

der twelve months is hardly able to ground food in his mouth, and his digestive system is not morphologically mature and fully functional yet. Knowledge of rheological behaviour of the disperse systems allows us to satisfy these requirements. We have studied rheological properties of canned fish-and-vegetable food and canned fish monoproducts to identify the effect of various factors on their stability. It is found that the optimal thickness characterizes systems with the viscosity values in the range of  $\tau_s$ , Pa 350 – 900, shear stress  $\eta^0$ , Pa·c 250 – 700, and the particle size of 15 - 75  $\mu\text{m}$ . The specified values are "recommended parameters", which characterize the optimal thickness of the product and are used to monitor the quality under production conditions.

In order to broaden the baby food range, we make researches to develop recipes of fish soups. It is well known that soups are traditionally the main course in our country. The aim of it is to prepare the child's digestive system to protein food. Soups stimulate appetite and activate the gastric juice secretion. Fish and meat soups have a marked effect on the secretion due to the high content of extractive substances (e.g. amino acids, purin bases, etc.). there are special nutrient-technological recommendations on development of soups appropriate to the needs of young babies: the protein fraction should make 3-5 g of total mass, while dry substances in a pureed soup should make 10-15% (in traditional soup with components chopped into small bits – 5-15%), content of amino acids and fatty acids should correspond to the physiological needs of infants. According to standards set by the Federal Research Institute of Nutrition (RAS), pureed soups are introduced when a baby has attained twelve months and traditional soups/ soups with fish balls could be given to a baby from eighteen months onwards.

Our studies allowed us to develop six recipes of soups with optimal content of amino acids and fatty acids for different stages of development of the infant digestive system. The soups have good organoleptic parameters and satisfy the federal recommendations.

Introduction of the developed technologies for production of new sorts of baby canned food products will contribute to provision of babies with foodstuff appropriate to their physiological needs for nutrients and energy.

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#### UNLOADING GRAIN FROM BUNKER BY SPIRAL-SCREW CONVEYOR

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In bunkers spiral-screwed conveyors are applied to storage of grain at unloading in casings, and also without casings. For reduction of capacity of a drive above a spiral stabilizing plates at various height from it can be installed.

By preliminary researches it is established that grain is unloaded by spiral-screwed working body from that site of the bunker which is most removed from unloading windows. It is necessary to explain the reason of this phenomenon to that the material a screw surface of a spring moves more actively, than the material which is being above the given layer, not having thus of free space for the expiration.

Grain acts in space of a rotating spring and mixes up in an axial direction up to unloading apertures. Speed of movement of layers of grain is not identical and as a result movements of a grain stream the active layer which reason is force of internal friction is formed.

Proceeding from complex internal essence of a bulk material which separate particles are bodies, and all weight has aspiration to current, for the description of behaviour of a "current" loose material it is convenient to assimilate to its some viscous liquid with average, volumetric density and factor of viscosity (internal friction). On the basis of the accepted hydromechanical model dynamics of a loose body can be described the equations similar to equations Navie - Stoks for a viscous liquid.

The received analytical dependences allow to find distribution of speeds at movement of a grain material and to explain features of its unloading from the bunker. Also it is received, that submission of the spiral-screwed conveyor at an unloading of grain from the bunker without a casing in comparison with a casing increases due to an active layer almost twice at the same parameters of a spring and angular speeds of its rotation.

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#### PROBLEMS OF SECONDARY ENERGY RESOURCES SALVAGING AT PETROCHEMICAL INDUSTRY ENTERPRISES

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For petrochemical industry enterprises the main energy resources use efficiency upgrading direc-

tions for the moment are: a) the energy resources and secondary energy resources use accounting and control system creation; b) the performance analysis and technology updating; c) the exchange of earlier technologies and equipment for advanced ones; d) the energy saving organization on the basis of energy-engineering combination principles.

At the petrochemical industry enterprises the waste energy use is provided, but the degree of their utilization and directions of use are imperfect for the most part imperfect and require a further elaboration.

From the main waste energy use trends adduced in scientific literature only the following ones can be recommended to the industrial isopropyl benzene production: a) the process stream warming-up in the primary and secondary processes; b) the production area and dwelling heating; c) the source and chemically purified water warming-up; d) the ventilation systems' air heating; e) the waste vapor compression heat pump system use within the product and semiproduct dispenser and recovery systems; f) the various parameter cold production; g) the water vapor production.

The exergy method of thermodynamic analysis has a good, constantly developed methodical base and is widely used for the analysis and evaluation of the heat and power systems' thermodynamic perfection.

When developing new energy saving technologies they usually confine themselves to the modernization of separate elements of heat and technology schemes, pay insufficient attention to the creation of integrated systems of heat and refrigeration supply enterprises inclusive of those using low-potential secondary energy resources.

The share of waste energy consumption from the waste treatment facilities is very low nowadays and makes at the average 8-10%. At the high-temperature technology enterprises the share of internal waste sources heat production achieves 50% of the total heat consumption. At the low-temperature processing the utilized heat consumption share makes total only 4-8%.

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#### **CAP STONE BREAKING-OUT PERFORMANCE SAFETY METHODS**

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The principle of providing comfortable conditions of work at a mining venture is the development

and introduction of techniques and technologies of breaking out useful minerals excluding the occurrence and influence of negative factors of production on the human body. Thereat, it is necessary to take into account that the main reason of traumatism consists in the subjective attitude of the human to hazardous factors of production, and that of morbidity – in the efficiency of preventive measures against harmful production factors and the human's personal physiological features.

At the procurement of natural stone the drilling-and-blasting, drilling-and-wedge and drilling mud methods with unexplosive destroying compositions, cutting with rope and rotary saws, ring cutters, bars and thermal spalling are the most popular ones. The drilling-and-wedge method is applied at the hard rocks procurement, but very seldom – independently. At the procurement of average and low strength stone the cutting method gained its popularity. The drilling-and-wedge method in the specified case is tended to be changed by highly mechanized methods. In the open cast mines, where natural stone is broken off by cutting, it is used in supplementary works, when stabilizing monoliths or giving them a regular form.

A comparative evaluation of all the cap stone breaking-out methods being currently in use has been carried out, inclusive of the method based on plastic substances application. The worksites were certificated on microclimatic, vibration and noise working conditions; the severity and intensity of physical labour mechanized forms being also analyzed.

It follows from the analysis carried out that the work performance using all the considered breaking-out methods, exclusive of thermal spalling, doesn't promote the above-level change of temperature, speed and air humidity of the operating space, provides optimal well-being at the existing effective and effective-equivalent temperatures. The design features of the equipment used at the cap stone breaking-out drilling methods condition optimal and permissive labour provision on the vibration action. By contrast to this, the performance of work using methods based on cutting and thermal spalling is connected with the above-level vibration action, that is partially compensated by the absence of a permanent contact of the worker with the cutting tool and short-run static holdup of the thermal spalling plants during the work. The noise characteristics of the equipment applied at drilling, cutting and thermal spalling exceed the exposure limits. The worst factors are referred to the thermal spalling, that is connected with giving and burning of the hydrocarbon fuel jet under heavy pressure. However, the above-level noise of perforators, rock breakers and explosions at the natural mineral breaking-out drilling methods is mainly low-frequency and broadband unlike high-frequency and narrowband noise of rope and rotary saws, ring cutters and bar machines. This points to the fact that the above-level noise associated with the application of natural stone breaking-out