhaps the most numerous. Some consist of surnames standing alone, as Washington, Cleveland, Bismarck, Lafayette, Taylor and Randolph; others are contrived of given names, either alone or in combination, as Louisville, St. Paul, Elizabeth, Johnstown, Charlotte, Williamsburg and Marysville. All our

great cities are surrounded by grotesque Bensonhursts, Bryn Joneses, Smithvales and Krauswoods. The number of towns in the United States bearing women's given names is enormous. Most of these places are small, but there is an Elizabeth with 75,000 population, an Elmira with 40,000, and an Augusta with nearly 45,000. Some place names are very matter-of-fact about natural surroundings. There's Twin Lakes (in six states), Three Lakes (in two states) and even Mosquito Lake (just in Alaska.)

Dinosaur, Colorado also falls into this what-you-see-is-what-you get category. It really is a place where dinosaurs can be found. Sometimes, American place names draw on natural features that aren't merely seen with the eyes, but also perceived by the nose and the tongue. Maybe the well water tasted like diluted candy (Sweetwater). Maybe something in the air smelled like rotten eggs (White Sulphur Springs).

It's interesting to note that Americans have named many towns after tastes they prefer in their diets. Americans are obviously inspired by sugar and salt, but have little regard for spiciness.

There's only one Spiceland (Indiana) amid many sweet-somethings. Salt tops sugar in popularity, though, especially if you count towns named Saline or Salineville (six of them) or Salinas (just one in California.) Cities that were named after people also tend to be unimaginatively named. There should have been a limit on the number Smithfields and Smithlands allowed.

There are numerous cities with names that advertise their supposed wealth in coal, lumber, wheat, corn, raisins and prunes, e.g. towns named Enterprise and the much rarer towns named Success. There are plenty of place names that seem eager to flaunt wealth and status. Comparative analysis of onyms shows linguistic creativeness of speech patterns. The study of Place Names is often connected with the society, peoples, cognition.

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*Materials of Conferences***AL-GAZALI'S RELIGIOUS –
PHILOSOPHICAL VIEW**

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The article considers the religious-philosophical view of Al-Ghazali. Philosophical interpretation of religious views is examined through the prism of comparative analysis of problems of faith and rational thinking, examines the correlation of philosophy and Kalam, the concept of the Creator and the created things in the religious-philosophical views of Al-Ghazali.

Living path through years, left heritage to younger generation peculiar to great thinkers, they are eternal treasure of history, among them I would mention the name of al-Gazali. It is known, that English philosopher Francis Bacon «left his name to future generation and other countries», as well the name of the clergyman al-Gazali is known not only among Arabian moslem culture, but it became the object of the world philosophical research.

The clergyman Mohamed al-Gazali was born in 1058 in the city Tus, Khorasan region, Iran in the ordinary family. His name («al-Gazali») comes from parents craft, they were spinners, the second he was born in Tus city, near Gazali village, but it might not be a true fact (*G.M. Kerimov*). He became orphan at early age and was brought up by his father's friend. The stream of life led him to great thinkers, communicating with them he acquired their knowledge.

The first education he got in his own city by Abul – Kassim Ismail al- Dhurjani (1084), sheih Abu Bakran-Nasati al-Tusu (1094).

Further his research path is connected with one of the intellectual elite centers Nishapur city. In the mentioned center al-Gazali improves his knowledge taking courses from two teachers, they were clergyman in Mekke and Madina («clergyman al-Haramai»), clergyman from asharat al- Dhuvaini (1085) and sufi sheih al-farmadi (1011-1084). The last influenced on him greatly, that later he chose the religious path.

Al-Gazali was highly educated person and his days spent in the palace «Malik – shah Seldjuk» were the most memorable ones. Nizam al-Mulk tried to gather all theologians together in order to solve the religious problems, his aims were to maintain the sunnit islam, famous religious schools «an-Nizamia were opened pursuing this very purpose».

The fact, that al-Gazali got chance to teach at this school is the result of his professionalism. During his work at this school, he got acquainted with several works on philosophy, religion, law.

According to Matem Mohamed al-Dhanabi, al-Gazali life path is not for just accumulation of simple events, but the factor of spiritual development [1]. Heritage of al-Gazali is very deep, to understand his world view, we should consider his historical phase. XI-XII centuries generated controversies of different directions of the islam world. In each direction al-Gazali paid attention to suggested facts. After a long research , analyzing different ideas of philosophers, he became a defender or advocate of islam from philosophers.

According to Suleimen Dunia religious – philosophical view of al- Gazali is divided into three stages

«1) before doubt stage

2) doubt stage, it is divided into two parts: in the first stage doubt is slight, many researchers have experienced it, the second stage – it is experienced by philosophers, (*Al-Gazali searching for truth became ill for two months and he had eleven years of unsettled life L.K.*);

3) calming down and being on the path of truth» [2].

His books are classified into two groups: the first – devoted to kalam, the second, the books containing secret data for those who didn't reach understanding. This classification may be one sided, especially considering difficulties during research. For example, as A. Hismatullin said that there are different arguments concerning al- Gazali's written heritage:

«1. Authenticity of materials, if they really belonged to him».

2. Chronology problem.

3. Private issues evolution view of al – Gazali on the base of textologic analysis.

4. The role of al- Gazali in Sufism development. Here are the issues of his Sufism succession or its absence: questions like, who was his mentor, what direction he follows in Sufism, etc» [3].

These problems occurred because he didn't write his name and there were not signed, to define that he is the author can be determined by the previous reference (A. Hismatullin). Looking through his research works, we find the possibility to define medieval islam philosophy directions.

In medieval East antica the heritage was rapidly growing and it raised the problem of increasing the role of the «mind». Islamic theologians understood

the necessity to communicate in philosophical language, the person who understood this necessity was al-Gazali. He introduced philosophy to Islam religion.

Al-Gazali mastered the ancient Greek philosophy and understood unpleasant moments between religion and philosophy, among them the most dangerous was the idea that philosophy denied the existence of Allah. He criticized Aristotle's, Farabi's and Ibn Sina's philosophy.

The first philosophical works he published in «Makasid al-falasifa, criticism of philosophical views can be found in his work» Tahafut al-falasifa». In the mentioned works he interviews philosophers on 20 problems and considers three of them to be doubtful, the others weak. The first eternal world, the second, lack of education about Allah, about individual phenomena, the third, revival of body. He didn't believe in these things and in principles of reason al-Gazali considered that everything is done by Allah's will. For example, the burning of a cotton, he explains not because of fire, but it is done by Allah. It was strongly criticized by Ibn Rushd. In forming his world view al-Gazali considered that «doubt leads to truth. His skepticism affected western philosophers», mainly R. Dekart.

Researching philosophy he was affected by it, he admitted contradictory views of Aristotle, al-Farabi, Ibn Sina and shared with Platon's view. G.M. Kerimov in his book «al-Gazali and Sufism» analyzed the influence of his philosophy to skepticism and agnosticism. Ibn Sina and al-Farabi tried to solve the problems in «diplomatic» way. Nevertheless, orientalist I. Oberman considers that al-Gazali played essential role to reveal this contradiction, but it wasn't successful [5].

Al-Gazali couldn't find the respond during his life time to «tahafut» devoted to aristotelism, but after his death Ibn Rushd found the answer. «Tahafut» problems can be grouped into two large groups, «interview» concerning natural problems and super natural. The problem they raised related to Allah and this really actual topic of Islam philosophy. Nowadays, according to Ustag M. Yesdi «facts used to prove God's existence can be divided into three categories:

- 1) categories, give reason for Allah signs in this world
- 2) proves existence of unneeded creator by world needs...
- 3) real philosophical proofs, formed by real rational message» [6].

Problems continuing from medieval period mainly, preserved till now.

It is difficult to say his belonging to philosophical or theological direction, because his world view

constantly changed, he opposed to philosophers, asharit and sufi, unlike other sufis he didn't approve sheih.

al-Gazali had dual philosophical view, from the one hand he criticized philosophers, on the other hand he considered Aristotle's logics to be real method to base theology, and later this became controversial problem. Theologians were against logics. Oliver Liman said». He gave the possibility to differentiate philosophy from logics, because theologian considered philosophy as a science which is in doubt about religious truth. Science experienced different variations, there was division as domestic and foreign science. For example, scientific classification mainly coincides with Aristotle's classification, but al-Hvarismi classified sciences as «religious» and «foreign», Ibn Haldune divided as «traditional» and «philosophical». Of course, there would be hindrance if there was any connection between logics and kalam.

Logics considered to be «foreign» science, but it is difficult to imagine «religious» science, kalam without logics. To find the way out from this situation Gazali considered philosophy and logics as separate sciences.

al-Gazali received traditional muslim education at first proved theological regulations. Constant search of truth led him to skeptical view to certain things. Insulted by kalamit, zahirit, batinid philosophers he chose religious way. In most cases sufism understood as individual experience of a human to be close to Allah, and according to Gazali religious person must be brought up by religious values.

al-Farabi and Ibn Sina considered that only education develops human spiritually and actions aren't necessary. So Gazali believes in true way consisting of education and action. Like philosophers, he says that soul is the main part of human, when dying it is separated from body.

According to his view, there are two ways leading to Allah: the first private way of a religious person, the second to carry out religious rituals and customs and to be close to God. His «doubtful» philosophy devoted to scientific problems. From this point, he could differentiate science from religion, he defined the truth through doubt, strongly opposed to philosophers' who didn't believe in Allah.

During al-Gazali time, sunnit dogmatics and religious mystery practice were contradictory, being religious from official ideology had difficulties, so Gazali bases that sufism isn't against official religion, here we are to blame the philosophical view which believes that mind is the main dominant. He states this from his own mystery experience and it helped not to doubt about reli-

gion. al- Gazali says to prove Allah's existence by logical method has no any basis. He emphasizes to prove something reasonably which leads to frustration from religious values and truth dogmats, but mysterious practice helps to believe in correctness of your own way. The main value for Gazali not to contradict to islam fundamentals and to enrich Islamic philosophy.

To consider Gazali as «thinker sufi» controversial issue. (B. Berns). However he was in search of the truth, that is why it is clear that representatives of religious philosophy, kalam and religious mysticism tried to consider him like-minded person. Gazali's religious world view his religious – philosophical view causes scientific interest , mostly western countries are specially interested in sufizm.

According to Ibris shah, in England «sufizm loyalty syndrome» increases, Seid Hussein Nasr said the way out from spiritual crisis in the West can be found in islam, in its high philosophy-sufizm. Of course, above mentioned problems, mysterious

practice of sufizm is revealed in Gazali's experience and it is the theme of several researches.

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*Materials of Conferences***THE STATE AND SOCIETY: INNOVATIVE ASPECTS OF SOCIAL RESPONSIBILITY**

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The new paradigm of social innovation is used in the modern world for the business practices and is a interaction between of private business and society. It implies a favorable and stable development of both parties. Companies are in constant search of new sources of innovation. Some companies implement social innovation on the basis of corporate social responsibility. Business begins to consider the demands of society as an opportunity for the development of new markets and ideas. Every year companies spend enormous resources on identifying innovative ways to develop, to find solutions to problems associated with the reputation and investment attractiveness. The most forward-thinking and progressive company came to the conclusion that the social and economic problems may have multi-dimensional solutions. [2, p. 170–171]. Corporate social responsibility (CSR) starts to play an important role in making up of positive image of the company that allows to speak about growth of efficiency of social investments into business.

Specificity of the Russian environment determines the need to develop their own recipes response to contemporary realities. The world experience in solving similar problems can be be very helpful.

The advanced companies permanently attending to innovations, have transformed processes of framing and testing of new ideas into system which can be accepted and played back practically any organization and is adapted for practice in different countries.

With significance rise no financial factors of sustainable development, such as social stability, ecological safety and others, are becomes relevant practical and theoretical aspects of corporate social responsibility. The job for over problems of social sector forces the companies to develop capabilities to design of the innovations supplying return both for business, and for society. When the companies approach to social problems thus, they assume a share of responsibility for their solution and attend to them the same as also any other project, important for their operating performance. The similar approach should be considered not as charity, such researches and designs are strategic investments into business.

There are many of the problems hindering implementation of principles of social responsibility of business in Russia. First, it is underestimation

from management of interrelation of socially responsible behavior and possibilities of creation of positive image of the company improving its competitiveness and investment attractiveness. At the same time, economic efficiency of implementation of principles of corporate social responsibility is underestimated and firms, and stakeholders too.

Other aspect of such problems is insufficient level of business culture of business community and the public, that also does not allow to evaluate adequately operation of the companies within the limits of socially responsible programs. In Russian practice the opinion of top management that following to principles CSR distracts resources from problem solving on upgrade and manufacturing re-structuring is stable. The main condition necessary for developing of new, socially responsible principles of business behavior, making up of a purposeful state policy in sphere of corporate social responsibility, support, including budgetary-tax instruments, the companies building the activity on these principles [3, p. 78–79].

Design and implantation of a reasonable and effective policy of social responsibility of business can promote an adjudicating of the Russian firms on international scene, to fluctuation of negative stereotypes, making up of positive image of Russian firms and growth of possibilities of combination of a market policy and social orientation of business structures. The positive reputation can be favorable to any company from the point of view of access to financial, informational and human resources.

Research activities allow to designate four levels of social responsibility for which the organization can apply:

1. Social obstruction. In this situation the company apply a minimum of efforts or do not apply them at all for the permission of social problems and ecology problems. When such company intersects legal or ethical boundary which separates comprehensible practice from unacceptable, negation and hiding of the operations can be its response.

2. Social obligations. This item switches on the operations of the organization routed only on discharge of the obligation is strict within the limits of the legislation. Management of such company insists that their main purpose – profit maximization.

3. Social response. The company which accepts such type of responsibility, not only meets legal and ethical requests, but on occasion goes further these requests. Company can voluntary participate in social programs, but is independent them does not initiate.

4. Social contribution. The company, which select such approach, take over the liabilities on social

responsibility and independently initiate realization of actions within the limits of socially responsible behavior [1, p. 106].

Following to a social rate, for the majority of Russian people, is narrowed and means availability of obligations from the companies into relation to staff. Simultaneously, workers not always positively perceive occurrence of obligations concerning the company – the employer. Such one-sided approach to understanding of a role of business in system of social and economic ratios reduces rates and efficiency of implantation of socially responsible innovations. The understanding of corporate social responsibility within the limits of a new paradigm is concluded in the concept of voluntary integration social and an environmental policy in complex business – operations.

Mutual relations with all circle of the interested parties linked by interaction of society and business, meet, as many research and development or innovative projects, many problems linked to misunderstanding and a vagueness, initially inherent in innovations. Ambiguous response is called by attempts to make, what anybody never didn't make, therefore initial design schedules are perceived as certain positive suppositions, instead of the reasonable forecasts. Sometimes efforts of companies in search of innovations in the social sector depreciate the critics representing them by units PR [2, p. 189]. Actually, constant readiness of business to designate resources, first of all means acquisition of new knowledge and capabilities which result from innovations.

In Russia the main task of developing of interaction of business, society and the power, creation of the favorable environment for developing of the business rendering, in turn, significant, and in many respects determining influence on developing of society. Business, being a structural part of society, should not narrow down the functions before profit maximization. Exhibition of social responsibility of business should be perceived at the present stage as mutually advantageous cooperation both for it, and for society and the state. As it was already marked, socially responsible behavior allows for companies to strengthen the image and reputation, to increase quality of management and investment attractiveness.

However, to generate conditions for productive job of a new paradigm of partnership and interaction of private and public interests within the limits of CSR, is necessary to supply transparent and accurate conditions for business, guarantees of observance of validity between partners, investment attractiveness for all sides of process, and also to convince business up the states to maintenance of the future results.

One of the main purposes of complex social policy is population improvement of the quality of life, a work and employment nondiscrimination, the help to the most vulnerable levels of population, and as reaching of social justice and social solidarity in society. Traditionally, reaching of these purposes was assigned to the State in the escalating of transfer payments. Such form of fulfillment of a social role reduces efficiency of economy as a whole, reconstituting financial streams.

The state structures of the Russian Federation acting on behalf of socially disadvantaged groups, and therefore are forced to reduce some of the factors of economic growth to the near future [4, p. 30]. This indicates that exist the objective need to connect businesses to participate in the formation of socially responsible society. The requirement for re-structuring of the Russian economy, for fluctuation of its character as the significant part of the State expenditure in social policy sphere was used insufficiently ineffectively [4, p. 57]. The state intend to prolong socially oriented projects in a sphere of education, health, agriculture and housing policies, these directions have not lost an urgency, however mechanisms of their implantation it is necessary to revise with allowance for private sector calls for funds. The considered aspects also are the contents of a policy of upgrade and innovative developing [4, p. 60] in the field of social sphere.

State support for business initiatives in the field of social innovation can ensure social harmony and achieving an acceptable level of economic growth. The implementation of this innovative paradigm will help to achieve social justice and economic efficiency in society.

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