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# JPRS Report

# Science & Technology

## USSR: Chemistry



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# SCIENCE & TECHNOLOGY

# USSR: CHEMISTRY

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INORGANIC COMPOUNDS

/9835

# NPO 'AEROZOL': PROBLEMS AND POSSIBILITIES

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 86 pp 759-760

[Article by L. G. Boldyreva]

[Abstract] Some of the problems and successes of the title scientific production association are discussed in a dialogue between the author and Ya. K. Yanson, R&D department head. The Riga association is 1.5 years old and is engaged in production of aerosolized household goods such as deodorants, hair sprays, furniture polish and insecticides. The assortment of products is said to be competitive with capitalist countries, but supply cannot keep up with demand in the area of deodorants, especially. This is partly due to a shortage in aerosol spray jets and distribution problems.

12765/9835
CSO: 1841/155

# CHEMICAL IMPURITY DETECTION METHOD FOR METALLURGY AND BIOLOGY

Tashkent PRAVDA VOSTOKA in Russian 9 Jun 87 p 1

[Article by L. Tokarev, correspondent (Samarkand)]

[Text] Metallurgists have received a precision tool for determining the quality of pig iron, steel and other alloys. This new method, which was developed by chemists of Samarkand State University (SamGU), makes it possible to detect, in a single procedure, the presence in these metals of the tiniest portions of magnesium, manganese, copper and rare-earth elements. The new method has been adopted by scientists of the Central Scientific Research Institute of Ferrous Metals in Sverdlovsk who produce standard chemically-pure alloys.

"Hundreds of methods of analyzing impurity contents are known to specialists," said V. A. Alekseyevskiy, docent of SamGU's school of chemistry and one of the development's authors. "But all of these methods have an essential shortcoming: each one detects only certain elements. Researchers employ three different methods to find out if an alloy contains copper, manganese or cerium, for example. Moreover, each researcher introduces his own subjective error into the end result, and none of the old methods is precise enough. A single laboratory technician can now distinguish all three components, using a single method of analysis."

The Samarkand scientists solved the problem by employing a mixed set of solutions of common chemical substances--so-called beta-diketonate adducts. In the process, research precision was heightened 10-fold; the rate of analyses was increased three-fold and their cost was lowered by two-thirds.

Metallurgists are not the only ones who have begun to employ the new method. It has been introduced simultaneously by foundry workers of the "Krasnyy Dvigatel" plant in Samarkand and at the Uzbek Scientific Research Institute of Veterinary Science, for example. The method can be used to determine the presence of various elements (of Mendeleyev's table) in rocks, minerals, wheat and barley, and in the blood of human beings and animlas,

The innovation will also become a good aid in services that monitor the condition of the environment. Precisely which enterprises have become

sources of pollution can now be determined much more quickly and accurately on the basis of the composition of chemical substances discovered in bodies of water.

/9835
CSO: 1841/424-E

# IDENTIFICATION OF LARGE STRUCTURAL FRAGMENTS OF UNKNOWN COMPOUNDS FROM COMPUTER ANALYSIS OF MASS AND C-13 NMR SPECTRA

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK in Russian Vol 5, No 2, Mar-Apr 87

[Article by I. I. Strokov, I. V. Gritsenko and K. S. Lebedev, Institute of Organic Chemistry and Scientific Information Center for Molecular Spectroscopy, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] A description is provided of structural elucidation of unknown compounds, based on computer analysis of mass and C-13 NMR spectra. The data bank utilized a library of mass spectroscopic information in conjunction with C-13 NMR correlation tables. The method was found suitable for identification of large structural fragments. Both group and individual identifications were possible based on some 23,000 mass spectra and NMR data on 5000 structures. Figures 2; references 15: 6 Russian, 9 Western.

12172/9835
CSO: 1841/379

SPIRAL-SHAPED MEMBRANE CATALYSTS

Moscow ZNANIYE - SILA in Russian No 3, Mar 87 pp 22-23

[Unattributed article; "Small but Precious"]

[Text] Perhaps not everyone has heard of the hydrogenation reaction, that is, the addition of hydrogen to molecules with double or triple bonds between carbon atoms, but everyone certainly has seen the results of this reaction. For example, polyethylene can be obtained only from ethylene liberated from the constituent acetylene, for which acetylene is selectively hydrogenated.

Especially high requirements for selectivity of hydrogenation are imposed in the production of chemical reagents, synthetic perfumes, and pharmaceutical preparations. The figure goes in all to kilograms, and thus the value of these substances is enormous. Many of them up to now have been obtained by the unproductive and difficult-to-automate batched method in expensive high pressure apparatus--autoclaves.

Membrane catalysts developed by the joint efforts of a number of academic and industry sector institutes help make the process continuous and carry it out in one stage instead of several.

The simplest kind of such catalysts is a tube made of papalladium alloy 1 millimeter in diameter and with a wall thickness up to 0.1 millimeter.

However, in order to make the chemical reactor, it is necessary to know in addition how to pack in it this very thin tube. And perhaps, foil is preferable? It is easier to manufacture, and it can be thinner than the walls of the tube. On the other hand, foil is flimsy, and it is necessary to crimp it, and this requires high precision dies: it is bent when hot reagents flow around it. The reactor is obtained by a very complex method of manufacture. It is somewhat easier to manufacture it with a membrane catalyst made of straight, thin-walled tubes, but this is the trouble--the differences in the degree of temperature elongation of the tubes and the housing of the reactor do not allow them to be attached to the housing at both ends; otherwise, they can tear. As a result, a design is obtained such that a considerable proportion of the external surface of the tubes, which also has a catalytic effect, is used poorly.

Scientists of the Design Bureau Section of the Petrochemical Synthesis Institute imeni A. V. Topchiyev of the USSR Academy of Sciences resolved the problem by using tubes in the form of a double spiral. The spirals are twisted by means of a special unit without filling the tubes. The flat spirals obtained are superimposed upon each other, whereupon the ends of all the odd spirals are joined to one pair of the tube collectors, and the ends of the even spirals, to the other pair. A spiral about 10 centimeters in diameter is obtained from a tube 3 meters in length. Two hundred spirals stacked on top of each other also comprise the filling of a chemical reactor hardly larger than a 3-liter jar.

Tests of the small reactor gave big results. For example, according to the usual technology, Vitamin K is obtained in four steps, and by means of the membrane catalyst--in one. And at the same time, the yield of the final product is raised from 80 to 95-98 percent. Linalyl is obtained on the reactor; it is a liquid with the aroma of lily of the valley and is indispensable to the perfume industry and to pharmaceuticals, where cygerol, a powerful medicine for burns and ulcers, is obtained from it. Previously, linalyl was obtained from coriander seed oil, and it cost twice as much.

And these are only the first steps. Who knows to what height the thin-tube spiral will reach.



12410/9835
CSO: 1841/365

UDC 536.75:541.128.7

# BIFURCATIONAL ANALYSIS OF AUTO-OSCILLATING MODEL OF SYSTEM POTASSIUM IODATE - HYDROGEN PEROXIDE - CYSTEINE - SULFURIC ACID

Kiev TEORETICHESKAYA I EKSPERIMENTALNAYA KHIMIYA in Russian Vol 22, No 6, Nov-Dec 86 (manuscript received 8 Jul 85) pp 667-673

[Article by Ye. V. Protopopov and T. S. Zuyeva, Chernovitskiy University]

[Abstract] A "reversible bond" mechanism is required in a homogeneous chemical system in order for a periodic process to take place. In an auto-oscillating model of the title reaction for three alternating concentrations of iodine, dissolved oxygen and cysteine, it is achieved as a result of the auto-catalytic stages of hydrogen peroxide oxidation by the iodate compounds, selective inhibition due to recombination of radicals, accumulation of dissolved oxygen, and reverse single electron transfer within the cysteine groups. A mathematical model, based on bifurcational analysis of the title system, was created, and criteria for determining and measuring a limiting cycle in the phase regions of concentrations in alternating systems were determined. The number and type of stability of stationary states were also determined. Figures 1; references 10: 9 Russian, 1 Western.

12765/9835
CSO: 1841/185

UDC 66.097.3.001:(549.61:546.28)

STUDY OF CATALYTIC PROPERTIES OF ULTRA-HIGH-SILICA ZEOLITES IN CERTAIN CARBONIUM ION TYPE REACTIONS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 4, Apr 86 (manuscript received 3 Dec 84) pp 769-773

[Article by N. R. Bursian, S. B. Kogan, Yu. A. Shavandin, N. V. Aleksandrova and V. K. Daragan, Leningrad Scientific-Production Association "Lenneftekhim"]

[Abstract] Ultra-high-silica zeolites of the ZSM type are widely used abroad as catalysts or catalyst components for a number of petrochemical processes. In the present work a study was made of the catalytic properties of domestically produced ultra-high-silica catalysts of type TsVM, TsVK and ZSM in carbonium ion type reactions of disproportionation (polymolecular hydrocracking) and isomerization of n-paraffins and disproportionation of toluene. Since mordenite-based catalysts are normally used in industrial isomerization of n-paraffins and disproportionation of toluene, the ultra-high-silica catalysts were also compared with mordenite-containing samples. For n-hexane converion, the H-ZSM zeolite exhibited greater selectivity and activity than mordenite, while for platinum-containing zeolites, H-mordenite catalysts showed the maximum activity. An attempt to explain the effect on the basis of differences in the chemistry of carbonium ion formation is presented. References 6 (Russian).

12765/9835
CSO: 1841/571

UDC 678.057.3

EFFECT OF FRICTION AGAINST DIE WALLS ON POROSITY OF EXTRUDED CATALYSTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 4, Apr 86 (manuscript received 20 Mar 85) pp 943-945

[Article by V. A. Samusenko]

[Abstract] A study was made of the relationship of the coefficient of friction to shaping pressure and pore distribution in aluminum hydroxide and high-silica zeolite catalysts shaped by extrusion through stainless steel and teflon dies. Catalyst paste of given moisture content was divided into two portions, extruded through steel and teflon dies, and the resulting catalyst cord was dried for 24 hours and broken into pellets. Total pore volume was determined by saturation of the pellets in kerosene. Non-uniformity of pore size within the bulk of the pellets is largely a function of adhesion of the

shaped catalyst mass to the die walls. The lower coefficient of non-uniformity of pore size distribution in pellets shaped through a metallic die as compared to that of teflon is due to the higher adhesion force of the shaped material to the walls of the die. Figure 1; references 3: 1 Russian, 2 Western.

12765/9835
CSO: 1841/571

UDC 542.943.7:547.313+547.92

EFFECT OF IMMOBILIZATION ON CATALYTIC PROPERTIES OF MANGANESE ACETATE PARA-(TETRAAMINOPHENYL)PORPHYRINATE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 6, Oct 86 (manuscript recieved 24 Dec 85) pp 1383-1386

[Article by A. B. Solovyeva, A. I. Samokhvalova, T. S. Lebedeva, V. S. Pshezhetskiy, L. V. Karmilova and Academician N. S. Yenikolopyan, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] Immobilization of catalytically active compounds on polymeric carriers makes it possible to separate the catalytically converted products from the catalyst by ultracentrifuging. In this case, if additional binding of the substrate to polymer molecules results in a growth in the specific activity of the catalytic site (polymer effect), the immobilization becomes even more effective. In the present work chemically immobilized manganese acetate tetra-p-aminophenylporphyrinate (TAFPMnAc) was synthesized on various polymeric supports, and its catalytic properties in oxidation reactions of cholesterol with molecular oxygen were studied. The immobilization was found to increase the catalytic effect within a narrow temperature range, the magnitude of the effect being a function of the hydrophilic and hydrophobic properties of groups on catalyst macromolecules and the content of TAFPMnAc. Figure 1; references 5: 4 Russian, 1 Western.

12765/9835
CSO: 1841/146

USSR CHEMICAL INDUSTRY

Moscow AGITATOR in Russian No 9, May 87 pp 25-27

[Article by V. Shishkin, deputy chief of the Chemical Industry Department of USSR Gosplan: "Chemistry for the National Economy"]

[Text] Enterprises of the chemical industry (including here and throughout the petrochemical industry) in the first year of the five-year plan have achieved some increase in the growth rates and absolute indicators of production. Its total volume grew by 5.9 percent as compared to 4.8 percent indicated in the plan. The highest of them was the manufacture and delivery to consumers of 160,000 metric tons of phosphate fertilizers, 360,000 metric tons of sulfuric acid, about 9,000 metric tons of chemical fibers and filaments, 1.3 million pairs of rubber footwear, and 90,000 tires, for 90 million rubles of goods of cultural, general and household purpose. The whole rise in production was obtained because of the increase in labor productivity.

In addition, serious defects in the work of the branch have not yet been overcome. Approximately one-third of the enterprises did not meet plans for the implementation of production in conformity with awarded contracts. Most of all, this is related to nonfulfillment of the plan for the production of mineral fertilizers, caustic soda and soda ash, and synthetic resins and plastics. The associations and plants in Bobruysk, Belaya, Tserkov, Voronezh, Leningrad and Chimkent turned out fewer tires than specified in the plan. About 9 percent of the sector collectives did not fulfill the tasks for an increase in labor productivity. Among them are the Barnaul Chemical Fiber Production Association, the Yavorsk Sulfur Production Association, the Navoi Electrochemical Plant, and the Rossosh Chemical Plant. The financial position of a number of enterprises which had not fulfilled their tasks for production cost and profit was unstable. The Tajik Chemical Industry Association, the Crimean Titan Association, the Zima Chemical Plant and the Sivash Aniline Dye Plant remain unprofitable.

These and other failures in work are explained in part by delays in different kinds of raw materials, other materials, energy resoures, railroad cars, and tank cars. But the main reason is the low rates of restructuring on the level of modern requirements. At many enterprises, equipment is poorly used, infractions of the industrial system are allowed, and new capacities are

developed slowly. Thus, the new industrial plants placed in operation at the Chimkent Tire and Barnaul Chemical Fiber associations are utilized at an extremely low level. At the Gnodno and Dneprodzerzhinsk Nitrogen Associations, the Gorlovka Styrene Association, and the Cherepovets Nitrogen Fertilizer Plant put in operation as early as 1984, units for ammonia production have not worked continuously because of the unreliability of compressors and other equipment. An installation for the production of polyvinyl chloride bulit in 1983 at the Zima Chemical Plant is still not utilized at this time. And there are many such examples in the sector.

This year the chemical industry, according to plan, must increase the output of production by 3.8 percent, including the production of chemical plant protection agents by 4, mineral fertilizers by 4.1, rubber footwear by 4.3, synthetic resins and plastics by 6.4, and chemical fibers and filaments by 6.7 percent. Scientific and technical progress and the development and augmentation of the output of new advanced products have to be accelerated in the sector. In particular, the output of membrane materials will increase for various purposes in sectors of the agroindustrial complex and the medicinal industry and for use in modules for water desalination and obtaining extra-pure water required by the power, machine building, and electronics industries. New forms of fertilizers which do not have analogues in the USSR are being developed, and new industrial processes are being adopted for the production of highly effective herbicides. The output of a new kind of synthetic rubber which completely replaces natural rubber and which is the first in the USSR is planned for development. An accelerated rise in the production of motor vehicle tires of radial construction with a longer service life will be continued.

These and other tasks are achieved by substantial development and improvement in the material and engineering base of the sector. In comparison with 1986, expenditures for technical reequipment and redesigning of existing enterprises will increase by 47 percent. For example, the Kemerovo Nitrogen Association and the Rossoshanskiy Chemical Plant are planning to place large-scale units into operation for the production of ammonia and the Slavyansk Chemical Industry Association and the Crimean Soda Plant for the output of soda ash. But a large share of the increase in production must and should be provided by means of better use of present capacities, continuous and trouble-free work of the units, elimination of waste, and increasing expenditures for raw materials and other materials per unit of production.

Namely, socialist obligations of the advanced collectives aim at this for fulfillment of the tasks of the 12th Five-Year Plan ahead of time and worthy meeting of the 70th anniversary of the October Revolution. Workers of the Dnepro Tire Association, preparing for conversion to full self-financing [khozraschet], have unfurled improvement under the motto "The 12th Five-Year Plan is a creative quest; high rates and quality, economy, and discipline at every workplace." The collective pledged, on the basis of the intensification and modernization of equipment and the adoption of advanced methods of labor, to raise a production volume a whole increment by means of an increase in labor productivity and even by decreasing the labor force by 600 persons. It is planned by the end of the Five-Year Plan to provide the

whole output of production subject to certification with the State Emblem of Quality. This year the collective plans to manufacture and achieve above plan 40,000 tires at 3 million rubles, including 35,000 tires for the 70th anniversary of the October Revolution. Not less than 60 percent of the above-plan production must be manufactured from economized raw materials and other materials. A number of enterprises of the sector and many teams have already taken on this initiative.

Leader G. K. Baranova of the team for procurement of production of rubber footwear of the Leningrad Red Triangle Association pledged to fulfill two and a half years of the Five-Year Plan by November 7. The collective of the explosive drilling team of the first ore administration of the Ural Potassium Association headed by Hero of Socialist Labor N. P. Savchuk, because of better organization of labor and exact observation of the technology of mining, also pledged to fulfill two and a half years of the plan for the October anniversary. And O. A. Narovskaya, spinner of the Daugavpils Chemical Fiber Association and Hero of Socialist Labor, and V. N. Borovik, set-up person for the textile shop of the Zhitomir Chemical Fiber Plant, undertook to fulfill three and a half years of the program by this date. In the enterprises of the sector located in the BSSR, 450 teams and shops and about 6,000 workers pledge to fulfill two years of the task of the Five-Year Plan for the anniversary.

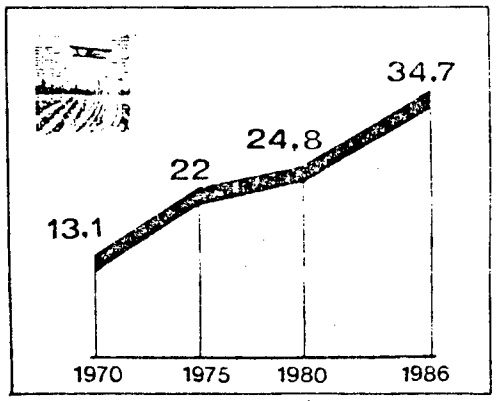
The best of the best collectives according to the results of All-Union Social Competition for 1986 were awarded Challenge Cups by the Red Banners of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Trade Unions, and the All-Union Komsomol. Among them are the Volzhsk Organic Synthesis Association imeni 60th Anniversary of the USSR, the Slavgorod Altay Chemical Industry Association imeni V. S. Yereshchagin, the Voskresensk Mineral Fertilizer Association imeni V. V. Kuybyshev, the Ionava Nitrogen Association imeni 25th CPSU Congress, the Sumy Chemical Industry Association imeni 50th Anniversary of the Great October Socialist Revolution, the Dnepropetrovsk Dnepro Tire association imeni 25th CPSU Congress, the Kiev Red Rubber Workers Association, the Omsk Tire Association, the Yerevan Armbytkhim [Armenian Household Chemicals] Association, the Dnepropetrovsk Paint and Varnish Association imeni M. V. Lomonosov, the Cherkassk Chemical Reagents Association imeni 25th CPSU Congress, the Kazan Synthetic Rubber Association imeni S. M. Kirov, the Moscow Tire Association, and the Tomsk Vulcanized Rubber Footwear Association.

The duty of all collectives of the chemical industry is to master successfully the intensive plans and obligations of 1987. Meanwhile, in the first quarter, many enterprises and even whole subsectors have disrupted the plan tasks. Here, finally, hard frosts also had an effect, but indeed they are not unexpected in the majority of zones of the USSR. In a number of enterprises, product quality did not correspond to the requirements of agencies of state acceptance, although they could have been prepared well in advance, not relying on chance, for this strict examination.

As in other sectors, in the chemical industry the average monthly wages of industry-production personnel are rising steadily: 1965, 107.6 rubles; 1970, 136.9 rubles; 1980, 183.2 rubles; and 1985, 204 rubles. It is also

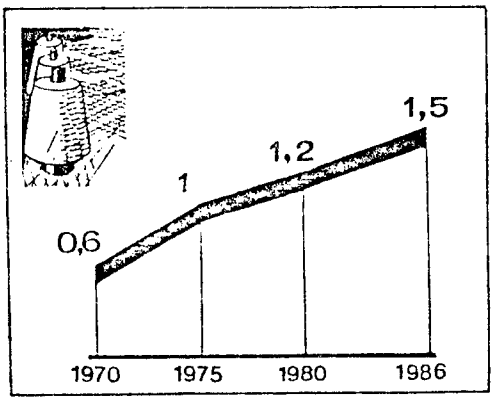
rising in the current Five-Year Plan. Thus, it should be the policy everywhere that every ruble is actually earned in order for labor productivity to rise faster and in order for the national economy and the people to obtain better quality chemical products for industrial and consumer purposes.

МИНЕРАЛЬНЫЕ УДОБРЕНИЯ (в пересчете на 100 процентов питательных веществ, миллионов тонн)



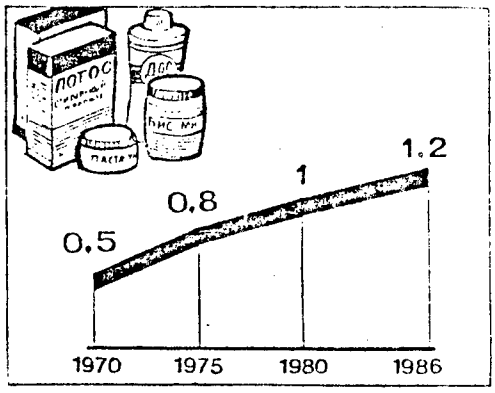

Mineral Fertilizers [converted to 100 percent of nutrients, millions of tons]

ХИМИЧЕСКИЕ ВОЛОКНА И НИТИ (миллионов тонн)




Chemical Fibers and Fertilizers [millions of tons]

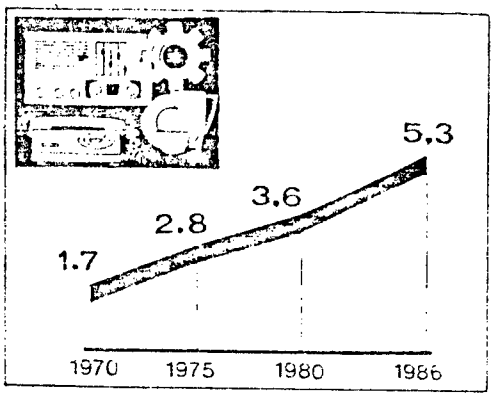
СИНТЕТИЧЕСКИЕ МОЮЩИЕ СРЕДСТВА (миллионов тонн)



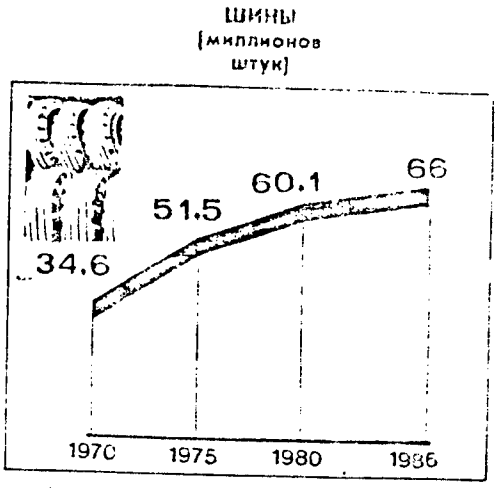

Synthetic Detergents [millions of tons]

Synthetic Resins and Plastics (millions of tons)

СИНТЕТИЧЕСКИЕ СМОЛЫ И ПЛАСТИЧЕСКИЕ МАССЫ (миллионов тонн)



Tires [millions of tons]






12410/9835
CSO: 1841/397

# ACTIVITIES OF CHEMICAL AND TECHNOLOGICAL SCIENCES DEPARTMENT OF KAZAKH SSR ACADEMY OF SCIENCES

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 4, Apr 87 pp 7-10

[Unattributed report: "On the Progress of Reorganization and Results of Scientific and Organizational Activities of Institutions of the Chemical and Technological Sciences Department of the Kazakh SSR Academy of Sciences in 1986 in the Light of the Resolutions of the 27th CPSU Congress and 16th Congress of the Communist Party of Kazakhstan"]

[Text] The department of chemical and technological sciences and its scientific institutions have done some work on clarifying the main directions in the development of the chemical and metallurgical sciences, on the improvement of the structure and research topics of the institutes and successful completion of the planned tasks of 1986.

The department has four scientific institutions with 1893 members, including forty-three doctors and 372 candidates of science, 744 scientists and 62 regular and correspondence graduate students.

The People's Control Committee of the Kazakh SSR revealed serious defects in the organization of scientific studies and estimation of the effectiveness of introduced research work in 1986 in the Metallurgy and Ore Dressing Institute and the Petroleum and Natural Salts chemistry Institute (resolution of 11 Apr 86). These facts were also reported in PRAVDA articles (20 Aug 86, 5 Nov 86). Specifically, serious distortions were revealed in the reports on economic effectiveness of a new technology for the recovery of high-paraffin-base oil by graduated thermal flooding (16 million rubles) in the development of which the Petroleum and Natural Salts Chemistry Institute did not participate.

The Metallurgy and Ore Dressing Institute submitted documents on the economic effectiveness of research results introduced at the Plant "Ukrtsink" [Ukrainian Zinc Plant] in the amount of 38 million rubles, while the actual economic effect, according to the data of the People's Control Committee of the Kazakh SSR, amounted to 0.7 million. The economic effect of 3.2 million rubles from the introduction of two types of lead accumulators developed by the institute at the Taldy-Kurgan Lead Accumulator Plant also turned out to be fictitious. The resolution of the People's Control Committee of the Kazakh SSR and the PRAVDA articles were discussed at bureau meetings of the

department, the annual session of the general meeting of the Chemical and Technological Sciences Department, and at scientific councils and open party meetings of the institute. The culprits were severely punished: director of the Petroleum and Natural Salts Chemistry Institute M. D. Diarov, his deputy B. F. Anisimov, as well as the deputy director of the Metallurgy and Ore Dressing Institute B. B. Beysembayev were relieved of their posts. M. D. Diarov, B. B. Beysembayev and IMO [Metallurgy and Ore Dressing Institute] laboratory director I. R. Polyvyannyy were severely reprimanded and fined. Effective measures are being implemented to eliminate all detected faults.

In 1986, research topics in the institutes of the department were defined more precisely, a number of topics were combined or expanded, low-priority projects were eliminated, serious attention was given to providing more personnel and equipment for projects connected with the priority directions and integrated programs. The most important projects for the Twelfth Five-Year Plan were defined for all institutes. Studies on fourteen topics based on the resolutions of the CPSU Central Committee and the USSR Council of Ministers have been started for 1986-1990. Among the 82 topics studied by the scientific institutions of the department in 1986, 29 topics were in connection with 13 programs of the USSR GKNT [State Committee on Science and Technology], and 19 topics were in connection with eight republic programs. It was decided that OKhTM [Chemical and Technological Sciences Department] were to be head institutes in five republic programs.

In 1986, participation of the Metallurgy and Ore Dressing Institute and the Chemical Sciences Institute in the Engineering and Technical Center "Autogenous Processes" was approved by the order of USSR Ministry of the Nonferrous Metallurgy. The Organic Catalysis and Electrochemistry Institute started work in connection with the MNTK plan "Catalyst". On the department's proposal, the republic scientific and technical complex "Nonferrous Metallurgy" was established with participation of IMO, IKhN [Chemical Sciences Institute], and KhMI [Chemistry and Metallurgy Institute] of the Kazakh SSR Academy of Sciences and a number of VUZy of the republic.

The structure of the Institute was changed and the management of the laboratories was strengthened.

In accordance with coordinated plans for joint work, scientific institutions of the department conducted studies with the USSR Ministry of the Chemical Industry and Ministry of Fertilizers and the Kazakh SSR Ministry of Nonferrous Metallurgy, Ministry of Health, and Ministry of Higher and Secondary Specialized Education. In 1986, about 200 jobs were done in connection with agreements on creative cooperation and 133 economic contracts.

In the department, 843 members were evaluated, 141 were dismissed, and 34 were lowered in rank. The released funds were used to strengthen the main directions of research, as well as to pay raises to 453 efficient workers.

The high average age of doctors of sciences in the department is alarming: 55 years (IMO -- 56.8; IKhN --58.0; IOKE [Organic Catalysis and Electrochemistry Institute] --54.0; IKhNiPS [Petroleum and Natural Salts Chemistry

Institute] -- 53.0); candidates of sciences: 42 years (IMO -- 46.0; IKhN -- 39.0; IOKE -- 43.0; IKhNiPS -- 40.0).

In 1986, studies on ten topics were completed, and 53 topics were started.

A single mechanism of the processes connected with the synthesis and destruction of polymeric phosphates was proposed, and an interrelation of the mechanism with the structure of monomeric and polymeric phosphates was established. A low-temperature method was developed for polycondensation in the liquid-crystal phase which makes it possible to obtain in one step polyimides with a prescribed microstructure. New effective catalysts were obtained for the synthesis of cyanepyridines, intermediate products for obtaining the pesticides reglone, lontrel and picloram (IKhN).

An electrochemical technology was developed for processing tellurium melts which makes it possible to increase the extraction of tellurium by 20-25%. It was established that during nitric-acid leaching of molybdenite concentrates, the process is intensified in the presence of acids. A two-stage continuous scheme was proposed which considerably improves the sorption conditions of molybdenum and creates prerequisites for the sorption and extraction of rhenium (IMO).

Skeletal and highly dispersed metallic and oxide catalysts were developed for selective hydrogenation of CO and complex organic molecules, as well as for the processes of purifying exhaust and waste gases. A relatively simple energy-conserving technology for eliminating the pyrophoricity of skeletal catalysts and a mechanical-chemical method for preparing and regenerating alloyed catalysts were also developed (IOKE).

Physicochemical properties and hydrocarbon compositions of oils were studied at the new Kumkol and Komsomolskoye fields, and recommendations for their treatment were transmitted to production enterprises (IKhNiPS).

In the year under review, 55 developed projects were introduced in the national economy, 164 applications for inventions were submitted, and 103 USSR authorship certificates were obtained, as well as two patents. In 1986, 10 monographs were published, including a monograph by Ye. A. Bekturov and Z. Kh. Bakauova Synthetic Water-Soluble Polymers from the publishing house "Khyutig" (FRG. Two collections and 476 scientific articles were published.

In 1986, members of scientific institutions of the department defended four dissertations for the academic degree of doctor of sciences and 33 for candidate of sciences.

Two sessions of the general meeting of the department were conducted; one of them dealt with improving the coordination and integration of scientific studies in the institutes of the department. 11 Meetings of the bureau of the department were also held.

The socialist pledges made for 1986 were fulfilled fully and on time. According to results of socialist competition between scientific institutions of the department, first place was awarded to the Chemical Sciences Institute and second place to the Organic Catalysis and Electrochemistry Institute. In the year under review, the institutes were awarded two silver medals and five bronze medals of the USSR VDNKh [Exhibition of Achievements of the National Economy].

Along with the positive aspects in the activities of the institutes of the department, there are also some defects.

Not all institutes are concentrating their scientific capacities on the fulfillment of priority tasks (IMO, IOKE). In the course of evaluations at IMO and IOKE, it was found that the release of the wage fund for switching to the new system of work was done chiefly through vacancies, which did not make it possible to strengthen the main directions with additional personnel of substantially increase the wages of creative employees.

It was established by the OKhTN commission that, due to the weakness of basic research and the low level of scientific methods, studies in basic scientific directions were not sufficiently developed at the Petroleum and Natural Salts Chemistry Institute. The new director of the institute (T. T. Omarov) was instructed to submit proposals on this problem.

Scientific councils of the department, with some exceptions, do not fully perform their functions and give little attention to the determination and concentration of scientific activities on the directions which are most important for the republic, often supplementing the work for which those institutes were founded ("Electrochemical Methods of Obtaining and Studying Inorganic and Organic Substances, Mineral Fertilizers, and Salts").

The publication of monographs and scientific articles decreased in the year under review.

The bureau of the department and the institutes did not implement the necessary measures for developing a base of experimental metallurgical production.

Few proposals of the department were included in the "Introduction" section of the State Plan for Economic and Social Development of the Kazakh SSR. IKhNiPS did not submit even a single work for introduction into the plan of the Kazakh SSR Academy of Sciences for 1987.

Just how close the republic programs "Kiry" and "Korroziya" are toward completion causes serious concern.

The bureau of the department has few scientific papers read at its meetings and general meeting sessions and does not give sufficient attention to the effectiveness of the utilization of the specialized and expensive equipment available in scientific institutions. More than 50 percent of such equipment has not yet been installed in IKhNiPS.

The presidium of the Kazakh SSR Academy of Sciences approved the report on the scientific and organizational activity of the Chemical and Technological Sciences Department for 1986 and recommended it for discussion at a session of the general meeting of the department.

The Presidium instructed the bureau of the department and directors of scientific institutions: to ensure development of priority directions of basic research for each institute;

to continue work on the reorganization of the activities of the institutes and the department in scientific, organizational, structural and personnel-related directions and ideological education;

to put the experimental metallurgical plant in operation in accordance with the work plant for 1987;

to ensure the implementation of decisions made at a conference with vice-president of the Kazakh SSR Academy of Sciences and academician of the Kazakh SSR Academy of Sciences U. M. Sultangazin "On Measures for Increasing the Effectiveness of the Utilization of Expensive and Important Equipment by Institutes of the Chemical and Technological Sciences Department" and to increase the effectiveness of the utilization of computers and automation in scientific research. Directors of scientific institutions were instructed to submit progress reports to the department before July 1.



10233/9835
CSO: 1841/394

# CHEMIZATION OF AGRICULTURE IN USSR AND COMECON MEMBER COUNTRIES

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV No 4, Apr 87 pp 38-44

[Article by Irina Burmina, Lyudmila Kopteva and Nikolay Titov, Technical and Economic Research of the Chemical Industry Scientific Research Institute: "Field of Action: Chemization of Agriculture"]

[Text] Among the conditions for implementation of the USSR Food Program, the development of intereconomic ties with Comecon member countries occupies an important place. The necessity for strengthening these ties and for all possible development of the agroindustrial complex sector and collaboration in this field is stressed in the materials recently formulated at meetings of the sister countries.

The chemization of agriculture to be conducted in conformance with the USSR Food Program by means of increasing the supply to agriculture of different chemical products simultaneously with the expansion of their product assortment and quality improvement is one of the most important directions specified in the USSR Integrated Program for the Chemization of the National Economy for the Period up to the Year 2000.

Mineral fertilizers, plant protection agents, chemical and biochemical additives to animal feed (amino acids, microelements, feed yeasts, vitamins, veterinary preparations, etc.), preservatives of succulent feeds and forage grain, film materials for different purposes, and containers for packaging agricultural products most of all are among chemical products of agricultural importance.

Wide use of film materials in agricultural production and meliorated construction, in the establishment of livestock farms, grain and vegetable storage places and other projects, and also products made of polymers--different hoses, crimped polyethylene pipes, vented sacking, wide-strip films and films for packaging food products--promotes the reduction of losses of agricultural products at all stages from production to consumption.

## Food Program and Intereconomic Ties

The action of Comecon member countries has the following directions in the field of chemization of agriculture:

sequential development of specialization and cooperation in the production of chemical agents for plant protection, chemical and biochemical feed additives, vitamins and antibiotics, amino acids, preservatives, etc.;

expansion of mutual trade of the chemical goods named, including mineral fertilizers;

deepening of scientific and technical collaboration in the interests of introducing advanced technologies for obtaining chemicals, for efficient use of them and also for raw material and energy resources.

Implementation of the long range target programs of collaboration up to 1990 (DTsPS) will have great importance for the fulfillment of the Food Program. Thus, DTsPS in the field of agriculture and the food industry, adopted at the 32nd meeting of the Comecon Session in 1979 provides for the accomplishment of 61 measures, including 10 relating to the chemical industry. The DTsPS contains a number of large scale measures which will promote the fulfillment of the tasks of the USSR Food Program for the Chemization of Agriculture in the field of energy, fuel, and raw materials approved at this same meeting of the Comecon Session.

The use of traditional methods and forms of collaboration, which at the present time have already obtained wide dissemination in the mutual ties of the sister countries, will also contribute to the efficient use of the potentialities of the international socialist division of labor in the solution of the tasks of the USSR Food Program. International specialization and cooperative production, collaboration in the field of capital outlays, participation in the international economic organizations of socialist countries, and different forms of scientific and technical ties provided, in particular, by the Integrated Program of Scientific and Technical Progress of the Comecon Member Nations up to the year 2000, approved at the 41st (extraordinary) meeting of the Comecon Session, can be among these forms.

Collaboration in the Field of Mineral Fertilizers

A traditional, extremely important direction of chemization of agriculture is the use of mineral fertilizers. At the present time, the USSR is the largest producer of mineral fertilizers not only among the sister nations, but also in the world (Table 1).

It is apparent from the Table that the output of mineral fertilizers in the USSR for the given period has increased by 34 percent. At the same time, it has increased a total of 6 percent in other Comecon member countries. In recent years, enterprises in the USSR have put into operation large capacity production of ammonium nitrate, carbamide, ammonium sulfate, ammophos, and potassium fertilizers. Important tasks lie before the USSR mineral fertilizer industry in the improvement in product quality, and an increase in the proportion of highly concentrated and complex fertilizers in the total supply for agriculture. The volumes of supplies of liquid complex fertilizers, and also of fertilizers in granular and macrocrystalline form, must be expanded.

Таблица 1

**Производство минеральных удобрений в странах — членах СЭВ**

(1) (тыс. т питательного вещества)

| | (2) Год | (3) Страны — члены СЭВ — всего | В том числе (4) (5) НРБ | (6) ВНР | (7) ГДР | (8) Республика Куба | (9) ПНР | (10) СРР | (11) СССР | (12) ЧССР |
|---|---|---|---|---|---|---|---|---|---|---|
| (13) Минеральные удобрения | 1980 | 37 300 | 653 | 1045 | 4735 | 178 | 2238 | 2451 | 24 767 | 1233 |
| | 1985 | 46 534 | 640 | 1069 | 4843 | 217 | 2269 | 3097 | 33 194 | 1204 |
| (14) В том числе: | | | | | | | | | | |
| азотные | 1980 | 15 884 | 436 | 649 | 943 | 131 | 1290 | 1707 | 10 241 | 618 |
| | 1985 | 20 667 | 469 | 685 | 1078 | 167 | 1254 | 2212[1] | 14 223 | 582 |
| (15) фосфорные | 1980 | 9 247 | 217 | 257 | 370 | 18,5 | 843 | 687 | 6 455 | 412 |
| | 1985 | 11 400 | 172 | 253 | 299 | 19,1 | 889 | 765[1] | 8 596 | 407 |
| (16) калийные | 1980 | 11 990 | — | 139 | 3422 | 28,6 | 105 | 57 | 8 064 | 203 |
| | 1985 | 14 464 | — | 130 | 3465 | 30,5 | 127 | 102[2] | 10 367 | 215 |

[1] 1984
[2] 1981

Table 1. Production of Mineral Fertilizers in Comecon Member Countries

Key:

1. Thousands of metric tons of nutritive substance
2. Year
3. Comecon member countries--total
4. Including
5. People's Republic of Bulgaria
6. Hungarian People's Republic
7. GDR
8. Republic of Cuba
9. Polish People's Republic
10. Socialist Republic of Rumania
11. USSR
12. CSSR
13. Mineral fertilizers
14. Nitrogen
15. Phosphate
16. Potassium

Mineral fertilizers play a significant role in the foreign trade of the USSR in chemical goods; they are one of the major export items.

More than 60 percent of the total export of mineral fertilizers of the USSR is directed to the markets of other sister countries, including almost 90 percent of the phosphate, more than 60 percent of the potassium, and more than 50 percent of the nitrogen. The USSR is practically the only supplier to the markets of Comecon member countries of nitrogen and phosphate fertilizers, and only in potassium fertilizers is it coupled with the GDR; the USSR share is 65 percent, and the GDR, 35 percent of the total export of potassium fertilizers.

Comecon member countries (including the USSR), because of reciprocal trade, satisfy their import requirements for nitrogen fertilizers by 90 percent, potassium, by 95 percent, and phosphate, by 20-25 percent. The remaining requirements for fertilizers are made up as the result of trade with third countries. The USSR, for example, meets part of its requirements for phosphate fertilizers also by means of trade with Morocco under conditions in which its own capacities for production of these fertilizers are not used completely because of the absence of raw materials. In addition, due to the participation of a plant for production of ammophos constructed on USSR territory as part of the Phosphorite Production Association (city of Kingisepp), the People's Republic of Bulgaria, the Hungarian People's Republic, the GDR, and the CSSR annually have obtained from the USSR this form of valuable fertilizer in the agreed amounts since 1976.

The USSR gives help to the sister countries in the development of production capacities for the manufacture of mineral fertilizers. For example, in the People's Republic of Bulgaria, enterprises for the production of nitrogen fertilizers are more than 50 percent and for the production of phosphate fertilizers almost 100 percent built with equipment which has come from the USSR. Modern shops for the production of ammonia, dilute nitric acid, ammonium nitrate, etc. were constructed at the chemical combine in Dimitrovgrad with the USSR's participation. Production was organized in Hungary at the Tisza chemical combine with the technical assistance of the USSR which at the present time produces about one-third of the nitrogen fertilizers in the country. In Cuba, 100 percent of nitrogen and 65 percent of mixed fertilizers are manufactured by enterprises constructed with the participation of the USSR. Almost 2 million tons of nitrogen, phosphate, and mixed fertilizers were obtained in all in 1985 at plants constructed with the technical assistance of the USSR in the People's Republic of Bulgaria, the Hungarian People's Republic, the Socialist Republic of Rumania, and the Republic of Cuba.

In their turn, Comecon member countries make a contribution to strengthening the material base of the mineral fertilizer industry in the USSR by means of supplying equipment for production of mineral fertilizers and also intermediate for obtaining them. In 1976-1980 alone, the sister countries sold such equipment in an amount of more than 380 million rubles, including installations for obtaining sulfuric acid, drying and granulation of phosphogypsum, and granulation of potassium chloride, production lines for manufacture of carbamide, and equipment for a vapor reforming unit for manufacture of ammonia. In 1981-1985, the USSR erected several dozen more units of equipment for the production of granular potassium chloride, carbamide, unified production lines for the output of ammonia, and installations for the manufacture of sulfuric acid, etc.

Czechoslovakia is the largest supplier of equipment for the mineral fertilizer industry in the USSR. For a number of years it has been sending equipment to the USSR for the manufacture of ammonia and carbamide for 14 enterprises in all. At the present time, enterprises in the cities of Grodno, Dneprodzeraninsk, and Cherkassk are producing carbamide; they are provided with Czech equipment with a capacity of 1,000 metric tons per day. Analogous equipment is sent to the Nitrogen Production Association in Nevinnomyssk. The purchase in the CSSR of such installations with a productivity of 1,200 metric tons per day is

provided in the current Five-Year Plan. In all in the USSR, nine plants operate, using Czech equipment for the manufacture of ammonia, and nine enterprises are in the installation stage. The CSSR is now manufacturing installations for new projects.

A considerable proportion of the equipment for sulfuric acid plants comes from Poland. A contract has been signed for purchase in the Polish People's Republic of the 50th plant for production of sulfuric acid. Its capacity is 500,000 metric tons per year. In the long range, the Polish People's Republic will be able to continue to deliver to the USSR the necessary equipment for manufacture of sulfuric acid. Putting these installations into operation will expedite growth in the output and further improvement in the structure of fertilizer production in the USSR.

Traditional supplies of high quality natural sulfur from the Polish People's Republic will aid the expansion of the raw material base of the Soviet mineral fertilizer industry.

In the interests of increasing the output of phosphate fertilizers, the USSR, together with a number of other Comecon member countries, participates in the study of the potentialities of the use in the future of resources of phosphorus-containing raw material present in the Mongolian People's Republic territory (Hobsogol deposit).

The contribution of socialist countries to the fulfillment of the tasks set in the USSR Food Program will also consist of joint research on the improvement and raising of the efficiency of different stages of the production processes for the obtaining of mineral fertilizers, the development of new kinds of fertilizers, and advanced methods for storage, transport, and application of them to the soil. Thus, as the result of the joint developments of USSR and Polish People's Republic specialists, a dehydrating method has already been adopted for obtaining phosphoric acid by extraction from apatite concentrate. The USSR Nitrogen Industry and Products of Organic Synthesis Institute and the Polish People's Republic Mineral Fertilizers Institute jointly prepared a project of an efficient two-stage method to purify gas of carbon dioxide with propylene carbonate and monoethanolamine within the installation for obtaining ammonia at a capacity of 1,500 metric tons per day. New improved processes are being developed for purifying synthesis gas of carbon monoxide. The USSR and the People's Republic of Bulgaria have developed and put into production an effective catalyst for low-temperature conversion of carbon monoxide with water vapor to obtain ammonia--a raw material for nitrogen fertilizers. This will enable the efficiency of nitrogen fertilizer production to be raised in the USSR.

The coordination center for the problem "Development of Requirements for New Complex and Other Mineral Fertilizers, Methods for Efficient Use of Them, and Study of Soil Fertility during Long Use" together with the section on mineral fertilizers for the Permanent Comecon Commission on Collaboration in the Field of the Chemical Industry conducted a number of tests of new kinds of mineral fertilizers. The mutual exchange of samples of different forms of mineral fertilizers and joint tests enabled the Coordination Center to determine the most advanced forms of fertilizers, which make it possible to formulate the

most proven order of the chemical industry for the output and supply to agriculture of fertilizers in optimal forms.

The USSR and a number of other Comecon member countries in 1981 signed the Agreement on the Conducting of Scientific Research Work on the Subject "Improvement of the Physical-Mechanical Properties of Mineral Fertilizers for the Purpose of Their Transport and Storage in Bulk". Ten organizations from eight Comecon member countries are participating in the implementation of this agreement.

Important Field of Action

The role of chemical plant protection agents (KhSZR) in the obtaining of high yields is constantly rising in proportion to the intensification of agricultural production. At the present time the USSR is arranging a rather large and dynamically developing subsector for the output of toxic chemicals. However, the requirement of Soviet agriculture for pesticides is being satisfied incompletely by means of its own production and the product assortment of toxic chemicals being produced and used is still insufficient. Therefore, the USSR with the exception of accelerated development of domestic output of KhSZR will in the long-range outlook continue actively to develop international specialization and cooperation in production with other Comecon member countries. In 1985 because of trade with them, the USSR satisfied about 30 percent of the important requirements for KhSZR.

Already at the present time, countries of socialist collaboration are arranging a rather powerful and dynamically developing production potential for the output of toxic chemicals and are manufacturing many original preparations based on their own scientific developments. Thus, in 1971-1985 the manufacture of KhSZR in the European Comecon member countries more than doubled (Table 2).

The GDR is among the 10 largest producers of KhSZR. Twelve enterprises of the country are manufacturing more than 189 kinds of preparations based on 69 active substances. The volume of production achieved makes it possible for the GDR to satisfy not only the basic part of its requirements but also to export a considerable proportion of pesticides.

Hungary also occupies one of the leading places among Comecon member countries in the output of pesticides. The positive action on the development of this production shows collaboration with the USSR. In conformance with the agreement on agrochemistry, the Hungarian People's Republic obtains a number of intermediate from the USSR for the manufacture of KhSZR. With the technical assistance of the USSR, a shop for the production of phosgene was put into operation in 1983 at the Borsod Chemical Combine in the Hungarian People's Republic; phosgene is an important raw material for pesticides. A characteristic feature of the development of the given production in the Hungarian People's Republic is the selection of large-scale assignments for scientific research in the subsector. As the result, the country annually introduces into production several kinds of new preparations. At the beginning of the 1980's, the Hungarian People's Republic put on the foreign markets the original USSR preparation-antidote AD-67. The export of toxic

Таблица 2

**Производство ХСЗР в странах - членах СЭВ**
(в пересчете на действующее вещество, тыс. т)

| | 1970 | 1980 | 1985 | 1985 к 1970 (1) |
|---|---|---|---|---|
| (2) Страны — члены СЭВ — всего | 249,3 | 447,8 | 542,4 | 217,6 |
| (3) В том числе: | | | | |
| (4) НРБ | 14,6 | 18,9 | 18,3 | 125,3 |
| (5) ВНР | 4,9 | 28,0 | 36,5 | 744,9 |
| (6) ГДР | 19,8 | 50,5 | 59,9 | 302,5 |
| (7) ПНР | 10,4 | 10,0 | 7,2 | 69,2 |
| (8) СРР | 24,8 | 39,7 | 53,1[1] | 214,1 |
| (9) СССР | 164 | 285 | 348 | 212,2 |
| (10) ЧССР | 10,8 | 15,7 | 19,4 | 179,6 |

[1] 1984

Table 2. Production of Chemical Plant Protection Agents in Comecon Member Countries (converted to active substances, thousands of metric tons)

Key:

1. 1985 in percent to 1970
2. Comecon member countries--total
3. Including
4. People's Republic of Bulgaria
5. Hungarian People's Republic
6. GDR
7. Polish People's Republic
8. Socialist Republic of Rumania
9. USSR
10. CSSR

chemicals from the country is constantly growing. In 1985, it comprised 29,400 metric tons as compared to 11,700 metric in 1980.

The output of KhSZR in Rumania has reached large scales in recent years; it is inferior only to the GDR in this field among socialist countries and is constantly increasing this production.

A further dynamic output of pesticides is planned in the long range in the GDR, the Hungarian People's Republic, and the Socialist Republic of Rumania. Such a strengthening of the production and export potential of a given subsector creates grounds for still more intensive recruitment of the chemical industry of the sister countries in the implementation of the USSR Food Program.

More than 300,000 metric tons of KhSZR worth more than 1 billion rubles are being put in the foreign trade channels of Comecon member countries, including in reciprocal trade more than 160,000 metric tons worth about 500 million rubles. The export capital for KhSZR in reciprocal trade in 1985 consisted of preparations, 50 percent of which were produced in the Hungarian People's Republic, 30 percent in the GDR, and 10 percent in the USSR. At the same time, the USSR plays the basic role (68.5 percent) in import (90,000 metric tons).

In the development of DTsPS in the field of energy, fuel, and raw materials, the USSR signed long-term agreements up to 1990 on agrochemistry with the Hungarian People's Republic and the Socialist Republic of Rumania. Thus, in conformance with the agreement on the expansion of existing and the building of new industrial plants for the production of KhSZR, mineral fertilizers and other kinds of chemical products and their mutual supply, Hungary specializes in the production and supply of a number of new highly effective pesticides. In 1981-1985, the Hungarian People's Republic delivered to the USSR 10 new kinds of advanced toxic chemicals for protection and diseases of plantings of maize, cotton, grain, legumes, melons, and garden crops. The USSR concluded an analogous agreement with Rumania. According to it, 13 kinds of KhSZR in a volume for energy-intensive production were exported to the USSR from the Socialist Republic of Rumania in 1981-1985.

Expansion of the product assortment of pesticides to be used in USSR agriculture in the long range also will promote a further increase in its collaboration with other Comecon member countries in the framework of the Interkhim International Economic Organization in particular in the course of the implementation of the Five-Year Plan in operation since 1979 and repeatedly extended during each successive Five-Year Plan of multilateral agreement in specialization and cooperation in the production of KhSZR.

In the course of further intensification of both multilateral and also of bilateral scientific and technical collaboration, great expectations are related to the joint efforts in the framework of the Coordination Center of Comecon member countries on the problem, "The Search for New Kinds of Pesticides, the Development of Biological and Other Methods for Plant Protection and a Comprehensive Investigation of the Effect of the Plant Protection Agents in the Environment" and also in the Interkhim International Economic Organization.

One of the basic tasks which must be resolved by the USSR and Comecon member countries in the long range is the lowering of the toxicity of preparations to warm-blooded animals and useful insects and increasing the use of rapidly decomposing substances.

The USSR and other sister countries are investigating the determination of the optimal times and quantities of pesticides by calculation of the maximal effect from their uses and the minimally allowable traces of them on crops which do not show harmful effects on human health when these crops are consumed.

The adoption of scientific research developments accomplished at previous stages of collaboration will be continued. In 1982-1985, a project was undertaken in the field of new active substances for obtaining pesticides which will be used in agriculture after 1985. Bilateral scientific and technical collaboration of the USSR with the CSSR, the Hungarian People's Republic, and a number of other socialist countries will be continued in the field of pesticides.

Feed Additives--A New Field of Collaboration

The newest direction of the chemization of agriculture is the chemization of animal husbandry (the use of feed yeasts, amino acids, vitamins, chemical and biochemical feed additives, etc.). In this connection, the USSR Food Program provides for an increase in the production and supply of feed additives to USSR agriculture. USSR agriculture will obtain 1.2 million metric tons of them (converted to nutritive substance) in 1990, compared to 950,000 metric tons in 1985.

As for feed yeasts, because of their own production, Comecon member countries satisfy approximately 40-60 percent of their own requirements. This clearly does not correspond to their potentialities.

This is the reason why interested parties join forces and resources in the expansion of production of this kind of product. Thus, the USSR, together with the GDR, the Republic of Cuba, the Polish People's Republic, and the CSSR, put into operation on USSR territory (city of Mozyr) a large plant for the production of feed yeasts which has a capacity of 300,000 metric tons per year and is based on liquid n-paraffins of petroleum. For construction of the plant, the GDR and the CSSR supplied to the USSR more than 100 types of machines, equipment, and materials and articles, including the unified Pareks installation for purification of petroleum paraffins, fermenters, etc.

The USSR will continue collaboration with other Comecon member countries in the development with total efforts of new industrial processes for obtaining feed yeasts. For example, by the technology of their work, USSR and CSSR specialists will improve on the base of one of the most promising forms of raw material--synthetic ethanol. The USSR and the GDR will continue to develop the technology of the biosynthesis of protein based on methanol and natural gas. At the present time, a method is being developed here for the manufacture of feed protein from the diesel fraction of petroleum.

The livestock and economic effect of additives is considerably increased if together with feed yeasts, deficient amino acids and vitamins, chiefly lysine and methionine, are included in the composition of the rations. Considerable success has been achieved in scientific research in the Polish People's Republic, where the technology has been developed for the production of lysine from molasses, raw sugar, and acetic acid, and work is ending on obtaining it from epsilon-aminocaprolactam.

Chemical and biochemical additives are used in different combinations in feed mixtures and rations. In 1976, the People's Republic of Bulgaria, the Hungarian People's Republic, the GDR, the Polish People's Republic, the CSSR and the Socialist Federal Republic of Yugoslavia concluded an agreement on specialization and cooperation in the production of seven kinds of feed additives for 1976-1980. The USSR became a participant in this agreement for 1981-1985. In the signing of the protocol on the extension of the agreement on international specialization and cooperation in the production of chemical and biochemical feed additives for 1986-1990, the product assortment of specialized preparations was expanded to 22 items. In conformance with this agreement,

the Comecon member countries supply each other with a number of feed vitamins and antibiotics of nonmedical purpose.

The USSR will continue scientific and technical collaboration with other sister countries on the problem of the microbiological and chemical synthesis of feed additives. As the result, the provision of food additives to USSR agriculture will be improved. The USSR is also interested in action with other Comecon member countries in the development of industrial plants for the production of several kinds of chemicals which are necessary for agriculture and the food industry, for example, preservatives, vitamins, veterinary preparations, and raw materials for the microbiological industry--formic and acetic acids, choline chloride, furazolidine, ammonium chloride, propynol B-400, ethyl ether, and cyanoacetic acid.

A new step in collaboration in the chemization of agriculture is the acceptance of the Integrated Program for Scientific and Technical Progress of Comecon Member Countries up to the Year 2000, in which the establishment and wide national economic development of microbiological agents for protection of plants of bacterial fertilizers for them, and regulators of their growth, and of valuable feed additives and biologically active substances for raising the productivity of animal husbandry are defined as one of the primary tasks.

All possible increases in the economic integration of Comecon member countries and the expansion of participation of the USSR in it will create additional potentialities for raising the productivity of all kinds of food in the interests of a further rise in the welfare of the people of the whole socialist concord.



12410
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ETHYLENE PRODUCTION AT KALUSH

Kiev RABOCHAYA GAZETA in Russian 8 Apr 87 p 1

[Article by RABOCHAYA GAZETA reporter from Ivano-Frankovsk]

[Text] A new facility for the production of olefins at the Kalush Production Association "Khlorvinil" obtained its main product: ethylene.

Before this, they successfully set up the production of benzene, propylene,and other chemical products, And now was the most responsible time. It was not accidental that it coincides in time with V. V. Kulik's shift. This shift consists of experienced people, and they probably did more than anyone else for the preparation and production of ethylene. This team produced the first batch of ethylene.

Equipment operator M. M. Maksimyak opened the discharge valve and Kalush ethylene started flowing through the pipelines. A few minutes later the workers of the isothermic storage facility registered its arrival.

According to the head of the complex, N. G. Kovalchuk, they pledged to reach the planned capacity level of production ahead of schedule, by the 70th anniversary of the Great October Revolution. The workers are determined to fulfill the pledge. Equipment operators A. D. Pronik, A. M. Eyubov, A. P. Shportko, V. L. Zrakov, P. G. Kovalenko, I. V. Yakovina and V. V. Shevaga have been working particularly hard. Incidentally, they were also outstanding during the start-up and adjustment jobs.

So far, the ethylene produced at Kalush is used for the plant needs. However, soon it will be supplied to the Tisayskiy Chemical Combine in the Hungarian People's Republic through the operating Leninvarosh-Kalush ethylene pipeline.

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NEW GAS SEPARATION FILTERS

Donetsk TASS in Russian 23 Jun 87

[Text] Specialists at the Donetsk Polytechnical Institute of the Donetsk Basin, the Ukraine, have created unique filters for separting gas mixtures and producing super-pure products. Using hydrogen's ability to dissolve into some metals, they developed a promising method which yielded a 99.999999 percent gas purity.

Hydrogen purification with the new filters consumes five times less energy than the traditional method and will be useful in various industries in combination with water electrolysis. The first installation in this country for producing super-pure hydrogen is nearing completion. It will use filters developed in Donetsk.

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# CENTRALIZATION OF REPAIRS IN NITROGEN INDUSTRY

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 11, Nov 86 pp 82-83

[Article by M. Goryachkin and Yu. Zagurskiy: "Improvement of Repair Organization at Nitrogen Industry Enterprises" Dnepropetrovsk]

[Text] The decisions of the 27th CPSU Congress foresee significantly reducing overhaul expenditures by increasing the quantity of obsolete equipment dropped from the inventory annually by 5-6 percent (1).

The methods of organizing repairs currently in use are subdivided into decentralized, combined, and centralized, depending on the features of the equipment, the size of the enterprise, and the nature of production.

The Soyuzazot All-Union Production Association contains over 30 enterprises characterized by the presence of a large quantity of chemical equipment of various types. Keeping it servicable requires prompt repairs of high quality. The most widespread method of conducting repairs is the combined method, where all types of repairs except overhauls are carried out through the efforts of shop repairmen. Overhauls and medium repairs are carried out on equipment usually by mechanical repair shops through the resources of contracting organizations. Centralized equipment repair (within the confines of one enterprise), in which the jobs and the workers are highly specialized, is the most effective.

This method of repairing equipment has not enjoyed adequate development at nitrogen industry enterprises. Criteria by which to determine the suitability of creating specialized subdivisions for equipment repair are absent. The scale of the enterprise must be accounted for when creating specialized centralized repair shops. When the facilities to be repaired are significantly far apart, the specialized repair brigades have to travel from one production section to another, which is associated with considerable losses of work time. This in 1984, 18-25 percent of the work time of repair brigades at the Dneprodzerzhinsk and Cherkassy Azot Production Associations was taken up by travel from one facility to another, while at relatively small enterprises such as the Grodno and Ionava Azot Production Associations, this time outlay is insignificant (5-7 percent). This is why plant-wide specialized shops for centralized equipment repair were created in these associations. Hence the degree of centralization is greater in these enterprises than in the

large Azot Production Associations. Thus, the level of centralization of repairs, defined in relation to the number of subdivisions, was 91.4 and 86.5 percent in the Grodno and Ionava Azot Production Associations, respectively, and 57.9 and 58.8 percent in the large Severodonetsk and Novomoskovsk Azot Production Associations. In contrast to the situation at the Grodno and Ionava Azot Production Associations, the centralized repair shops of the Severodonetsk Azot Production Association were organized on the basis of production processes: The responsibility of repairing the chemical equipment of an individual production operation was assigned to each centralized repair shop. In this connection six centralized repair shops were created in the Severodonetsk Azot Production Association; moreover spare parts are manufactured by a centralized repair shop and a mechanical repair shop. This principle of organizing centralized repair shops significantly reduces losses of work time for repairmen associated with travel from one facility to another.

We suggest that the labor-intensiveness of repairs on individual types of equipment can be used as a valid basis for revealing the most suitable specialization of each centralized repair shop. In the course of organizing the specialized sections of the centralized repair shops of the Severodonetsk Azot Production Association, we studied the labor-intensiveness of overhauls on individual types of equipment (see table). Thus it would be suitable to create four specialized sections for repair of individual types of equipment in Centralized Repair Shop No 1: columnar apparatus, containers, heat-exchange equipment, and compressors and generators. These sections represent 72.1 percent of the labor-intensiveness of all overhauls on equipment used in the production of ammonia and alcohols. We took a similar approach to creating specialized sections for repair of individual types of equipment in the course of creating centralized repair shops for the rest of the production operations.

As a result of creating centralized repair shops for each production operation, we were able to transfer some of the repairmen belonging to the main production shops to the newly created centralized repair shops, which helped to increase the manageability norm. Thus the number of repairmen per engineer or technician increased by a factor of 3.7 in production operation No 1, by factors of 4.2 and 2.5 in production operations No 1 and No 3, and correspondingly by a factor of 2 in production operation No 4.

Creation of centralized equipment repair shops at the Severodonetsk Azot Production Association promoted an increase in the effectiveness of repairs. Calculated per ruble of commodity production, the expenditures on current repairs and overhauls of equipment were reduced from 9.1 kopecks to 8.42 kopecks, and the savings was 300,900 rubles. Calculated per ruble of gross production, the expenses on current repairs were also reduced in ammonia and alcohol production from 1.66 kopecks to 1.57 kopecks, in plastics production from 3.1 kopecks to 2.8 kopecks, and in polyethylene production from 8.8 kopecks to 1.8 kopecks.

Labor-Intensiveness of Overhauls of Individual Types of Equipment at the Severodonetsk Azot Production Association (Percent of the Overall Labor-Intensiveness of Each Production Operation)

| (1) Наименование оборудования | (2) Производства | | | | | |
|---|---|---|---|---|---|---|
| | № 1 | № 2 | № 3 | № 4 | № 5 | крупно-тоннажное (3) |
| (4) Аппараты колонного типа | 16,9 | 15,7 | 16,4 | 13,8 | - - | - - |
| (5) Емкости | 12,7 | 10,2 | 21,1 | 11,1 | 8,5 | — |
| (6) Теплообменное оборудование | 22,9 | 18,1 | 20,9 | 11,4 | - - | 31,1 |
| (7) Компрессоры и генераторы | 19,6 | 12,6 | - - | - | 19,2 | 15,1 |
| (8) Насосы | - - | 8,2 | - - | 13,3 | - - | - - |
| (9) Аппараты с перемещением сложных устройств | - - | - - | 9,3 | - | - - | - - |
| (10) Печи | - | - - | - | 10,5 | - | 7,8 |
| (11) Вентиляторы, вентсистемы | - | - | - | 6,2 | 8,9 | 16,2 |
| (12) Реакторы, автоклавы | - - | - | - | 7,9 | | - |
| (13) Станки, прессы, пробивные | - | - - | - - | - | 11,5 | - |
| (14) Весы, дозаторы, питатели, краскотерки | - - | - - | - - | - - | 9,2 | 5,9 |
| (15) Всего | 72,1 | 65,1 | 71,5 | 77,2 | 60,3 | 79,1 |

Key:

1. Equipment
2. Production operation
3. High-output
4. Columnar apparatus
5. Containers
6. Heat-exchange equipment
7. Compressors and generators
8. Pumps
9. Apparatus requiring movement of complex devices
10. Kilns
11. Fans, ventilation systems
12. Reactors, autoclaves
13. Machine tools, presses, punches
14. Scales, metering units, feeders, paint grinders
15. Total

Consequently, to improve repair organization we need to create centralized repair shops depending on the work volume of the given facility and the time it takes for workers to travel from one facility to another, and we must achieve high specialization of the repair sections, jobs and workers.

FOOTNOTE

1. See Ryzhkov, N. I., "Ob osnovnykh napravleniyakh ekonomicheskogo i sotsialnogo razvitiya SSSR na 1986-1990 gody i na period do 2000 goda" [The Main Directions of the USSR's Economic and Social Development in 1986-1990 and in the Period to the Year 2000], Moscow, Politizdat, 1986, p 31.



11004/9835
CSO: 1841/173

UDC 665.622.43.066.5

# USE OF ELECTRONIC CURRENT REGULATORS IN POWER BLOCKS OF DEHYDRATORS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 6, Jun 87 pp 7-8

[Article by A. N. Stepanenko, V. M. Vinogradov and V. V. Papko, candidates of technical sciences]

[Abstract] Principal elements of traditional energy supply systems for dehydrators are the transformer and reactor which require large quantities of expensive copper. Instead of the reactor it is possible to use regulators consisting of a series of electronic switches and integral systems. Two types of regulators were studied at the Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin: amplitude tension regulators set at a given current value and impulse current regulators set at maximum tension amplitude, which are periodically removed from the transformer. It was established that the first type of regulators are more effective when compared to the transformer-reactors at I = 50 to 160 A. Electronic tension regulators acting as the current limiting unit may be constructed in the form of a block with reversible current couplings where the power is regulated by counter-parallel switching of these electronic switches. Regulation of average tension can be achieved by varying the starting time of these switches. It should be a stable system with high current stability coefficients. Figures 2.

7813/9835
CSO: 1841/422

COMPETITION AND REORGANIZATION IN CHEMICAL INDUSTRY

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 5, May 87 pp 264-267

[Article by L. I. Goldin]

[Abstract] M. Gorbachev has pointed out the need to bring competitiveness to the level of individual workers and their immediate teams, paying attention to quality of the end products and not just quantitative output. Many plants have committed themselves to increased productivity; there is movement being generated to donate extra days to accomplish these savings in material, fuel, and power. One of the important ways of achieving these goals is to implement widely the experience of successful plants. Several such success stories are related along with incentives used in promoting their programs (including financial bonuses). Transition from administrative to economic management methods, enlargement of autonomy among the plants, new controls of productivity, and solution of social problems put worker collectives in a new situation in which they must find a way of utilizing the new rights and potentials. Social competition should play an important role in solving these problems.

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UDC 658.511.5

INDUSTRIAL SECTOR'S METHOD FOR INSPECTING CHEMICAL-ENGINEERING EQUIPMENT

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 87 pp 26-27

[Article by V. I. Bobyshev and Ye. N. Galperin, candidates of technical sciences, and V. D. Zhdanov, engineer]

[Abstract] One of the most difficult operations involved in the inspection of chemical enginering equipment is the collection and handling of operational data needed to arrive at conclusions and make recommendations and the lack of a single methodological approach which takes into account the specifics of the sector-consumers, which leads to the development of various individual methods of inspection which do not as a rule agree with each other. This makes it difficult to obtain objective operational information and makes it practically impossible to generalize on data for individual pieces of equipment comprising a production line. On 1 Jul 86, RD 26-11-04--85, "Sector System for Quality Control of Production. Collection and Analysis of Operational Data on Equipment, MinKhimMash Profile," was introduced to provide a common approach to the inspection of the industrial sector's engineering equipment. This document is used to solve such problems as: checking design specifications of equipment under operating conditions; getting initial data on an analog and its component parts to determine engineering-economic indicators in the design documents during developmental stages; comparison of domestic and imported

equipment; detection of design and assembly defects; formulation of recommendations for improvement of the equipment and substitution of imported components with domestic analogs. RD-26-11-04--85 may also be used to solve individual problems such as determination of annual production volume and current expenditures of a consumer and the determination of dependability factors a rational system for preventive maintenance.

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CSO: 1841/258

UDC 658.011.46:621.791.5.03.002.2

## IMPROVEMENT OF SYSTEMS FOR MANAGING RESOURCES AT ENTERPRISES

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 87 pp 38-40

[Article by B. Ye. Trinchuk (deceased)]

[Abstract] The Odessa Scientific-Production Association "Kislorodmash" achieved high technical-economic levels during the past five-year plan. Production amounted to over 8.8 million rubles in excess of plan, labor productivity rose 43.6%, and the labor force was reduced by 1045. Production was increased mainly due to such human factors as labor productivity, employee suggestions, organization, reduction in wastes and computerization of operations.

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CSO: 1841/258

## TRANSITION OF SECTOR ENTERPRISES TO FULL COST ACCOUNTING AND STATE ACCEPTANCE OF PRODUCTION

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 87 pp 42-43

[Abstract] In January 1987, the associations and enterprises of chemical and petroleum machine building converted to full cost accounting based on self financing, and at the same time at 95 of the leading enterprises of the sector, state acceptance of production was initiated. On 29 Nov 86, a meeting of the Council of Ministers was held with the participation of leaders from the enterprises and organizations to work out problems associated with preparations for these steps. Thus, I. K. Mudragel, Chief of the Main

Planning-Economic Administration, reported that training on self-financing has commenced at the Sumsk NPO imeni M. V. Frunze and AvtoVAZ. At the MinKhimMash Institute for Raising Qualifications, cadres are being trained which include directors and leaders in economic, financial and other services. The report also noted certain shortcomings in the preparations, e.g., slow and incomplete restructuring of management to the new methods. Other reports cited the need for rejection of outmoded ideas and habits. The meeting adopted a resolution to hasten the restructuring of inter-plant cost accounting. Deputy Minister V. M. Fedosov underscored the social-economic significance of introducing state acceptance of production.

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UDC 661.652.002.237

PREPARATION OF NON-CAKING TECHNICAL GRADE BORAX

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Jul 86 pp 417-418

[Article by V. A. Chumayevskiy, V. Ya. Lebedev, Ye. P. Barulin and V. N. Kiselnikov]

[Abstract] Decahydrated borax, as preared by the soda method, contains up to 6% free moisture as a saturated solution on the crystal surfaces, which promotes caking by forming salt bridges under storage conditions. Research showed that at 22 degrees C and less than 70% relative humidity, decahydrated borax converts into the pentahydrate as a result of weathering, and the product cakes into a monolith. In the present work it is demonstrated that caking can be reduced by treating the decahydrated borax with 2-3% boric acid solution obtained from allied boric acid production. After crystallization, the borax crystals are separated from the mother liquor and washed with boric acid effluent and dried in two stages in a cyclone. Anhydrous boric acid, included in the stream of drying air, coats the borax and prevents caking for about 6 months. Figures 3; references 5: 3 Russian, 2 Western.

12765/9835
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UDC 658.387:62.0017:66

DEVELOPMENT AND REALIZATION OF GOAL-ORIENTED COMPLEX PROGRAMS ON SCIENTIFIC ORGANIZATION OF LABOR AND MANAGEMENT BY INDUSTRY - MOST IMPORTANT ROUTE FOR RAISING LABOR PRODUCTIVITY

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Jul 86 pp 438-440

[Article by V. V. Kardashevskiy and L. N. Mikhaylova]

[Abstract] At the present time organization of labor and management within the NOT (Scientific Organization of Labor) framework is not goal-oriented owing to the lack of clearly formulated concrete goals, vague organizational structure of developmental management, and lack of a system of measures directed towards complex solution of problems. This can be corrected only by creating a unified integrated system developed by a goal-programmed method, tying together stated goals with resources using goal-oriented complex programs (TsKP). An algorithm of sub-programs for the chemical industry is presented. In the first preparative stage basic technical and economic goals are figured; in the second stage, the measures needed to reach these goals are listed; in the third stage the final selection of the steps needed is made; and in the last or concluding stage, plan assignments of the production organization are realized. Figures 2; references 4 (Russian).

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RE-EDUCATION OF INDUSTRIAL CHEMISTS

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 86 pp 725-726

[Article by M. A. Ivanov, Director, Novomoskovskiy Branch MIPK]

[Abstract] The Novomoskovskiy Branch MIPK (Moscow Institute for Raising the Qualifications of Directing Workers and Specialists of the Chemical Industry) was organized in 1969 primarily for training the supervisory staff of militarized fire protection and mining safety personnel. Offices and laboratories are equipped with modern devices such as television, VCR's, recorders and other forms of electronic teaching aids. Each year the branch instructs 400-500 personnel for mining and the chemical industry. Currently, the branch is also teaching planning, labor organization and production management for 1500 full-time and 3500 part-time students. Lectures and seminars also include such subjects as "Theory and Practice of Managing Socialist Production," "Collective Forms of Labor Organization" and "Leninist Principles of Management and Their Creative Development of CPSU".

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RAISING LEVEL OF ECONOMIC TRAINING OF CHEMICAL ENTERPRISE PERSONNEL

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 86 pp 731-732

[Article by V. I. Slepykh, Chief of Chair of Planning, Finance, Accounting and Economic Stimulation of Production, MIPK [Moscow Institute for Raising the Qualifications of Directing Workers and Specialists of the Chemical Industry]]

[Abstract] One of the tasks decreed by the 27th CPSU Party Congress is to provide highly effective and productive operations for all production associations, particularly chemical. This makes effective training of management personnel essential. At the present time the title institute is teaching economics and management to a broad contingent of supervisors in the chemical and mineral fertilizer industries to provide a reserve of deputy directors, department heads and head bookkeepers. New methods of management, including maximum use of computers, are being taught to personnel.

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CSO: 1841/155

UDC 66.001-89.001.23:66.012.52.004.14

COMPUTER TECHNIQUES IN FORMULATING BALANCED PRODUCTION OUTPUT PLANS FOR CHEMICAL INDUSTRY

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 86 pp 756-760

[Article by Yu. F. Zolotarev]

[Abstract] Although steps are being taken to introduce computer technology in the planning operations of the chemical industry, all of its possibilities are far from being realized. It is not being utilized in planning work where the role of great quantities of accurate and repeatable computations provide reliability in initial data. At present, the need for more balanced planning is especially great. Many recently built production facilities are not being fully utilized owing to inter- and intra-branch inconsistencies and disproportions, especially in material balances. Discussion follows on employing computers for balancing production planning in the chemical and petrochemical industries.

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UDC 62-50

# DIALOGUE SYSTEM FOR FORMALIZING AND PROCESSING QUALITATIVE INFORMATION IN CHEMICAL ENGINEERING

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 6, Oct 86
(manuscript received 28 Dec 85) pp 1431-1435

[Article by Ye. P. Markov, N. N. Dorokhov, Yu. K. Kuznetsov, V. I. Senchuk and Academician V. V. Kafarov, Moscow Chemical Engineering Institute imeni D. I. Mendeleyev; State Scientific Research Institute of Glass, Moscow]

[Abstract] Problems in the selection, reliability, formalization and processing of qualitative information come in the solution of problems in modeling and controlling chemical engineering processes. One modern approach is to use the method of odd numerals. In the present work an experiment is described on constructing a dialogue system for an individual user, formalizing and processing qualitative information by the odd numeral theory, and is directed towards the solution of practical problems using any available information. The program allows the user to enter qualitative information and teach the system in the user's own language. A general dictionary of terms which the user can use to describe engineering parameters is stored in the system. Figure 1; references 7: 6 Russian, 1 Western.

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CSO: 1841/146

UDC 661.185.22

## PRODUCTION OF WATER-SOLUBLE POWDERY SURFACTANT POLYMERS FROM STYROMAL

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 60, No 3, Mar 87 (manuscript received 28 Nov 85) pp 686-688

[Article by K. M. Adylova, U. K. Akhmedov and M. M. Niyazova, Tashkent Polytechnical Institute imeni Abu Raykhan Beruni]

[Abstract] The goal of this study was to produce water-soluble powder polymers based on styrene-maleic anhydride copolymer (Styromal) with a predetermined ratio of hydrophobic and hydrophilic groups with surfactant properties. It was shown that close control of hydrophobic and hydrophilic groups in macromolecular polymer chains imparted surfactant properties to these polymers and led to production of highly disperse powders. When a 30% content of these complex ester groups was exceeded, an amorphous mass resulted, and with a lower ester group content, granules tended to form. Figures 2; references 4 (Russian).

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CSO: 1841/418

UDC 628.543:53.097

## ELECTRICAL BREAKING OF STABLE ORGANIC EMULSIONS

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Jul 86 pp 399-400

[Article by G. I. Zakhvatov]

[Abstract] Many existing methods for breaking emulsions are not satisfactory owing to process complexity, excessive reagent consumption and formation of waste products. Organic substances such as petroleum products, oils and greases can be more effectively separated from water by electrical neutralization at relatively low energy consumption (0.05-0.2 kW A/cubic m). A method

based on neutralization of the surface charge of emulsion particles with alternating current is presented. Highly charged aqueous systems are fed into a metal container in which titanium electrodes are suspended at an angle of 7-8° from the vertical. As much as 90-95% of oil and grease products can be removed from water on a continuous basis. Figure 1; references 2: 1 Russian, 1 Western.

12765/9835
CSO: 1841/590

# IMPROVEMENTS ON MULTI-RAIL ROCKET PROJECTOR

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 May 87 p 2

[Article by Professor O. Leypunskiy, doctor of physical and mathematical sciences]

[Text] People passing by a building of the Kazan University which was quite ordinary in appearance would often dart aside in fright hearing a terrible roaring noise from behind the fence as if a powerful bomber was flying right above the roof. One day the roar suddenly stopped and people on the street heard... laughter. It never occurred to them that this laughter was accompanying an important experiment on the improvement of the famous "Katyusha" multi-rail rocket projectors.

Rocket-projectors were already firing at targets at the proving grounds. However, the rockets did not always reach the target. The designers of these projectors encountered a mysterious phenomenon: pressure in the combustion chamber would suddenly increase sharply and the chamber would burst, and in some instances the powder would stop burning. The rocket would fall to the ground. This was contrary to the century-old artillery experience: if the powder in the cannon is ignited, it would burn to the end. Ya. Zeldovich was instructed to study this incomprehensible phenomenon in order to ensure effective functioning of the combustion chamber. At that time he was in charge of one of the laboratories of the Institute of Chemical Physics of the USSR Academy of Sciences which was evacuated to Kazan during the war.

Our laboratory consisted of four scientists, including the director and a laboratory technician. On one of the gloomy September evenings of 1941, Zeldovich, beaming with delight, dashed into the room shouting from the threshold:

"Fellows! We are going to work on rockets. They must start flying."

Getting ahead of my story, I shall say that the job was completed in the middle of 1942 in a fantastically short period of time. Being spurred by the grim conditions of the war years, we worked from morning to night.

The combustion chamber of "katyusha" projectiles was designed for several long gun-powder cartridges. In order to understand what occurs in it during combustion, we made a model of one cartridge. A hole was made in the wall of the building for letting out the gases. That was what frightened the people on the

street. We worked in the adjacent room and had to put up with this. It became clear after the first experiments that the "unplanned" increase in the pressure in the chamber had an effect on the combustion of the gun powder. But how was it affected? Members of the scientific research institute which developed the "katyusha" believed that the pressure was created near the front wall of the chamber and then the gases going to the nozzle "blew out" the fire. Proceeding from this idea, they selected the shape and the arrangement of the cartridges.

While working on this problem, Zeldovich developed his theory of nonsteady-state combustion which explained the incomprehensible phenomenon quite differently. I in turn assumed that still another unknown phenomenon "works" in the chamber. We named it fanning. Gases near the back wall of the chamber move faster, which speeds up the burning of the gun powder, simultaneously increasing the pressure. Who was right? It depended on the answer to this question whether or not the rocket projectors would be more effective against the enemy. This question could be answered only by a simple experiment: to let the cartridges burn to one half, extinguish them and see on which side a cone forms. If it is on the front side, then the members of the scientific research institute were right, and if it is on the back side, then Zeldovich was right.

We made a back wall of the chamber together with the nozzle on hinges. When it was opened, the pressure dropped sharply and, according to Zeldovich's theory, the combustion had to stop.

As a result of this, we conducted this decisive experiment. The cartridge was burning, the building was shaking from the roar, and we watched the clock in the adjacent room. When the time came, someone jerked the wire pull, the roaring stopped, we ran to the device and... started laughing. The cartridge flew out of the opened chamber and cut into the wall. There was a cone on one end, but on which one, front or back? This problem remained open until the next experiment.

The latter went beautifully. We marked one end of the cartridge and were convinced that we were right: the combustion rate near the nozzle was higher. Fanning was also detected. It was this phenomenon and the theory of nonsteady-state combustion that made it possible for the "katyusha" projectiles to acquire their internal ballistics and, finally, to transform into the modern powerful rockets.

10233
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UDC 546.821:620,193.4

## CORROSION OF TITANIUM IN AQUEOUS SOLUTIONS CONTAINING HF

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 4, Apr 86 (manuscript received 17 Jan 85) pp 923-927

[Article by L.Ye. Tsygankova, V.I. Vigdorovich, Ye.K. Oshe and I.A.Semerikova]

[Abstract] Titanium cannot be used in the construction of equipment operating in strong acids if the latter contains over 0.001% by weight of hydrogen fluoride. Why the addition of HF markedly stimulates corrosion is still not clear. A study was made of the effects of hydrogen fluoride and fluoride ion concentration on the corrosion of titanium VT-14 in concentrated hydrochloric acid solutions and in solutions containing HCl, NaCl and NaOH at 353K. Starting at a certain critical concentration (0.02%), small additions of HF markedly increase the corrosion rate of titanium. A similar effect takes place in less concentrated HCl solutions containing NaCl. Evidently, if a sufficiently large amount of titanium goes into solution in the presence of low HF concentration, all of the resulting fluoride becomes complexed and the rate of titanium corrosion decreases and becomes equal to that of a similar solution not containing HF. This hypothesis was checked out experimentally. Figures 4; references 10: 7 Russian, 3 Western.

12765
CSO: 1841/571

UDC 621.79.027.54

## ELECTROCHEMICAL REMOVAL OF OXIDES FROM CORROSION-RESISTANT STEELS WITH TRANSFER ELECTRODE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 4, Apr 86 (manuscript received 30 Jul 84) pp 927-930

[Article by I. D. Ydovenko, A. I. Lisogor and V. I. Kovalevskiy, Institute of General and Inorganic Chemistry, UkSSR Academy of Sciences]

[Abstract] Oxides and oxidation tints are formed on the surfaces and in the thermal reaction zones of corrosion-resistant steels during argon-arc and plasma

welding, as well as heat treating. Scale consists chiefly of two groups of oxides: MexOy and spinel oxides MeCr2O4. Scale is normally removed from corrosion-resistant steel either by grinding or pickling, both methods having significant drawbacks. A promising method appears to be an electrochemical method employing a transfer electrode, described previously. This method is conducted at high current density without having to load the object into a bath of neutralizing electrolytes or wait for the formation of protective passive coatings. The time required for complete removal of scale and oxidation tint for 1 meter of an argon-arc weld seam is 1 minute. The corrosion potential of a weld seam after mechanical cleaning is more positive than that of the base metal after electrochemical cleaning. This is apparently the result of iron entering the solution and leaving a chromium-enriched surface. Experiments on the tendency of weld seams to undergo intercrystalline corrosion show that electrochemical treatment does not cause this type of corrosion. Tests also show that electrochemical treatment of corrosion-resistant steel does not lower its resistance to various acids. The method has been introduced to industry for treating large-dimensional objects and construction. Figure 1; references 7: 5 Russian, 2 Western.

12765/9835
CSO: 1841/571

UDC 541.138:541.135.5

POLYMERIC DIAMINOBENZOQUINONE-MODIFIED Pt ELECTRODE MODELS OF PRIMARY LIGHT TRANSFORMATION IN PHOTOSYNTHESIS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 6, Jun 87 (manuscript received 1 Jul 86) pp 1665-1668

[Article by Ye. Yu. Kats, A. Ya. Shkuropatov, O. I. Vagabova and V. A. Shuvalov, Institute of Soil Scence and Photosynthesis, USSR Academy of Sciences, Pushchino]

[Abstract] Polarographic studies were conducted on Pt electrodes modified with polymeric diaminobenzoquinone to assess light energy transformation parameters as a model system for photosynthesis. Assessment of cyclic voltampere curves for p-benzoquinone and 2-methylamino-1,4-benzoquinone and 2,5-bismethylamino-1,4-benzoquinone on cathodally-polarized Pt electrodes demonstrated that, along with a negative potential shift, introduction of the amino groups increased the reversibility of the redox process. The differences between the cathodal and anodal peaks were 250 and 165 mV, respectively, for the mono- and diaminoderivatives at a scanning rate of 10 mV/sec. Quasireversible electrode kinetics were also obtained for $SnO_2$ electrodes. Figures 3; references 10: 3 Russian, 7 Western.

12172/9835
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UDC 541.145

# MODEL MICELLAR SYSTEM SIMULATING LIGHT-GATHERING PIGMENTS OF PLANT PHOTOSYNTHETIC APPARATUS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 294, No 6, Jun 87
(manuscript received 29 Jul 86) pp 1401-1404

[Article by T. S. Dzhabiyev, V. A. Nadtochenko, I. V. Rubnov and V. A. Smirnov, Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka, Moscow Oblast]

[Abstract] A micellar system based on Triton X-100 was designed to simulate the light-gathering pigment system of the plant photosynthetic apparatus, in which the micelles were loaded with anthracene and complemented with eosin and a tris-dipyridyl ruthenium (II) complex ($RuB_3^{2+}$). Methyl viologen ($MV^{2+}$) served as the redox process indicator. This particular set of dyes overlapped the solar emission spectrum in the 400-560 nm range. The data demonstrated that incorporation of anthracene in the eosin and $RuB_3^{2+}$ system enhanced the rate of the photoprocess several fold, indicating that proper structural relationships were obtained for electron transfer by anthracene molecules. In addition, the system allowed energy from the useful portion of the solar emission spectrum to be harnessed for hydrogen production from irreversibly oxidized electron donors. On a preliminary basis, this model may be used to simulate plant photosynthetic mechanisms. Figures 4; references 14: 9 Russian, 5 Western.

12172/9835
CSO: 1840/427

UDC 502.7

# POLLUTION OF SOIL, WATER RESERVOIRS AND VEGETATION

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 4, Apr 87 pp 22-24

[Article by B. P. Baginskas, A. B. Zhyamaytis and R. P. Kazalupskene]

[Abstract] The greatest environmental pollution originating at the Ionava Production Association "Azot" extends in a west-to-east direction with the prevailing winds along a distance of 3 km. Pollution diminishes from 3 to 10.5 km where fallout from gases and dusts is less. Soil and water pollution in other directions, even 1 km from the enterprises, are markedly less. Ammonia nitrogen neutralizes sulfuric and nitric acids, thereby reducing soil and water pollution greatly, although gradual pollution of ground water may still be assumed to take place. "Azot" manufactures ammonia water, ammonium nitrate, carbamide and nitrophoska fertilizer using ammonia nitrogen. In 1981, the enterprise produced 360,000 tons of ammonium nitrate, 174,000 tons of carbamide and 582,000 tons of nitrophoska, releasing considerable quantities of gaseous pollutants, the most harmful to plants and water being sulfur dioxide and nitrogen oxides which cause acid rain. During 1980-82, 4616-5710 tons of sulfur dioxide were released which required 1671 tons of ammonia to neutralize. Nitrogen oxides comprised 3852-5938 tons, requiring 1934 tons of ammonia to neutralize. Thus 3605 tons of ammonia were needed to neutralize sulfur dioxide and nitrogen oxides. During the same period, 4120 tons of ammonia gas were vented to the atmosphere, 515 tons of which remained in the free state without neutralizing sulfur dioxide or nitrogen oxides. While ammonia gas may preclude formation of acid rain, it does not reduce soil and water acidity. Gaseous effluents from "Azot" contain 13,860 tons annually of carbamide, ammonium nitrate and nitrophoska dusts covering an area of 40,000 hectares. If they were spread evenly, it would amount to 344.5 kg/hectare, providing an enormous amount of nutritive elements to plants. Results are presented on a study of the degree of soil and surface water pollution for a distance of 11 km from the plant. Samples were taken at 0.5 km intervals and to depths of 50 cm at 5 cm intervals. Data are presented on pH, potassium, phosphorus and sulfate content.

12765/9835
CSO: 1841/352

UDC 632.151

RELATIONSHIP OF QUALITY OF AGRICULTURAL PRODUCTION TO ATMOSPHERIC INDUSTRIAL POLLUTION

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 4, Apr 87 pp 26-29

[Article by I. A. Zharkova and T. P. Ivanova, Voroshilovgrad Branch of Institute of Economics of Industry, UkSSR Academy of Sciences]

[Abstract] More than any other branch of industry, agriculture is most directly affected by the state of the environment. A study was made by the Voroshilovgrad Branch of the Institute of Economics of Industry in conjunction with the Chair of Agrochemistry of the Voroshilovgrad Agricultural Institute on the negative effects of industrial pollutants on the quality and loss of harvests. Mathematical expressions were derived for correlating the loss in agricultural production to distance from the source of industrial pollution for conditions of the Donbass region. The drop in gluten content of winter wheat grown in the vicinity of ferrous metallurgy, coke chemical and coal enterprises is correlated with the concentrations of sulfur dioxide, nitrogen oxides, ammonia, phenol and industrial dusts. The formulas may be used in managing and planning steps in the so-called "industrial-agricultural" systems to reduce the volume of pollutants and provide an ecologically "clean" industrial technology.

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CSO: 1841/352

UDC 541.183.12

USE OF CHARGE-SELECTIVE MEMBRANES FOR ELECTRODIALYSIS TREATMENT OF MINERALIZED COLLECTOR-DRAINAGE WATERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 4, Apr 86 (manuscript received 2 Jul 84) pp 912-915

[Article by V. D. Grebenyuk, V. K. Veysov, R. D. Chebotareva, K. P. Braude and G. Z. Nefedova]

[Abstract] Intensified irrigation of farmland has caused a drastic increase in water consumption. Mineralized collector-drainage water (KDV), after dilution, can be used as a supplemental water source. The total quantity of these waters keeps increasing with the expansion of irrigation, and in the Turkmen SSR for example, it now consists of 5 cubic km per annum. The purpose of the present work was to study the possibility of desalination of pre-softened KDV, using an imitation solution of average degree of mineralization and treating it with a unit charge-selective membrane, MK-100, modified with ethylenediamine. After dialysis, using the modified membrane,

the resulting brine concentrate contained sodium ions, chiefly, while the non-modified control membrane was enriched with magnesium ions. The modified membranes resulted in separation coefficients 2.5 to 3.0 times greater than those of the non-modified membranes. Figures 3; references 7 (Russian).

12765/9835
CSO: 1841/571

UDC 502.7.678.4

INVENTORY RESULTS OF SOURCES OF AIR POLLUTION AT TIRE REPAIR ENTERPRISES

Moscow KAUCHUK I REZINA in Russian No 7, Jul 86 pp 27-28

[Article by V. V. Mugur, L. V. Pobedinskaya, Yu. S. Rudoy and I. V. Sitnik]

[Abstract] According to a decree of the CPSU Central Committee and the Council of Ministers, pollution norms will be set for each organization and enterprise which, if exceeded, will result in penalties. For this reason, each enterprise must first establish a "maximum allowable value" for its total effluent by making an inventory of all of its pollution sources. Such inventory results for a truck tire repair plant indicated that the main air pollutants are rubber dust formed while roughening tire casings; benzine solvent vapors emitted during application of adhesive on the roughened surface; hydrocarbons formed during vulcanization; traces of sulfur dioxide and amino compounds. The cyclones used to recover the rubber dust actually only recover about 80%, and particles smaller than 3000-250 mkm are lost. This figure can be raised to 95% if more effective cyclones are used. The benzine solvent vapors can be reduced by using a narrow band weave, while elimination of high sulfur fuel in the boiler rooms can eliminate the sulfur dioxide and other air pollutants. References 6 (Russian).

12765/9835
CSO: 1841/589

FIRE HAZARD AND TOXIC PROPERTIES OF ADHESIVES 51-K-22 and 4508

Moscow KAUCHUK I REZINA in Russian No 7, Jul 86 pp 28-29

[Abstract] The title adhesives are solutions of natural rubber in benzine solvent, which is the toxic and flammable ingredient. Although benzine is not considered to be a highly toxic substance, it does cause irritation of the tear ducts and skin and chronic inflammation. At concentrations exceeding the maximum allowable, it also affects the central nervous system. A working zone may be monitored either chromatographically or by chemical means based on burning the benzine vapors to carbon dioxide. An automatic device to monitor benzine content in air has been developed. References 3 (Russian).

12765/9835
CSO: 1841/589

UDC 630*863:628.543.563

TREATING EFFLUENT FROM HYDROLYSIS ENTERPRISES USING BIOOXIDANTS OF HIGH SPECIFIC OXIDIZING CAPACITY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 8, Nov-Dec 86 pp 21-22

[Article by A. G. Afanasyev, Chief Engineer, Krasnodar Chemical Combine, B. P. Lenskiy, S. V. Posuponko, M. M. Mikhaylov, V. D. Klimukhin and S. I. Sorokin]

[Abstract] In a previous report it was shown that biological treatment of heavily contaminated effluent, containing yeast mash, from the Krasnodar Chemical Combine in air tanks with dynamic filtration makes it possible to maintain the concentration of active sludge in the aeration zone of 15-20 g/liter and to achieve a chemical oxygen minimum of 15-18 kg oxygen/cubic meter·day. Such high levels of oxidizing capacity can be achieved only with corresponding high rates of oxygen dissolution. The high temperatures of the yeast mash (40-45 degrees C) require high energy output in the aeration stage. In the present report, the system was modified to include an aeration bubbler with a mass transfer column, consisting of a biofilter assembled in 1984-85. Comparison with a method proposed by the "Gidrolizprom" Scientific Production Association shows that the present method is more advantageous. Reference 1 (Russian).

12765/9835
CSO: 1841/168

# FUTURE PRODUCTION PLANS OF FERTILIZER MINISTRY

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 12, Dec 86 pp 72-73

[Article by S. I. Masud: "Expanded Meeting of the Board of the Ministry of Mineral Fertilizer Production"]

[Text] The board of the Ministry of the Mineral Fertilizer Industry held an expanded meeting in Moscow in July 1986, during which it examined the issue "The Plan for Economic and Social Development of Mineral Fertilizer Industry in 1986-1990 and the Tasks of the Ministry Implied by Decisions of the June (1986) Plenum of the CPSU Central Committee and the Fifth Session of the 11th Convocation of the USSR Supreme Soviet."

The Ministry of the Mineral Fertilizer Industry is faced with great and important tasks in the 12th Five-Year Plan. In particular in 1986-1990, it must achieve growth in industrial production volume equal to a third of the 1985 volume, and it must significantly increase production of mineral fertilizers and chemical agents for plant protection. The proportion of produces in the top quality category with respect to the total commodity production volume must be increased to 76 percent by the end of the five-year plan. Labor productivity must be raised by 29.6 percent during the five-year plan so as to ensure a 95 percent increase in industrial production.

Much attention will be devoted in the socioeconomic program for development of the mineral fertilizer sector to improving the housing conditions of workers. Thus 5.5 million square meters of total living space, 32,100 places in children's preschool institutions, 25,000 student places in schools of general education, hospitals with a capacity of 3,100 beds, and polyclinics capable of handling 6,700 visits are to be put into operation.

It was noted at the board meeting that the increase in industrial production volume was 11 percent in January-June 1986, given an annual quota of 6.4 percent.

The product sales volume plan was fulfilled by 102 percent, labor productivity grew significantly, and production cost dropped.

The ministry surpassed the plan for producing nitrogen and phosphorus fertilizers, chemical agents for plant protection, sulfuric acid, synthetic resins, plastics and consumer goods.

The plan for deliveries to agriculture was exceeded by about 130,000 tons of mineral fertilizers and 5,600 tons of chemical agents for plant protection.

Deliveries of potassium fertilizers to the countryside should increase by 19.6 percent, and deliveries of nitrogen fertilizers will grow significantly in the 12th Five-Year Plan. Special significance will be attached to producing phosphorus fertilizers and, in particular, phosphorus fertilizers containing trace elements.

The pesticide assortment will expand. Obsolete preparations will be replaced by more effective ones. Preparations which are less toxic to man and warm-blooded animals and which can be used in lower doses are being created.

One other important issue concerned with delivering products of the Ministry of the Mineral Fertilizer Industry to the countryside was discussed at the board meeting. It had to do with the supply of lime-containing materials. As we know, agriculture needs large quantities of materials with which to lime acidic soil. In some regions of the country liming increases yields more than introduction of fertilizers. By 1990, the deliveries of lime-sulfate fertilizers will more than triple.

Speakers at the meeting thoroughly analyzed the sector's production of mineral fertilizers in the first half of 1986.

The board developed a number of specific measures directed at fundamentally restructuring the sector's work in the spirit of the requirements of the times.



11004/9835
CSO: 1841/173

UDC 631.85

# TRACE ELEMENTS IN PHOSPHORUS FERTILIZERS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 3, Mar 87 pp 61-62

[Article by V. G. Kazak, T. L. Onishchenko, Yu. Ye. Sayet and A. V. Gorbunov]

[Abstract] Mineral fertilizer production is a multi-ton operation, and the raw material base for nitrogen and potassium fertilizers is almost exclusively refined natural phosphate ore, essentially a polymineral. Refining phosphate ore is primarily directed towards increasing the total concentration of phosphorus in the finished product (separation of ballast macrocomponents) and converting phosphorus compounds into forms which can be assimilated by plants. With the exception of fluorine, trace elements are not separated in the existing refining technology. Research on various types of natural phosphate ores indicates that large amounts of trace elements, especially fluorine, strontium, lanthanum, uranium, lead, arsenic, zinc and vanadium are present, while systematic studies of the technogenic behavior of trace elements in the chain--initial phosphate ore-concentrate-fertilizer-soil-plant--are almost totally lacking. In the present work data are presented on the trace element composition of basic types of phosphorus fertilizers produced from apatite ores of the Kola Peninsula and phosphorite concentrates from the Karatau, Kingisepp and Yegoryev deposits. Specifically, ammophos, nitroammophos and double superphosphate were studied and shown to contain large amounts of trace elements which ultimate result in ecological contamination of the soil.

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CSO: 1841/384

UDC 661.634.2.061.4:66.066.8

OBTAINING EXTRACTION GRADE PHOSPHORIC ACID BY PRELIMINARY CHEMICAL ENRICHMENT OF KARATAU PHOSPHATE ORE

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Jul 86 pp 403-405

[Article by P. V. Klassen, A. A. Novikov, V. M. Borisov, E. V. Khlebodarova, L. I. Samigullina, A. V. Grinevich, V. G. Dubinin, V. A. Shchegoleva and N. P. Belskaya]

[Abstract] Extraction grade phosphoric acid was first obrained from Karatau phosphorite ore in 1969, but since then the quality of the ore has deteriorated with a higher content of insoluble matter resulting in foam formation. A new two-stage method has been developed where the carbonate portion of the ore is broken down to eliminate foam in the first stage, and the basic phosphate ore is decomposed in the second stage. Tests run on the initial phosphorite, the solid phase of the foam and the phosphogypsum show that preliminary decarbonization of the ore and removal of the foam product from the extraction process results in less foam formation in the extractor and the elimination of finely dispersed insoluble matter from the ore. The process has been recommended to be put into industrial use. Figures 4; references 2 (Russian).

12765/9835
CSO: 1841/590

UDC 661.525.324.002.237

STUDY OF POSSIBILITY OF USING AMMOPHOS TO CONDITION AMMONIUM NITRATE

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Jul 86 pp 407-408

[Article by I. P. Titova, Yu. V. Tsekhanskaya, V. M. Olevskiy and O. S. Novikova]

[Abstract] Owing to raw material shortage and process danger, only one enterprise is currently employing sulfate-phosphate pre-conditioning of ammonium nitrate. In the present work a study was made of the effects of adding ammophos to ammonium nitrate on the physical chemical and thermal characteristics of the latter. A sulfate-phosphate additive was prepared from ammophos from an aqueous extract (GOST 18918-73) and ammonium sulfate (GOST 3767-73) by ammonolysis, crystallization, filtration and drying at 100°C. The dried product was added to molten ammonium nitrate and ground in liquid hexane. Tests show that the additive in no way worsens the physical properties of the ammonium nitrate and that it can be used as a substitute for phosphoric acid, which is short supply.

12765/9835
CSO: 1841/590

UDC 622.78:621.926.082

PREPARATION OF ORE BY AUTO-CRUSHING FOR ELECTROTHERMAL PRODUCTION

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Jul 86 pp 416-417

[Article by S. F. Shinkorenko, A. Ye. Sukhanov, L. I. Nekhayeva, Yu. P. Kim and F. F. Sandt]

[Abstract] Yellow phosphorus is currently produced in electrothermal furnaces from the lumpy fractions of phosphorite ore after addition of coke and quartz. This lumpy fraction of 70 to 10 mm particle size must have certain required specifications, especially high thermal resistance, otherwise it breaks down in the upper regions of the electrothermal furnaces and causes caking of the charge, disruption of the gas conditions and free phosphorus formation, which lowers the productivity of the equipment. Optimum ore for this purpose is the so-called Grade B ore of the Dzhantas deposit, although its reserves are becoming depleted. Currently, this ore is crushed to 70 mm particle size at a crushing-grading plant in jaw and conical mills into lump form with microfissures, making it unsuitable for transport or direct use in the furnaces. Research showed that the least mechanically strong ore lumps are also less heat resistant. This makes it possible to select the more heat resistant variety of ore by auto-crushing. In the present work results are presented on experiments on selective crushing of phosphorite ores by standard methods and by using auto-crushing. Conical crushing required 3 tons of ore to produce one ton of 70 to 10 mm particle size ore, while auto-crushing required only 1.65 ton, i.e., a 1.8-fold decrease in the consumption coefficient.

12765/9835
CSO: 1841/590

UDC 631.812

QUALITY CERTIFICATION OF MINERAL FERTILIZERS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 5, May 87 pp 16-19

[Article by Ye. N. Yefremov, Central Institute of Agrochemical Service to Agriculture]

[Abstract] Chemicalization of agriculture is one of the most important aspects of the achievements of the year 2000 goals in terms of accelerated scientific and technical progress in the USSR. Closely connected with this is production of high quality fertilizers which can be achieved through proper quality control measures (state certification). It consists of a complex of organizational and technological as well as economic measures to assure systematic evaluation of various production indicators at the highest governmental levels. In 1974, ammonium nitrate was the first fertilizer tested in this fashion which

achieved a higher production category. Attestation (certification) aims to introduce new scientific advances into production, modernization of manufacturing methods, and consistent improvement of product quality; it evaluates domestic products, indicates directions for improvements, economically stimulates productivity, and allows sanctions against poor qulaity material. Such a control method does not exist in any other country, where individual companies determine quality standards for their own products. Some pros and cons were reported for comparing the quality of domestic products with imports. Individual quality indicators are established at different stages of the production use path, and this is why they are more meaningful than the indicators obtained at the production stage only. References 3 (Russian).

7813/9835
CSO: 1841/420

INTENSIFIED FARMING AND CONTEMPORARY PROBLEMS IN AGROCHEMISTRY

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 4, Apr 87 pp 2-5

[Article by B. A. Yagodin, Corresponding Member VASKHNIL [All-Union Order of Lenin Academy of Agricultural Sciences imeni V. I. Lenin]]

[Abstract] Fertilizers being the most effective means for increasing agricultural output, agrochemistry has come to occupy a central position, especially since it also studies the interaction of factors which determine the productivity of plants. Despite the steady growth in deliveries of mineral fertilizers to the agricultural sector, the growth in harvests of grain, potatoes, sugar beets and other crops increased very insignificantly over the past 15 years. Reasons for the low effectiveness of fertilizers are the lack of balanced application of all nutritive elements in the required assortment, the existence of 50 million hectares of high acid soils requiring liming, frequent use of non-composted manure containing huge quantities of weed seeds, non-uniformity of fertilizer application, insufficient use of liquid fertilizers, use of nitrogen fertilizers in excess amount and many others. A shortage of even one nutritive element hampers harvest growth, and therefore, strict control of the contents of nutritive elements in soil as a result of large scale agrochemical cultivation of soils and the possibilities of using high norms of liquid fertilizers and industrial wastes are lacking. Agricultural productivity may be increased with intensified cultivation of various crops, although it must be borne in mind that this results in depletion of nutritive elements from the soil, requiring changes in composition and dosages of fertilizers. One serious factor holding back large harvests is the lack of a detailed dynamic model of plant nutrition which takes into account specifics of species and zones of cultivation. Data are needed on theinput dynamics of nutritives with physiologically possible, maximum, and economically desirable harvests. Clear cut requirements on the quality of nitrogen and trace-fertilizers for use with programmed release of nutritives are still lacking. Other problem areas listed include pollution, regional specialization of agriculture, and better usage of trace elements.

12765/9835
CSO: 1841/352

UDC 66.047.57:66.099.2:631.82

# HYDROMECHANICAL EVALUATION OF MATERIAL MOVEMENT IN DRUM TYPE GRANULATOR-DRIER AND IMPROVEMENT OF ITS DESIGN

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Jul 86 pp 422-425

[Article by V. N. Dolgunin, V. Ya. Borshchev, A. A. Ukolov, V. I. Budantsev, V. I. Kuznetsov, Yu. P. Senatorov and V. V. Volkov]

[Abstract] Drum type granulator-driers are used widely in fertilizer production because of their ability to combine several unit operations into a single step with resultant savings in space and energy requirements. To optimize the engineering parameters in pelletizing and drying ammophos on a pair of typical drum granulator-driers (BGS) 3.2 meters dia X 20 meters in length, a statistical analysis of 100 observations of the interactions of these parameters with operating variables was made employing step-wise multiple regression on a computer with standard programming. The study revealed two "hidden" design factors which tend to produce excessively coarse or fine particles. Evidently, the rising blades of the rotor in a cross-section of the drier leave a curtain of falling fine particles, while the descending blades form coarse particles, resulting in two distinct zones of varying particle size. A modification in construction design is presented in which the ammophos pulp is fed into the appropriate zones of the BGS in such a manner that the unmarketable pellet size fractions (coarse and fine) are minimized. Figures 5; references 5: 4 Russian, 1 Western.

12765/9835
CSO: 1841/590

JOURNAL: CERAMICS - MATERIAL OF THE FUTURE

Moscow KHIMIYA: KERAMIKA - MATERIAL BUDUSHCHEGO in Russian No 2, Feb 87 (signed to press 16 Feb 87) pp 1-2

[Annotation and table of contents from journal: KHIMIYA by Yu. D. Tretyakov and Yu. G. Metlin]

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ANNOTATION

The extraordinary mechanical, electrical, magnetic and optical properties, corrosion and radiation resistance, ecological safety, and specific behavior of ceramics as solid-phase materials of variable composition have put them beyond competition with many other traditional materials. There is every reason to consider that the future of the motor and machine-tool industry as well as the production of automatic systems and electronic computers is

determined by the success of the production of new kinds of ceramics. The potential for ceramics is due to their multifunctionality, the availability of raw material, and to the relatively low power consumption in ceramics production.



12999/9835
CSO: 1841/334

UDC 546.85

# EFFECT OF PRECIPITATION TEMPERATURE ON STRUCTURE AND PROPERTIES OF COPRECIPITATED BISMUTH AND TITANIUM

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 87
(manuscript received 8 Oct 86) pp 7-9

[Article by V. D. Parkhomenko, M. M. Troyan and V. G. Vereshchak, Dnepropetrovsk Chemical-Technological Institute]

[Abstract] The widely used method for production of piezoceramic materials is based on coprecipitation of components, producing materials with high homogeneity and chemical activity. The effect of precipitation temperature on the dispersion characteristics and phase composition of coprecipitated bismuth and titanium was studied along with caking and electrophysical parameters of the ceramics obtained from them. The relationship of components in the precipitate was $Bi_4Ti_3O_{12}$; precipitation temperature was varied in the range of 20 to 90°C. An increase in precipitation temperature led to larger particle size. Along with that, the aging processes were correlated with changes in phase and dispersion composition of the precipitated components. Temperature elevation facilitates recrystallization and an increase in the size of individual components, leading to multiphasic precipitate. Increased precipitation temperature also had a negative effect on ceramic formation from the coprecipitates. To counteract this and still obtain products with maximum density and good electrophysical parameters, high temperatures are required in ceramic annealing. Figures 3; references 6: 5 Russian, 1 Western.

7813/9835
CSO: 1841/412

UDC 621.385-747

PROTECTIVE COLORED VARNISH COVERS FOR RADIOTECHNICAL COMPONENTS MADE FROM COMPOSITE MATERIALS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 87
(manuscript received 3 Apr 85) pp 66-68

[Article by L. F. Makiyenko, I. G. Kalugin, Yu. K. Galich, V. M. Khobotov, V. A. Sviderskiy and N. A. Tkach, Kiev Polytechnical Institute]

[Abstract] Effectiveness of the protection of radiotechnical components by various compositions is determined by their ability to protect against moisture. The goal of this study was to avoid hydroformations on the surface and absorption of moisture in general. Commercial and experimental colored varnish products were studied. It was shown that the protective cover made from the composite KNN-21 was the most effective, followed by OS-12-03 in combination with a thin layer of 136-41. References 4 (Russian).

7813/9835
CSO: 1841/412

UDC 541.135.4

FREQUENCY EFFECTS ON CONDUCTIVITY OF IONIC CRYSTALS

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK in Russian Vol 5, No 2, Mar-Apr 87
(manuscript received 8 Apr 86) pp 3-13

[Article by E. F. Khayretdinov, Institute of Solid State Chemistry and Mineral Processing, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] An analysis was conducted on frequency ($\omega$) factors in conductivity of ionic crystals ($\sigma$), using a simple equivalent electrical circuit approach to evaluate the response of the crystals to sinusoidal electric fields. In general, conductivity was found to be expressed by the following equation, taking into consideration the DC and AC components: $\sigma = \sigma_{AC} + \sigma_{DC}$. The relationship between the AC and DC components may be obtained from $\sigma_{AC} = \sigma_{DC} \cdot \omega_p^{-n} \cdot \omega^n$ where $\omega_p$ is the charge hopping frequency, and $0 < n < 1$. Figures 10; references 25: 5 Russian, 20 Western.

12172/9835
CSO: 1841/379

UDC 666.112.9.01:539.3

RESILIENT PROPERTIES OF GERMANATE GLASSES CONTAINING LEAD AND BISMUTH OXIDES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 30, No 3, Mar 87 (manuscript received 9 Oct 84) pp 85-87

[Article by I. I. Rabukhin and M. M. Smirnova, Department of General Technology of Silicates]

[Abstract] Resilient properties of tri-component lead-bismuth-germanate glasses have been poorly studied, yet such data are required for evaluation of resilient optical coefficients and acoustic-optic effectiveness of such glasses which may be used in acoustic optics as optic media. Resilient properties of glass with 14 different combinations of lead, bismuth and germanium were studied. It was shown that resilient properties of sodium-lead and lead-bismuth-germanate glasses may be calculated sufficiently accurately from partial values of component oxides which were determined in this study. Properties of bismuth-germanate glasses depend strongly on synthetic conditions, and therefore, different authors report different, often contradictory results. Therefore, these glasses act as an exception to the above finding. Figures 2; references 16: 11 Russian, 5 Western.

7813/9835
CSO: 1841/418

UDC 537.534

COMPUTER SIMULATION OF IMPLANTATION OF LARGE DOSES OF LOW ENERGY NITROGEN IONS INTO SILICON

Moscow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 2, Feb 87 (manuscript received 24 Apr 86) pp 68-73

[Article by V. M. Konoplev, Institute of Solid State Physics, USSR Academy of Sciences, Chernogolovka]

[Abstract] The composition of the immediate surface layer of a target irradiated with large doses of ions is very complex and is influenced by many factors, such as the characteristics of the ion stream, the initial composition of the target, vacuum conditions of the irradiation and certain properties of the target itself. Basic processes directly related to ionic irradiation include selective sputtering, cascade transfer of ions and radiation-stimulated diffusion and segregation. Computer simulation of the implantation of large doses of ions under the current state of the art may be carried out by including only some of the above factors. The EVOLVE and

TRIDYN programs, which include selective sputtering and cascade ion transfer are examples. In the present work the DYNA program was used to simulate implantation of large doses of nitrogen (+2) ions with 2.1 KeV of energy with binary collision approximation. Target sputtering and changes in the profile of implanted nitrogen resulting from cascade transfer are examined. Relationships were obtained between the nitrogen distribution profile and sputtering coefficients of target components and implantation dosage. The results were then compared with experimental data. Recommendations are presented on selection of optimum implantation dosages for purposes of microelectronics. Figures 4; references 24: 1 Russian, 23 Western.

12765/9835
CSO: 1841/250

UDC 539.1.043:539.612

STRENGTHENING RHODIUM-ALUMINUM ADHESION CONTACT DURING IONIC BOMBARDMENT

Moscow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 2, Feb 87 (manuscript received 29 May 86) pp 143-145

[Article by I. A. Fayrakhmanov, I. B. Khaybullin, L. A. Funk and S. A. Strezhnev, Kazan Physical-Technical Institute]

[Abstract] It has been shown previously that ionic bombardment under recoil atom implantation conditions is an effective method for increasing the adhesion strength of the most varied film-substrate systems. However, the mechanism for increasing the adhesive strength of thin films under the action of high energy ionic bursts has not been established. In the present work Auger electron spectroscopy and fast electron diffraction were used to study the changes in crystal structure, element and phase composition at the rhodium-aluminum substrate interface under bombardment with various doses of Kr (+) ions at 80 KeV of energy. Rhodium film thickness did not exceed 300 Angstroms, i.e., it was comparable with the mean trajectory path of a Kr (+) ion in rhodium. The results demonstrated that changes in phase state and atomic distribution take place at the interface and are the chief causes of the significant increase in adhesive strength. Figures 2; references 4: 3 Russian, 1 Western.

12765/9835
CSO: 1841/250

UDC 546.185+661.635

PROPERTIES OF SUPERPHOSPHATES OF ALKALI AND ALKALINE EARTH METALS. PART 16. GLASSY SUPERPHOSPHATES OF CALCIUM, MODIFIED WITH NIOBIUM OXIDE

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHASKOY SSR: SERIYA KHIMICHESKAYA in Russian No 2, Mar-Apr 87 (manuscript received 21 Sep 84) pp 6-9

[Article by S. I. Kalmykov, N. P. Shevchenko and N. M. Nikolayeva, Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata]

[Abstract] Phosphate glasses are superior to silicates in certain properties such as index of refraction, dielectric permeability and resistance to breakdown. However, use of these glasses, especially the superphosphates of mono- and bivalent metals, is limited, owing to their low chemical and thermal resistance. Heated in a dry atmosphere to 200 degrees C, the superphosphates deglassify to form a crystal phase, while thermal treatment in the presence of water results in destruction, releasing tertiary phosphate-tetrahedra in the form of phosphoric acid and phosphate fragments. It is possible to improve some physical chemical properties by including a multivalent metal oxide, particularly niobium, in their structure. Addition of niobium oxide to metaphosphate glasses is known to increase their chemical resistance and softening point considerably. In the present work a study was made of the effects of adding niobium oxide on the properties of glassy calcium superphosphate at 1200 degrees C, followed by rapid cooling on a metal plate. Niobium oxide content varied from 4 to 8% by weight, and the calcium oxide:phosphorus pentoxide molar ratio was 0.77. The results show that the 8% niobium oxide addition enhances both chemical and thermal resistance of calcium superphosphate. The stabilizing action is apparently related to niobium oxide's participation in structuring the rigid three-dimensional lattice by incorporation in the form of $NbO_6$ groups in the phosphate chain. Figures 3; references 11: 9 Russian, 2 Western.

12765/9835
CSO: 1841/350

UDC 541.12.012+546.161

SYSTEMS $CdF_2$-$MgF_2$ and $CdF_2$-$ScF_2$

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 1, Jan 87 (manuscript received 14 Oct 85) pp 163-164

[Article by P. P. Fedorov, M. A. Sattarova, F. M. Spiridonov and B. P. Sobolev]

[Abstract] The present work is a continuation of a study of the reactions of cadmium fluoride with fluorides of other metals using differential thermal

analysis to obtain phase diagrams for the title systems. Both systems are eutectic with coordinates at 940 ± 5 degrees C and 28 ± 2 mole % for magnesium fluoride, and 952 ± 5 degrees C and 23 ± 2 mole % for scandium fluoride. Solid solutions were detected for both cadmium and scandium fluorides. Figure 1; references 7: 5 Russian, 2 Western.

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UDC 546.36'654'786:542.49

BEHAVIOR OF $CsLa(WO_4)_2$ WHEN BEING HEATED

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 1, Jan 87 (manuscript received 18 Apr 85) pp 180-183

[Article by N. V. Ivannikova, K. Ye. Mironov and A. A. Pavlyuk, Institute of Inorganic Chemistry, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] The crystals of rare earth and alkaline earth ditungstenates have interesting optical properties, and it is important to know their melting points, melting behavior and polymorphic conversions, if any. The lack of the latter has been demonstrated in a previous work. In the present work a study was made of the processes taking place during melting of cesium-lanthanum and tungstenate, using differential thermal, X-ray diffraction, and isothermal analysis and crystal growing. The results indicate that the title compound is formed as a reaction product of a triple system. Recommendations for choosing solvents from which to grow cesium-lanthanum tungstenate crystalsbased on crystallization isotherms are presented. Figures 3; references 8: 7 Russian, 1 Western.

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3rd ALL-UNION CONFERENCE ON THERMODYNAMICS AND SEMICONDUCTOR MATERIALS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 6, Jun 87 pp 1703-1705

[Article by V. M. Glazov, A. S. Pashinkin and V. A. Fedorov]

[Abstract] The 3rd All-Union Conference on Thermodynamics and Semiconductor Materials Sciences was held on May 13-15, 1986, in Moscow. The conference was organized jointly by the Ministry of Higher and Secondary Specialized Education and the USSR Academy of Sciences. The conference was attended by more than 400 representatives of some 150 organizations and was divided into two plenary and five specialized sessions. The various presentations covered the importance of thermodynamics to the development of microelectronics and semiconductors, calculations involved in phase diagrams, molecular models of solutions, and so forth. The work of the five specialized sessions touched on general problems in chemical thermodynamics, thermodynamics of heterogeneous equilibria of semiconductor systems, thermodynamic characteristics of semiconductors, computer modeling of semiconductors, and advances in experimental chemical thermodynamics. The conference was supplemented by 50 exhibit stands. Plans have been made to hold the 4th conference in this series in 1989 in Moscow.

12172/9835
CSO: 1841/446

LIQUID CRYSTALS IN MICROELECTRONICS

Moscow ZNANIYE - SILA in Russian No 3, Mar 87 p 50

[Article by V. Brel under the "Photo Window" rubric: "Attention! Phase Transition"; introductory quotation by Etil Plaudis]

[Text] "Brightness attracts, deep darkness frightens, and we shall take a bite of unreachable fruit."

The most daring projects of microelectronics and mass household electronic applicances, not to mention lasers and space engineering, arose solely due to progress in the technology of growing crystals.

We have been fascinated since childhood by the diversity and the magical splendor a mineral. From the physicochemical point of view, however, the mechanism of synthetic crystal formation is amazingly simple; it is a phase transition. The initial phase--liquid or vapor--is converted into the solid state. Indeed, predetermined components and alloying impurities are contained in them at the same time. To obtain a definite crystal composition, it is necessary only to control the phase transition. That is all! It is elementary.

In practice, however, everything is somewhat more complicated. Many problems have to be solved empirically, inasmuch as calculations in the majority of cases are not sufficiently reliable. Modern facilities are a complex system of technological, controllable equipment. This is the way crystals with an unusual combination of magnetic, electrical, and elastic properties are synthesized in the crystallization furnace operating in the Magnetic Materials Laboraotry of the Krasnoyarsk Physics Institute imeni L. V. Kirenskiy of the Siberian Department of the USSR Academy of Sciences. Crystallizers located in the furnace are filled with a melt saturated with the components of the substance being crystallized, or as they frequently say, with the melt solution. At a certain temperature, the ring crystal mount with the seed crystals (small crystals) suspended over the uncovered orifice of the furnace is subsequently lowered. Monocrystals are grown layer after layer on the seed crystals, which are intensively washed with the melt solution. At a particular stage at the will of the experimenter, this process is abruptly stopped, and the crystal mount is removed from the furnace.

Man must be grateful to nature for creating such a possibility for the transformation of a substance. The simplest phenomenon of phase transition essentially is a comprehensive physical law.

But this is still not all. Phase transition is possible not only during a change in the aggregate composition of the substance. It can take place inside a solid or liquid. At the same time, astonishing things are observed.

Let us say that if a thermometer is placed in the molten metal and its readings are observed during cooling of the metal, the picture will be as follows: the thermometer column will begin to fall rapidly, but at some moment, it will stop, and then the drop will continue. The critical point in the temperature, as you have already guessed, exists at the moment of phase transition, which goes with the liberation of heat maintaining the temperature.

In liquids, however, the phase transition takes place otherwise: with the liberation or absorption of heat, a change in volume occurs without fail. Man uses this circumstance in the development of the newest thermoregulators, in which the highest precision, reliability, and simplicity are required.

And in conclusion, one more transition should be mentioned: "the crossing of Suvarov through the Alps" in engineering, which has become a symbol of our time in alphanumeric and videoanalysis. The flashing of numbers on the display of an electronic watch is scarcely marveled at by anyone today. And this, by the way, also is a phase transition, but of a still different kind; it takes place in liquid crystals under the action of an electrical field.

Liquid crystals in general are marvelous. Thus, by using an inconceivable rate of change in structure of liquid crystals, the first experimental prototype of colored manual television sets has been successfully developed.

All this creates an optimistic outlook, and we can conclude our note with the thought that the best times for microelectronics are still "concealed" in the invisible thin layer of the phase transition.



12410/9835
CSO: 1841/365

UDC 546.33'185

## REACTIONS OF SODIUM POLYPHOSPHATE WITH RARE EARTH ELEMENT IONS

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 1, Jan 87 (manuscript received 10 Apr 85) pp 218-224

[Article by Zh. A. Yezhova, I. V. Tananayev and Ye. M. Koval, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences]

[Abstract] Polyphosphates of rare earth elements are of great interest due to their possible use in lasers, luminophores, microelectronics and optics. In the present work results are presented on a study of reactions in the system NaPO)D(3)U( - LnX)D(3)U( - H)D(2)U($NaPO_3$ - $LnX_3$ - $H_2O$, where Ln = La, Ce, Pr, Nd, Eu, Gd, Tb, Er and Y; X = nitrate and chloride ions. The basic conditions governing the formation of various types of hydrated polyphosphates are presented. Methods are proposed for preparing both hydrated and anhydrous basic, neutral and double polyphosphates of rare earth metals suitable for study of luminescent properties and cathode excitation. Figures 4; references 3 (Russian).

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CSO: 1841/178

UDC 535.15.34-546.65.562.

## ANALYSIS OF VIBRATIONAL SPECTRA OF $Nd_2CUO_4$ WITH PEROVSKITE STRUCTURE

Frunze IZVESTIYA AKADEMII NAUK KIRGIZSKOY SSR in Russian No 6, Nov-Dec 86 (manuscript received 19 Aug 86) pp 58-61

[Article by B. U. Asanov, O. I. Kondratov, N. V. Porotnikov and K. I. Petrov, Insittute of Inorganic and Physical Chemistry, KiSSR Academy of Sciences]

[Abstract] The vibrational spectra of the title compound was calculated theoretically using the polymer chain method in valence-force approximation.

The calculated results are in satisfactory agreement with experimental values, and it is proposed that the frequencies be referred to the vibrational forms. Frequency branches were constructed for periodic chains, and the crystal force fields were estimated. Figures 2; references 6: 3 Russian, 3 Western.

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CSO: 1841/232

UDC 541.49+541.651+546.657

## SPECTROGRAPHIC STUDY OF COMPLEX FORMATION OF NEODYMIUM WITH OXYETHYLIDINE DIPHOSPHONIC ACID IN ACID MEDIUM

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 1, Jan 87 (manuscript received 18 Oct 85) pp 53-57

[Article by Ye. G. Afonin, N. I. Pechurova and L. I. Martynenko, Moscow State University imeni M. V. Lomonosov]

[Abstract] It has previously been shown that oxyethylidine [Editor's Note: oxy = hydroxy] diphosphonic acid forms complexes of varying degrees of protonization with many metallic ions and that monoprotonized complexes formed from rare earth and lanthanoid elements are insoluble in water but go into solution at low pH values. In the present work high resolution spectrography was used to study complex formation of neodymium (III) with oxyethylidine diphosphonic acid in both acid and aqueous solutions at 0.35-4.5 g-ion/liter hydrogen ion concentrations. A neodymium complex characterized by the 4290 Angstrom absorption band was demonstrated. The high degree of stability of the complex is evidently due to participation of the alcohol group in the coordination. Figures 3; references 5: 4 Russian, 1 Western. [Oxy = Hydroxy]

12765/9835
CSO: 1841/178

UDC 546.718

## THERMAL DECOMPOSITION OF TETRAALKYLAMMONIUM PERTECHNETATES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 1, Jan 87 (manuscript received 1 Apr 85) pp 83-86

[Article by A. F. Kuzina, K. E. German and V. I. Spitsyn, Institute of Physical Chemistry, USSR Academy of Sciences]

[Abstract] A study was made of the thermal properties and mechanism of thermal decomposition of tetramethyl-, tetraethyl- and tetrabutylammonium

pertechnetates. The basic gaseous and solid products of thermolysis and secondary chemical processes were determined by differential thermal analysis. Tetraethylammonium pertechnetate manifested polymorphism with a type I phase change at 45 degrees C. Tetraethylammonium perrhenate also exhibits a similar phase change at 37 degrees C. Figures 4; references 11: 8 Russian, 3 Western.

12765/9835
CSO: 1841/178

UDC 632.954

## TOXICITY OF INSECTICIDES TOWARDS GRAIN CROP PESTS

Moscow AGROKHIMIYA in Russian No 12, Dec 86 (manuscript received 17 Dec 85) pp 89-91

[article by N. P. Sekun, Ukrainian Scientific Research Institute for Plant Protection, Kiev]

[Abstract] The use of metaphos and Trichlorfon as insecticides for cereal crops has become limited owing to their toxicity towards mammals and the resistance of plant pests to them with time. In a search for new pesticides during the period of 1981-84, Volaton and Decis appeared to have high biological activity and are the safest towards mammals amongst a group of 12 preparations tested. The sensitivity of insects towards insecticides depends to a great measure on their viability and stage of development, and this must be taken into account when working out consumption norms for the preparations. References 4: 3 Russian, 1 Western.

12765/9835
CSO: 1841/189

UDC 547.551.4.594.3

## REACTIONS OF CHLOROANILINES WITH 2-DIALKYLAMINOMETHYLCYCLOHEXANONES

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 3, May-Jun 87 (manuscript received 26 Oct 84) pp 77-81

[Article by N. T. Donenbekova, A. A. Lekerov and K. B. Yerzhanov, Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata]

[Abstract] The authors showed earlier that α-hydroxy and α-aminocyclohexylnitrile derivatives exhibit herbicidal activity. The present work shows that heating 2-dialkylaminomethylcyclohexanones with o-, m-, p-chloroaniline or 3,4-dichloroaniline and potassium cyanide in acetic acid at 40-50° C or in

ethanol yields 2-o-(m-, p-)-chloroanilinomethylcyclohexanones and 2-(3,4-dichloroanilinomethyl)cyclohexanone, respectively. These compounds exhibited medium herbicidal activity. A dose of 5 kg per hectare of 2-(3,4-dichloroanilinomethyl)cyclohexanone exhibited activity comparable to 0.9-1.2 kg per hectare of 2,4-DA. References 7 (Russian) (1 by Western author).

7813/9835
CSO: 1841/420

# SOLIDIFYING SUCCESSES ACHIEVED

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 1, Jan 87

[Article by A. A. Dzhafarov, general manager of the Azneft Production Association [PO] under the rubric "Introducing into Practice the resolutions of the 27th Congress of CPSU"]

[Text] The workers of the petroleum industry have successfully fulfilled the 1986 oil and gas production plan.

Work results for the first year of the 12th Five-Year Plan and tasks for 1987 were discussed at meetings of the party-economic active members of the Azneft PO and the Kaspmorneftegazprom [Caspian Sea Oil and Gas Industry] VPO [All-Union Production Association] in light of decisions made by the 27th Congress of the Party, the 31st Congress of the Azerbaydzhan Communist Party, and the June 1986 Plenum of the CPSU Central Committee.

At the meeting of the offshore oil producers, the head of the CPSU Central Committee sector, V. I. Zubkov, was present. Work results of the active members were presented by the Assistant Secretary of the Azerbaydzhan Communist Party Central Committee, V. N. Konovalov.

The following took part in the work of the party-economic active members: First Deputy Chairman of the Azerbaydzhan SSR Council of Ministers, A. T. Rasizade; Director and Deputy Director of the Department of the Chemical and Oil Industry of the AzCP Central Committee, K. S. Sadykh-zade and A. M. Badalov; Head of the Department of the Council of Ministers of the Republic, R. M. Dadashev; Chief Administrator of the Labor and Salary Organization of the Ministry of the Oil Industry, N. P. Makarov; Deputy Director of VNIIBT [All-Union Scientific Research Institute for Drilling Technology], A. K. Karayev; and Head of the RK [Rayon Committee] of the Oil and Gas Industrial Workers' Union, K. G. Agaguseynov.

At meetings of the party-economic active members, this paper was presented by A. A. Dzhafarov, head of the PO Azneft and K. A. Abasov, head of the VPO Kaspmorneftegazprom.

The main political event of 1986 was the 27th Congress of the Communist Party, which determined the course toward intensive development of the national economy in our country, based on the strengthening of discipline and order, improvement in the economic system, and introduction of scientific and technical advances into manufacturing practice.

So far, much has been done in this direction. The Azneft PO has worked out complex measures for radical improvement of work quality in all parts of the petrochemical industry to improve the economy of the plants and to increase the creative activity of work collectives.

The execution of these and other measures worked out during the year has ensured a positive shift in the industrial-economic activities of the Association in the first year of the Five-Year Plan. The task has been over-fulfilled by the association with respect to the principal technical-economic indicators. Thus, the plan for oil extraction and yield has been fulfilled 100.1 percent. The oil yield was 3,979 tons over the annual plan. 25.6 million cubic meters more natural gas were extracted than planned.

These figures were obtained by the strenuous and purposeful labor of work collectives, directed toward fulfilling the resolutions of the 27th Congress of the CPSU and the 31st Congress of the Communist Party of Azerbaydzhan. Last year, in the production the associations, 33,100 geological-technical measures were executed, i.e., 22.6 percent of 6,100 more than planned. Instead of the planned 3,900 well operations, 4500 operations were carried out by modifying the next-to-the-face zone of wells. To continue work by forcing the deposits to form strata, 24.1 million cubic meters of water were pumped instead of 24 million cubic meters as planned.

For improving the sanitary conditions of the bottom of wells, 2800 capital repairs were carried out, i.e., 112.1 percent, and 92,800 underground repairs, or 2800 more than provided in the plan.

Some work has been done to increase the number of new methods to be introduced to increase the oil output of strata. Successful work concerning steam heating, intrastrata combustion, flooding strata with surfactants or alkaline solutions, and application of microfoam systems ensured the extraction of 173,000 tons of oil against 151,500 tons planned.

In the fiscal year, owing to a number of measures taken to intensify oil extraction, maintain strata pressure, and control sand manifestation, etc., the working conditions of the wells have somewhat improved, and this permitted extension of the time between repairs, which amounted to 56.2 days.

The implementation of this complex of measures made it possible for the Association to succeed in considerably stabilizing the level of oil production in 1986. It must be especially noted that four NGDUs (oil and gas extraction administrations) not only prevented a further decline in oil extraction, but they even surpassed the 1985 level. Thus, compared to last year, the oil output has increased: for NGDU Muradkhanlyneft, by 58,500 tons, for

Neftechalaneft, by 2,900 tons, Siazanneft, by 3,600 tons, and Leninneft, by 2900 tons. The experience of these NGDUs has shown that due to the current increase in engineering work on the bottom of wells, a decrease in the level of oil output can be prevented by putting the residual oil supplies into processing.

It must also be noted that for some NGDUs, a considerable decrease in oil output has still occurred. Thus, for example, for NGDU imeni 26 Baku Commissars (headed by Bagiyev), oil production decreased 5.1 percent this year, for Salyanyneft (headed by Guseynov), 4.2 percent, and Ordzhonikidze (headed by Tagiyev), 4 percent. Analysis has shown that in these NGDUs, there are few reserves for increasing production capacity.

On the whole, execution of the plan by the Azneft Association has been promoted to no small degree by the assiduous work of leading brigades, instigators of socialist competition, with the slogan: "Every day--toward overfulfilling the Plan." These collectives of oil- and gas-extracting brigades led by foremen Aligasan Musayev from NGDU Salyanyneft, Dmitriy Zibarev from Ordzhonikidzeneft, Tarkhan Ibragimov from Kirovneft, Rail Kuliyev from NGDU imeni 26 Baku Commissars, and others.

Great success has been achieved in work by the brigade for capital repair of wells at the Azizbekovneft NGDU, led by the AzSSR state prize winner, Kaspar Miraliyev, which fulfilled the plan by 195.5 percent, as well as by the brigade for underground repair of wells at NGDU Shirvanneft, led by Rafik Gashimov, which fulfilled the plan by 140.6 percent. The competition for trouble-free and rapid well sinking is led by the drilling brigade headed by the Hero of Socialist Labor Akif Amanov at Ali-Bayramlinsk UBR (drilling operation administration), which fulfilled the plan by 147.4 percent, and the brigade led by Sarkhosh Mamedov at Kyursanginsk UBR, which fulfilled the plan by 194.4 percent.

The plan for gross and realized production was fulfilled by 100.5 percent; production exceeded the plan by 583,000 rubles and 1,324,000 realized production by 1,324,000 rubles. The plan for labor productivity was fulfilled by 101.1 percent. Overfilling the plan resulted in a profit of 506,000 rubles.

However, regardless of some improvement in technical and economic indicators as compared to 1985, the oil and gas administration has not completely utilized available reserves for increasing production capacity.

Thus, of 11 NGDUs, only one, Shirvanneft (headed by Mamedov), has not fulfilled the oil extraction plan and owes the country 9600 tons. The main reason for not fulfilling the plan is the weakening of organizational and engineering work and the low level of technological and executive discipline evidenced by the great withdrawal of wells from the current fund.

It has to be said that in this sector the affairs are generally unsatisfactory for the Association. In all the NGDUs, 344 wells were put into operation,

and 297 went out of service. An especially considerable drop-out took place a NGDU Leninneft: 74, Ordzonikidzeneft: 54, and Azizbekovneft: 53.

The period of operation between repairs still remains short. For NGDU imeni 26 Baku Commissars, it is 41.2 days and for Ordzhonikidzeneft--46.6 days. The reserves for improving the economic indicators in industrial activity of the Association have been especially underutilized. This concerns especially the cost price of oil and gas. In overfulfilling the plan of oil and gas extraction and labor productivity, the Association has been unable to ensure execution of the plan with respect to such an important indicator as the cost price of the primary product. In this respect, six of eleven NGDUs have shown a price increase. This shows that the directors of NGDUs have not, so far, paid the necessary attention to lowering production costs and still do not understand what importance is attributed by the party and the government to higher efficiency and quality of production.

The drilling organizations also improved work in the first year of the Five-Year Plan. The plan for general drilling was fulfilled by 105.2 percent. 21,900 meters were drilled above plan, and construction of 38 wells was completed. Compared to 1985, drilling length increased by 21,100 m, and 16 more wells were constructed than planned.

However, the work of drilling organizations deserves serious criticism. Improvement in the indicators was due to operational drilling, the plan for which was fulfitled by 115 percent; 47,900 m were drilled above plan. Compared to 1985, drilling length increased by 33,000 m. The planned drilling rate was fulfilled by 112.9 percent; compared to 1985, it increased by 94 m or 18 percent. Such a significant growth rate was influenced by a decrease in breakdowns by more than a factor of two. At the same time, the annual plan for exploratory drilling was fulfilled by 74 percent in all. All eight drilling organizations have failed to fulfill the well sinking plan.

The current situation in exploratory drilling is the result of serious neglect in the organization of drilling operations, failure in work and technological discipline, and low rates in creating new exploratory facilities.

The construction organizations (headed by Veliyev and Nagiyev) worked below their potential; they completed work in constructing new exploratory facilities in an insiffucient quantity and with delay, and this negatively affected fulfillment of the well-sinking plan.

Construction work has to precede drilling the first wells at new oil fields. Because of delayed construction work, of the 23 areas planned in the 11th Five-Year Plan, only 7 were introduced into exploration; in 1986, only 3 instead of 4. Owing to an interruption in the drilling plan and the time needed to complete construction of exploratory wells, the plan for increasing oil reserves became unfulfilled. Thus, of 100,000 m of planned exploratory shafts, 59,000 m were designated to be drilled in the area between the Kura and Iora rivers in the Yevlakhsko-Agdzhabedinsk depression, but in fact, only 3000 m were drilled in all. In this case, of 23 wells intended to ensure fulfillment of the plan for increasing oil reserves, only 12 were completed.

During the year, not one new deposit was opened; not one new oil stratum was discovered.

In 1986, the construction organizations of the Association worked inadmissibly poorly: the annual plan for capital investment was fulfilled by 97.1 percent. Incomplete utilization of investment amounted to 5.5 million rubles. The plan for construction and assembly work was fulfilled 91.8 percent and for drilling, 99.4 percent. Blame for the low indicators lies mainly with the Azneftestroy Trust (headed by Veliyev), NGDU imeni 26 Baku Commissars (headed by Bariyev) and Kirovneft (headed by Mamedov).

The failure to achieve the construction plan is due to unsatisfactory work of the Azneftstroy Trust and the self-financing, construction-and-assembly organizations of the oil and gas administrations. This is also evidenced by fulfillment of the plan for introducing basic funds. Altogether, this very important indicator was fulfilled by 100.1 percent. If the well-construction indicators are excluded from fulfillment, then according to capital construction figures, the plan for introducing basic funds has been fulfilled by only 64.3 percent, i.e., 10 million rubles below plan.

The introduction of overall floorspace in housing construction was fulfilled 70.4 percent.

In 1986, the Association adopted more than 70 scientific-technical measures, which were coordinated with the USSR Council of Ministers, Minnefteprom, and the Council of Ministers of the Republic. The economic effect of the introduction of preliminary accounting was 10 million rubles. The state plan for developing science and technology has set three tasks and envisaged the attainment of seven indicators of the technical level of production. Enterprises of the Association fully completed two tasks: drilling with slow-moving cutting engines with a rotary drillpipe string and putting powerful computer complexes based on general-purpose processors into operation at AzNIPIneft. The planned number of diaphragm pumps to be introduced for oil production has not yet been reached. In effect, only 10 of 30 were put into operation.

Of the seven indicators of the technical level of production, one has not been achieved: the commercial rate of exploratory drilling. The effective rate was 156.6 m/statistical month against a planned 230.

The plan for production and use of advanced technology, mechanization, and automation of production processes in Minnefteprom envisaged the adoption of seven measures; all have been executed to the degree planned.

Based on the Unified Plan introduced by Minnefteprom, measures were introduced into the Association for completed scientific research works at branch institutes and organizations. The great majority of these works has been carried out in the amount specified by Minnefteprom. It has to be noted that in the Association, the period of well operation between repairs is the shortest (56 days) in the industry. In this matter, specialists at AzNIPIneft can and must render effective assistance to oil workers. The Institute must thoroughly reorganize its work for creating and introducing a

complex of measures to sharply improve oil extraction and well-drilling indicators. Beyond that, in 1987, the collective at Azneft PO is facing great challenges in the area of introducing new engineering and technology. According to plan projections, the number of new technological processes and engineering equipment to be introduced is sharply increasing. It is planned to increase the introduction of diaphragm pumps for oil recovery, the number of the wells to be treated with inhibitors, and the number of measures intended to lengthen the period of well-operation between repairs. In the drilling field, the range of effective rock-disintegrating tools and instruments used for recovering stalled drill-columns, etc., will be widened.

In response to the Appeal of the CPSU Central Committee to the workers of the Soviet Union, the labor collectives of the Azneft Association have joined into socialist competition for successful completion of the tasks of the 12th Five-Year Plan.

In both the Appeal and the resolution of the CC CPSU, the USSR Council of Ministers, VTsSPS (All-Union Central Council of Professional Unions) and the All-Union Lenin Communist Union of Youth "On All-Union socialist competition for successful fulfillment of the tasks of the 12th Five-Year Plan," the main goals of the competition have been determined: a drastic increase in labor productivity, product quality, economy of all types of resources, unconditional execution of contractual obligations, and strengthening of labor discipline.

The resolution demands an increase in the level of socialist competition, expansion of the effort of labor collectives and individual workers to use their maximum potential, attainment of the highest limits, widening and strengthening of the glasnost of competition, thorough improvement of work by using advanced experience, and acceleration of its introduction.

In accord with these requirements, the Association has worked out the conditions for socialist competition for collectives of enterprises, organizations, plants, brigades and workers of the Association for successful fulfillment of the 12th Five-Year PLan.

Socialist competition has given a purposeful character to the work of oil workers. As a result, ten enterprises and organizations, 270 brigades, among them 256 teams of leading occupations, fulfilled the tasks of the first year of the Five-Year Plan ahead of schedule. Of the 256 brigades of leading occupations, 91 brigades worked in underground repair, 54 in capital repair of wells, 38 in drilling, 5 in tower construction, and 68 as construction brigades.

A new flow of creative energy was induced in oil workers by the patriotic initiative of miners V. Gvozdev, A. Potapov, and drilling foreman V. Sidoreyko, bringing the competition to a maximum growth of output. The initiative of production innovators was supported in the Association by 281 brigades, 137 of which pledged to fulfill two or more years of the Five-Year Plan by the 70th anniversary of the Great October Socialist Revolution.

This competition is now led by oil and gas extraction Plant No 2 Ordzhonikidzeneft, Plant No 2 NGDU imeni 26 Baku Commissars, Plant No 2 NGDU Leninneft, as well as by brigades for underground repair of wells led by V. Gashimov (NGDU Shirvanneft) and T. Shiraliyev (NGDU Ordzhonikidzeneft) and brigades for capital repair of wells led by K. Miraliyev from NGDU Azizbekovneft and S. Radzhabov from NGDU Shirvanneft.

However, there is some neglect in this matter also. It would seem that at all enterprises and organizations, competitive conditions have been strengthened, measures have been taken to study and introduce advanced production experience, and patriotic undertakings by advanced collectives of the branch and Association to expand the socialist competition according to one or another initiative have been studied, but in practice, concerning the fulfillment of documents, there is an inadmissible formalism, and the adopted resolutions have not been supported by obligatory organizational work.

Let us take an example. Oil workers, petroleum refiners and petroleum chemists of the Bashkir ASSR came up with patriotic initiatives to stabilize oil extraction during the years of the 12th Five-Year Plan and to exceed the plan by 4.5 million tons of oil. It is characteristic that these obligations have been supported by concrete measures, but this initiative is treated formally without the necessary creative initiative. Little has been done at the enterprises to study and widely expand advanced experience.

This year, the main task facing our association is to assure extended stabilization of the oil extraction level and creation of the necessary conditions for raising it, starting with 1989. In this case, the oil and gas output has to be assured, by limiting costs to 91.98 kopecs per ruble of marketable product and with a planned profit amounting to 22.9 million rubles.

In order to achieve this main goal, besides the complex of measures to increase the efficient use of well-funds, the worker collective at Azneft PO must construct and put 188 wells into operation. Therefore, drilling 330,000 m of operating shafts is planned. Moreover, the task of exploratory drilling has been established, according to which the construction of 25 wells and the drilling of 115,000 m of exploratory shafts must be completed.

Preparation for completing this responsible task began as early as in the fourth quarter of 1986. Based on the thorough analysis of our work in 1986, a complex of organizational and geological-technical measures has been developed, the realization of which was undertaken by all the enterprises and organizations of the Association.

The present year is particularly special for the collective at the Association. Since January 1, 1987, our association shifted to new management conditions. This shift is being carried out on the basis of a drastic reorganization of the economic mechanism, a wide application of a system of stable economic standards, strengthening of the influence of intra-industrial self-financing, based on a wide expansion of creative initiative, and an increase in labor activity of the collectives and every worker toward achieving high end results for the Association, enterprises, and organizations.

Great importance is attributed to expanding the rights of the Association and enterprises and increasing their responsibility for fulfilling the plan.

One of the main features of the ongoing reorganization is intensification of the economic methods of management. And this means that the attention of the leaders of collectives must be drawn to guaranteeing fulfillment of the plan with respect to such indicators as production cost, profit, labor productivity, control of wage fund distribution, and introduction of true internal cost accounting.

With the new economic conditions, the number of planned indicators approved by the Ministry in five-year and yearly plans for the Association and Association enterprises and organizations is significantly decreasing.

At the same time, this year, a complicated and responsible challenge must be met, concerning improvement in the organizational structure of the association.

The Azneft Association is carrying out preparations to fulfill the resolutions of the CC CPSU, the Council of Ministers of the USSR, and VTsSPS "On improving wages and introducing new pay scales and official tax rates for workers in the industrial sectors of the national economy."

The oil producers in our Association are facing many great and complicated tasks. And it is a patriotic duty and honor for every worker and specialist, through consolidated and highly productive work, to unconditionally filfill the plan and socialist obligations in honor of the 70th anniversary of the Great October Socialist Revolution.



12999/9835
CSO: 1841/334

PREPARATIONS FOR YAMAL GAS FIELD DEVELOPMENT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 May 87 p 1

[Article by Yu. Semeykin, journalist, Yamal, Cape Kharasavey]

[Text] Preparations have been started for the development of the first gas field at Yamal. A group of vessels arrived at Cape Kharasavey. The dry cargo vessel "Arkhangelsk" stood at the ice "pier" as if solidly frozen to its bluish ice. It has more than 7000 tons of equipment and construction materials in its holds and on the deck. More than 30,000 tons of freight will be delivered here.

There are no deep water bays on the west coast of the Yamal Peninsula. Dry cargo freighters and tankers cannot come closer than five kilometers from the shore. Therefore, vessels use the solid ice of the Kara Sea for mooring.

Shift teams of machine operators are working here around-the-clock in spite of the blizzard. All available manpower and equipment are used for unloading operations. The following workers particularly distinguished themselves in this hard work: bulldozer operator A. Polyanskiy, foremen S. Agudov and N. Demura, mechanic V. Tarnavskiy, rigging worker V. Bashtanov and installation worker A. Samuylov.

Specialists of the Ministry of the Gas Industry and "Severgazprom" Association came to the conclusion that the construction and drilling of the new Bovanenkovo gas field has to be started this year. The extraction of hydrocarbon raw materials from these deposits must start during the Thirteenth Five-Year Plan, but for this it will be necessary to drill more than 100 development wells.

This is a difficult task, and the association treats it with full understanding of its complexity and responsibility. In addition to a deep drilling expedition, a motor vehicle transportation enterprise was created at Cape Kharasavey. Recently, the third construction administration of the trust "Severgazstroy" also started working. Scientists developed optimal technological solutions for the construction of wells and completed a large volume of other scientific research jobs. The Ukhta Experimental Mechanical Plant has started the production of blocks and nonstandard equipment.

The settlement of the arctic shift teams of "Severgazprom" was built in the middle of the 1970s. The living conditions of the people arriving here, putting it mildly, leave much to be desired. The conditions for the workers of the motor

vehicle transportation enterprise are particularly poor. People sleep here even in the recreation room on bunk beds arranged in several tiers. Another acute problem is a shortage of special work clothing. It is simply impossible to work under the arctic conditions without short fur coats, fur boots and fur mittens. These and other problems were raised by the workers at their meeting with the management of the association and enterprises based now at Cape Kharasavey. These problems must be resolved as soon as possible.

Before starting the drilling of the wells, it is necessary to transport 45,000 tons of equipment, construction materials, blocks for prefabricated dormitory facilities and food supplies. The builders have to build in a short period of time production facilities, housing, a cafeteria and medical station.

The country's largest gas transportation system will start from the Yamal's first gas field.

According to the general director of the "Severgazprom" Association B. Budzulyak, there are no examples in world practice of the construction of pipelines of such length and capacity under permafrost conditions. Fundamentally new technical solutions will be needed for this.

However, these are the problems of tomorrow. Today, trains of sleighs are already running in the Yamal tundra from Kharasavey to Bovanenkovo. The snowy silence has been broken by the roar of tractors and helicopters.

10233
CSO: 1841/336

## STATE INSPECTION AT ENTERPRISES OF USSR MINISTRY OF PETROCHEMICAL INDUSTRY

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 6, Jun 87 pp 2-3

[Article by L. A. Sadovnikova, Z. A. Mynova and V. V. Bulatnikov, All-Union Scientific Research Institute of the Oil Industry]

[Abstract] In order to improve the quality of products produced by the various enterprises of the USSR Ministry of Petrochemical Industry, new regulations went into effect, governing the performance of quality control laboratories. The appropriate technical laboratories responsible for quality control underwent certification in 1984-1985, using testing methods which meet COMECON and conventional industrial standards. The program includes monitoring of reagents and instruments used in testing in order to ensure reliable data. The success of enterprises that have gone over to the production of State quality products rests on immediate alleviation of shortcomings in products based on quality control.

12172/9835
CSO: 1841/449

## SOCIALIST COMPETITION IN PETROCHEMICAL INDUSTRY

Moscow KAUCHUK I REZINA in Russian No 6, Jun 87 pp 2-4

[Article by V. A. Khanov, USSR Ministry of the Petrochemical Industry]

[Abstract] The workers of the petrochemical industry are reported to have taken seriously the challenges issued by the 27th Party Congress for economic and social development of the USSR. The rate of economic development in the petrochemical industry presently exceeds that seen in the 11th Five-Year Plan, in itself an indication of the effectiveness of socialist competition. In addition to individual and group awards and commendations, the petrochemical industry has the distinction of being the first to be evaluated on the basis of net production. The cost-effectiveness approach has resulted in attenuation of many negative phenomena, such as formalism, duplication, and a standardized approach. The cost-effectiveness basis, individual responsibility and

recognition, and increased productivity have combined to render the economic progress of the petrochemical industry highly satisfactory to date. However, an ultimate evaluation can only be based on the final results, both in terms of quantity and quality of the products.

12172/9835
CSO: 1841/447

UDC 621.892.86.84:546.77

MOLYBDENUM COMPLEXES - SYNTHETIC ADDITIVES TO LUBE OILS

Moscow NEFTEKHIMIYA in Russian Vol 26, No 6, Nov-Dec 86
(manuscript received 25 Feb 86) pp 823-827

[Article by P. I. Sanin, G. N. Kuzmina, Yu. A. Djozovoy and T. A. Zaymovskaya, Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences]

[Abstract] Molybdenum complexes are lube oil additives which give oils antioxidant and antiwear properties. Five molybdenum complexes containing dithiophosphoric and dithiocarbamine ligands were synthesized, tested and found to have antioxidant and antiwear properties. The most effective were those complexes having the maximum number of sulfur atoms. The molybdenum complexes have the capability to separate molybdenum disulfide during friction between metallic surfaces, which has an effect on the wearing process. Figures 2; references 12: 10 Russian, 2 Western.

12765/9835
CSO: 1841/175

UDC 66.092.662.75

HIGH VELOCITY HYDROGENATION OF BORODIN BROWN COAL WITH PETROLEUM BASE PASTE FORMER

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 87
(manuscript received 2 Dec 85) pp 52-56

[Article by A. A. Krichko, O. A. Solovova, S. N. Shatov and M. K. Yulin, Institute of Mineral Fuels]

[Abstract] Exploratory work was started at the Institute of Mineral Fuels in the early 1970's on improving the production of liquid products from coal by hydrogenation. The basic problem was lowering the hydrogenation pressure from 30-70 to 10 MPa and less. Research indicated that this is possible through use of a paste-former, i.e., a hydrogen donor of coal or petroleum

origin, an active catalytic system (molybdenum) and organic additives. Lowering the pressure reduces the capital investment in plant construction and allows use of available equipment for high volume output. Under the proposed technology, the reaction time during the coal liquefaction stage is 30-60 minutes, which limits the productivity of the process. In the present work results are presented on a study of the conversion of organic matter from Kansko-Achinsk brown coal during hydrogenation under high velocity heating conditions and relatively low reaction times. The paste-former consisted of an oil fraction having a boiling point above 260 degrees C, obtained during atmospheric distillation of a blend of West Siberian crudes. It was demonstrated that at less than 17 minutes of reaction time, 74-76% of the coal organic matter was converted, and the yield of liquid products based on the paste was 80-82%, while the hydrogen consumption did not exceed 1.2%, based on the paste. A drop in the extent of conversion at 450 degrees C is evidently due to secondary processes and the formation of condensation products. Figures 3; references 9: 4 Russian, 5 Western.

12765/9835
CSO: 1841/353

UDC 553.061.15:552.577:552.578.1

## GENERATION OF GASES DURING BIOCHEMICAL CONVERSION OF PEAT

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 87
(manuscript received 2 Jul 86) pp 30-33

[Article by Ye. A. Rogozina, I. K. Norenkova, S. V. Viltovskaya and Ye. V. Kostyunicheva, All-Union Petroleum Scientific-Research Geological Prospecting Institute]

[Abstract] The initial stage of organic matter breakdown, aerobic destruction, theoretically results in formation of carbon dioxide and water. However, in nature this process also includes formation of bacterial metabolites and biomass. Thus active biochemical processes take place in the surface layers of pond sediment with intensive oxygen absorbtion so that even at shallow depths oxidation is displaced with reduction. Anaerobic breakdown is governed by two stages. In the first stage fermentation hydrolysis converts proteins, lipids, and polysaccharides into lower fatty acids, alcohols, aldehydes, ketones and gases (carbon dioxide and hydrogen). In the second stage, these compounds ar eused by methane-forming and sulfate-reducing bacteria. A knowledge of the dynamics and scale of biochemical gas generation thus becomes important to an understanding of the quantitative side of organic matter conversion in present day sediments of the Baltic, Caspian, Arabian, and South China Seas, continental shelf of the Pacific Ocean and Quaternary and Pliocene deposits of the Caspian Sea basin varies from $0.2 \times 10^{-6}$ to $2.7 \times 10^{-2}$ cc/kg of sediment per day, or $0.8 \times 10^{-4}$ to 10 cc per year. It has also been reported that present day sediment contains as much as 300 cc of methane per kilogram. However, it is almost impossible to estimate the scale of gas formation in

natural specimens owing to the dispersion of gases within the thickness of the deposits in natural waters. Therefore, laboratory simulation of biochemical conversion processes of organic matter in present day sediments appears most promising. In the present work a study was made of organic matter conversion in peat to determine the directions of analogous processes in nature and to estimate the scale and dynamics of gas generation and their composition. A peat sample (humic organic matter) from a tundra lake in Archangelsk Oblast was used. The lake measured 1.25 by 1.5 km and was 0.2-0.5 meters deep, apparently of glacial origin. The water was yellow in color, rich in organic matter and lightly mineralized. The results of the study made it possible to compute the gas generating potential of the upper 10 cm layer of peat during the initial stage of conversion to be $3.2 \times 10^5$ cubic meters of methane gas per square kilometer of peat. This includes $0.6 \times 10^5$ cubic meters in the sorbed state. Figures 2; references 12 (Russian).

12765/9835
CSO: 1841/353

UDC 662.74(047)

SCIENTIFIC COUNCIL OF STATE COMMITTEE ON SCIENCE AND TECHNOLOGY ON PROBLEMS OF 'NEW PROCESSES IN COKE-CHEMICAL INDUSTRY', COKE-CHEMICAL SECTIONS OF SCIENTIFIC TECHNICAL COUNCIL, USSR MINISTRY OF FERROUS METALLURGY AND CENTRAL ADMINISTRATION OF SCIENTIFIC TECHNICAL DIVISION OF FERROUS METALLURGY

Moscow KOKS I KHIMIYA in Russian No 6, Jun 87 pp 57-59

[Article by O. F. Bukvareva]

[Abstract] A joint meeting of the title bodies was held in Moscow 29-30 Oct 86, during which the following topics were covered: 1) accomplishments of the scientific-technical program, 2) the state of raw material and the needs and technical directions for improving the quality of fire resistant materials for coke banks, 3) possibilities of replacing metallurgic coke in non-blast furnace production by other types of coke, and 4) purifying coke gas of ammonia impurities. This joint meeting was followed by a session of the executive committee (Bureau) where discussions covered technical aspects of the technology of coal charge tamping, ecological problems in the coke-chemical industry, and their solutions and technical-economic calculations using wide chamber coke banks. Another meeting of the Scientific Council (GKNT) was held 9 Dec in Donetsk where two problems were addressed: introduction of thermal preparation of coal charges and introduction of computer technology into the coke-chemical industry. All discussions brought out deficiencies and provided only generalizations instead of practical solutions.

7813/9835
CSO: 1841/422

STANDARDIZATION OF RUBBER AUTO ACCESSORIES

Moscow EKONOMICHESKAYA GAZETA in Russian No 21, May 87 p 9

[Article by I. Korovkin, deputy chief of the Main Technical Administration of the USSR Ministry of the Automobile Industry: "Chemists' Help Needed"]

[Text] In the article "Conflict" published under the rubric "State Acceptance" Two Approaches" (No 8), the question was justly raised regarding the necessity of standardizing industrial rubber accessories. The USSR Ministry of the Automobile Industry instructed enterprises of the industry to conduct work in 1987-1989 on the unification of industrial rubber parts and prepare a restrictive list of them. The use of their new kinds in new designs will be strictly regulated. Coordination of that work in the industry was assigned to the Central Scientific Research Institute of Automobiles and Automobile Engines (NAMI), where a special subdivision is being organized.

Of course, unification must be based on the highest technical level achieved in the industry of accessory parts. However, VPO [All-Union Production Association] "Soyuzrezinotekhnika" [All-Union Trust for the Manufacture of Industrial Rubber Products] and the plants under its jurisdiction are imposing such limitations on deliveries of high-quality industrial rubber products (RTI) that it is becoming simply impossible to meet these conditions.

It is necessary to expand the type and size series in the current standard technical documnetation for industrial rubber accessories. This will ensure a wider selection and use of standardized parts in developing new types of automobile equipment.

For example, GOST [All-Union State Standard] 5813 "V-Shape Fan Belts" provides for 80 type sizes of belts, while the "Daeco Corporation" catalog (USA) lists more than 5000 belts of 40 types and their service life is twice as long as the domestic belts.

This explains a considerably higher utilization percentage of standardized and unified industrial rubber products by foreign automobile manufacturing firms.

The number of RTI [industrial rubber product] suppliers to automobile plants is unjustifiably large. At the present time ZIL [Moscow Automobile Plant imeni I. A. Likhachev] receives industrial rubber accessories from 14 plants, AZLK [Moscow Automobile Plant imeni Lenin Komsomol] -- from 15, MAZ [Minsk Automobile Plant] -- from 12, Pavlovo Bus Plant -- from 18 enterprises. They are often brought from distant areas. Moreover, different plants of industrial rubber products manufacture parts of the same or even identical type from different rubbers which often differ in their basic technical indexes. For example, for automobiles ZIL-131 and ZIL-130, identical seals for identical assemblies are manufactured from various kinds of rubber substantially differing in their service efficiency.

All of these problems can be solved by the Ministry of Automobile Industry only in cooperation with the USSR Ministry of the Petrochemical Industry and VPO "Rezinotekhnika". We expect consists to take an active part in work connected with the unification of industrial rubber parts.

10233/9835
CSO: 1841/394

UDC 541.117:541.49

## REACTION OF METHYL ACRYLATE WITH TITANIUM TETRACHLORIDE DURING VAPOR CONDENSATION ON COLD SURFACE

Kiev TEORETICHESKAYA I EKSPERIMENTALNAYA KHIMIYA in Russian Vol 22, No 6, Nov-Dec 86 (manuscript received 20 Nov 84) pp 673-679

[Article by G. B. Sergeyev, V. S. Komarov, V. N. Bekhterev and M. N. Mashyanov, Moscow State University]

[Abstract] In a previous study the rate of reagent vapor condensation was found to have an effect on the polymerization of cyclopentadiene in the presence of titanium tetrachloride at 77K. In the present work this effect was studied for the case of complex formation between methyl acrylate and titanium tetrachloride during condensation of reagent vapors on a copper surface at liquid nitrogen's boiling point. Infra-red spectroscopy showed that the mole fraction of reagents entering reaction is a function of the condensation rate and has an extreme character. A formal-kinetic model describing this relationship between the complex-forming substances and the condensation rate is presented. Figure 1; references 8 (Russian).

12765/9835
CSO: 1841/185

UDC 621.382

## TEMPERATURE RELATIONSHIP OF PMMA ETCHING IN $CF_4$ IN DIODE TYPE REACTOR

Moscow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 2, Feb 87 (manuscript received 9 Sep 85) pp 91-95

[Article by S. L. Antonov, Yu. P. Baryshev, K. A. Valiyev, I. Yu. Lukyanova, K. Ya. Mokrousov and A. A. Orlikovskiy, Institute of General Physics, USSR Academy of Sciences, Moscow]

[Abstract] Polymer destruction during plasma-chemical etching occurs both as a result of chaotic chain rupture and the splitting off of a terminal radical

of a polymeric molecule. Important information on the concrete mechanism of destruction may be obtained by studying Arrhenius curves, i.e., etching rate - temperature relationships. Previous work on dry etching of polymethylmethacrylate (PMMA) and other electronic resistors showed that the Arrhenius curves exhibit a linear relationship at low temperatures with an inflection point at about 20 K below the glassification point of the resistor. It is believed that the PMMA etching rate at 303-353 K is limited by diffusion processes, while beyond the inflection point, at 353-358 K, it is limited by chemical reaction of the polymer with chemically active particles of the plasma. This work was carried out in a cylindrical reactor with bulk plasma excitation at 13.56 MHz frequency, and the sample was moved about on a perforated screen to exclude the effects of charged particle bombardment. In the present work a study was made of PMMA etching in carbon tetrafluoride plasma at 308-403 K threshold temperatures in a diode-type reactor with flat parallel electrodes, with plasma excitation at 75 kHz, and with the etching taking place under intensive ionic bombardment. The resulting Arrhenius curve has two inflection points at 358 and 378 K. Mass spectrometric study of secondary ions in the PMMA near-surface layer showed that fluorine penetrated this layer to a depth of 0.01-0.02 microns. Causes for the occurrence of an etching rate saturation point on the Arrhenius curve at 378 K and its practical applications are discussed. Figures 2; references 4 (Western).

12765/9835
CSO: 1841/250

UDC 678.674.4.01:620.178.5

PROPERTIES OF MODIFIED OLIGOMER SOLUTIONS UNDER VIBRO-TREATMENT AND POLYMERS BASED ON THEM

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87 pp 14-15

[Article by N. N. Vorontsova, S. B. Sukachev and T. I. Khoroshilova]

[Abstract] Controlled alteration of a polymer's structure is possible through the action of an external force field on a solution or melt of the polymer before hardening. In the fabrication of chemically resistant containers and large diameter pipes of glass reinforced plastics, a 56% styrene solution of unsaturated oligomer obtained from dioxypropylated diphyenylolpropane and maleic anhydride is used. The polymer matrix mainly provides a redistribution of tensile stresses for the individual fibers and protects them from the external medium. One of the basic characteristics of the polymer matrix is therefore its elongation to rupture correlation (e), which must be 5-6%. At this value of e the material becomes monolithic under stress. Also, the e value of a bisphenol type oligoester does not exceed 1.5-2.5%. Addition of 1.5 parts by weight of oligobutadienediol (OBD), containing 1.7% hydroxyl groups and 1.5 parts by weight of triisocyanate (TIC), containing 13-18% isocyanate groups raises the value of e to only 3.5-4%, while the breaking strength increases to 450-500 MPa, which is also

insufficient. A study was made of the possibility of increasing the e value of OBD- and TIC-modified oligomers while preserving their breaking strength by vibro-treatment with a device at 318 K and a frequency of 50 Hz at a 1 mm amplitude. After vibro-treatment of styrene solutions of the oligomer for 3 hours, they were maintained at rest for 24 hours and then subjected to secondary vibro-treatment for another 3 hours. The results show that the treated hardened samples had an e value of 5.68% and that vibro-treatment of a modified bisphenol type unsaturated oligomer makes it possible to raise the mechanical characteristics of the resulting polymer to the required standard. Figures 2; references 6 (Russian).

12765/9835
CSO: 1841/344

UDC 678.742.2;678.764.43;66.085.3

## THERMOSETTING RADIATION GRAFTED PEHP WITH ALLYL METHACRYLATE ADDED

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87 pp 15-16

[Article by T. M. Kiseleva, V. V. Lyashevich, V. I. Dakin, F. F. Sukhov and N. A. Shmakova]

[Abstract] Thermosetting components made of radiation grafted high pressure polyethylene (PEHP) are used widely. The polymer is irradiated to a saturation dosage equal to or greater than 0.1 MGr, and the yield is increased by addition of a polyfunctional compound such as allyl methacrylate. A study was made of the thermosetting and physical-mechanical properties of irradiated PEHP, containing various amounts of the monomer ranging from 0 to 9.3%. The results show that addition of a polyfunctional monomer such as allyl methacrylate during radiation grafting of PEHP makes it possible to prepare a thermosetting material close in thermosetting capability to that of irradiated PEHP not containing the additive and having superior physical-mechanical properties such as tensile strength, relative elongation and setting stress. Figures 2; tables 2; references 7 (Russian).

12765/9835
CSO: 1841/344

UDC 678.5:667.637.4:537.622.4

ESTIMATION OF STRENGTH PROPERTIES OF POLYMER FILMS BY THEIR MICROHARDNESS

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87, pp 21-22

[Article by N. S. Gamov and O. S. Ivanov]

[Abstract] When making magnetic discs with ferro-lacquer coatings it is necessary to use polymer materials which provide high strength to the coatings. The strength of filled polymer materials is a function of the properties of the polymer matrix, the degree of filling and the adhesion strength between the filler and the polymer. Polymers based on epoxy resins are known to have high adhesive strength, and it therefore may be assumed that in order to obtain magnetic coatings having high strength, epoxy polymers having high strength characteristics should be employed. In the present work a study was made of the possibility of estimating the strength properties of polymer coatings and their optimum compositions from microhardness data of thin polymer films. Whenever a sharp indentor impacts a polymer, both plastic deformation and structural breakdown take place. The latter becomes a necessary condition for estimating the strength of the material. Analysis showed that the strength of epoxy-polyamide compositions is not high, and therefore, they are not suitable for use as binders for magnetic coatings. Compositions based on resin ED-20 and citric acid had the best properties. The results further indicated that microhardness measurements may be employed to determine optimum composite composition. References 4 (Russian).

12765/9835
CSO: 1841/344

UDC 678.82:539:66.085.3

THERMOPHYSICAL PROPERTIES AND STRUCTURE OF IRRADIATED POLYSULFONES

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87 pp 25-27

[Article by N. I. Shut, N. V. Klimenko, L. M. Bolotina and V. P. Gordienko]

[Abstract] New polymeric structural materials having good service properties and high thermo-radiation and chemical resistance are used to make components for use under extreme service conditions. Such polymers include aromatic polysulfones, which appear promising for use in conditions of radiation and high temperatures. A study was therefore made of the effect of fast electron radiation on the thermophysical properties of polysulfones. Various polysulfones were subjected to fast electron radiation to saturation doses of 1 and 5 MGr, and the specific heat capacity and coefficients of thermal conductivity were determined at temperatures ranging from the boiling point of nitrogen to temperatures exceeding the glassification point of the polysulfone. Structural changes were determined by IR-spectroscopy. The results

indicated that the thermophysical properties are determined chiefly by structural changes caused by the radiation. Radiation has its greatest effect in the range of relaxation transition, which is apparently related to the formation of a graft structure and products of radiation breakdown. Figures 2; references 6: 3 Russian, 3 Western.

12765/9835
CSO: 1841/344

UDC 678.84.033.019.31

EFFECT OF FILLERS ON COMPOSITION OF POLYMETHYLSILOXANE BREAKDOWN PRODUCTS

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87 pp 33-34

[Article by V. S. Osipchik, N. D. Rumyantseva, Ye. D. Lebedeva, N. I. Sokolova and M. S. Akutin]

[Abstract] Incorporating fillers into polymers is one of the basic methods for making composite materials having special properties. Polymer-ceramic materials based on silicon organic binders, such as polyorganosiloxanes, have combined properties of the polymer and the ceramic and exhibit heat resistance, high strength and the capability to preserve physical-mechanical characteristics under a wide range of temperatures. Service temperature of components made of these materials depends much on the high temperature heat treatment conditions. These conditions were selected on the basis of the qualitative and quantitative composition of the breakdown products of the polyorganosiloxane binder in the presence of a ceramic filler as determined by pyrolytic gas chromatography using ceramic Al, Ti and Mg oxides as fillers and a polymethylsiloxane binder obtained by condensation of the co-hydrolysis products of methyltrichlorosilane and dimethydichlorosilane. Qualitative composition of the pyrolysis products remained identical, while the quantitative yield was a function of the type of filler and the pyrolysis temperature. Differential-thermal analysis of thermo-oxidative breakdown of highly filled materials showed that the temperature of initiation of thermooxidative breakdown of composite materials, in comparison to the initial polymethylsiloxane, is shifted towards the high temperature region. For a material based on titanium dioxide, this temperature is shifted 90-100 degrees C; for aluminum oxide, 60-65 degrees C; and for magnesium oxide, 10-20 degrees C. Regularities determined by studying breakdown processes of highly filled polymethylsiloxane may be utilized as a basis for selecting calcining conditions for polymer-ceramic components. Figure 1; references 5 (Russian).

12765/9835
CSO: 1841/344

UDC 678.743.22:621.798.1:620.2

PACKAGING FROM PVC FOR CONSUMER GOODS

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87 pp 46-48

[Article by V. N. Krivoshey and M. G. Solomenko]

[Abstract] Consumer goods packaging made of PVC is now second only to polyolefins in volume of production. Among its many advantages are clarity, low gas and odor penetration, low bulk, no sterilization for food products and bagging and sealing in one operation. PVC packaging material is prepared from ground or powdered PVC particles and shaped into sheets and film. Production of PVC packaging material requires special equipment, periodic cleaning and maintenance of engineering parameters and in general a more highly qualified service personnel than with polyolefins. Heat resistant compositions require 2-6% stabilizers consisting of fatty acid salts of barium, cadmium and zinc combined with an organic phosphite such as Forstab. Clear plastic requires 2% of an octyl-tin-sulfur-containing compound as stabilizer. To improve the workability of the compositions and to lower viscosity of the melts and working temperature, 2% methacrylic-acrylic acid copolymer is added. A lubricant consisting of a fatty acid ester and glycerine facilitates flow of the melt through various parts of the equipment. Various types of high-output automated equipment have been designed for PVC packaging into various shapes. Bi-axial orientation of the PVC molecules produces clear material more economically than conventional extrusion. More recently, bottles are being fabricated from rigid PVC by this method. These bottles are used for carbonated beverages. References 3 (Russian).

12765/9835
CSO: 1841/344

UDC 678.06-405.8.001.2

OPTIMAL DESIGNING OF LOAD-CARRYING PANELS FROM INTEGRATED FOAMPLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87 pp 49-51

[Article by V. P. Valuyskikh]

[Abstract] The distribution of density in integrated foamplastics throughout the bulk of an object and its design is a function of the engineering parameters of the process by which it was produced. The difficulty in solving problems in design optimization is due to the large number of quality characteristics of the article which lack specific given values (material consumption, duration of production cycle, energy and labor, etc.); large number of control parameters; diversity of physical-mechanical characteristics; poorly defined relationship between the physical-mechanical characteristics and the engineering parameters of the production process. A

need arose to develop a mathematical model for evaluating the physical-mechanical characteristics of various items made of integrated foamplastics which would decrease the volume of both full-scale and laboratory experiments, material expenditures and duration of research. It therefore seemed interesting to examine the approaches to optimal design of objects made of integrated foamplastics and optimization algorithms and the results of some computer calculations of rational parameters of laod-carrying panels. The problem of optimum density distribution throughout the integrated foamplastic in objects having various shapes and geometric sizes in three dimensions are discussed, and formulas are presented and examples given for determining stress-deformation in complex geometric shapes. An optimization algorithm is presented. Figures 2; references 7 (Russian).

12765/9835
CSO: 1841/344

UDC 678.5:677.4:535

## USE OF POLYMERS IN FIBER OPTICS

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 87 pp 54-57

[Article by B. B. Troitskiy and L. S. Troitskaya]

[Abstract] Fiber optics is finding greater and greater use in such fields as machine building, mensuration, tool making, medicine, communication systems and other branches of industry. Polymers are widely used in fiber optics, especially in the preparation of individual optical fibers, cable making and joinery. In the present work a review is presented on polymers used in the preparation of optical fibers consisting solely of polymers and fibers consisting of a quartz core surrounded by a polymer shell. Optical fibers based on chalcogenide and fluoride glasses are not covered. References 93: 18 Russian, 75 Western.

12765/9835
CSO: 1841/344

UDC 678.742+541-64:547.31

SIZE OF FILLER PARTICLES AND DEFORMATIONAL BEHAVIOR OF COMPOSITE HAVING PLASTIC MATRIX

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 6, Oct 86 (manuscript received 20 Dec 85) pp 1418-1422

[Article by V. A. Topolkarayev, Yu. M. Tovmasyan, I. L. Dubnikova, A. I. Petrosyan, I. N. Meshkova, A. A. Berlin and Academician N. S. Yenikolopyan, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] The deformational behavior of filled polymer systems is determined to a large extent by the shape and size of its filler particles, their spatial distribution and the morphology of the polymer matrix. In the present work an analysis was made of the effects of the amount and particle size distribution of the filler on the structural organization and deformational behavior of compositions based on a highly plastic matrix and fractionated aluminum hydroxide produced by the "Sumitomo Aluminum Smelting Co." Polymerized-filled composite material was prepared by polymerizing ethylene in the presence of catalytically active filler. Microdeformation processes in the vicinity of the filler particles were analyzed by electron scanning microscopy, and tensile strength was determined on 400 mkm samples at a relative deformation velocity of 0.67 per minute. The filler particles appear to catalyze specific microdeformational processes in the filled system. The nature of the latter is determined by the size and mutual distribution of filler particles, thickness of matrix layers and their capability for plastic flow and self-hardening. For a given filler there is an optimal particle size for increasing the plasticity and elongation-to-rupture coefficient of the composite. Figures 2; references 6 (Russian).

12765/9835
CSO: 1841/146

EXPANSION OF ORGANIC-SEMICONDUCTOR R&D IN ARMENIA

Moscow KOMMUNIST in Russian 3 Jun 87 p 4

[article by F. Nakhshkaryan]

[Abstract] This article assesses the status of research of organic semiconductor materials in the Armenian republic. The chief facility for work in this area is a laboratory of the Armenian affiliate of the All-Union Scientific Research Institute of Chemical Reagents and Extra-Pure Chemical Substances (AF IREA) of the Ministry of the Chemical Industry. Doctor of Chemical Sciences A. Matnishyan is the head of the laboratory.

It is recalled that the USSR State Committee for Science and Technology assigned the laboratory the task of synthesizing monomers of the acetylene

series. Scientists under Matnishyan's direction defined a number of key research directions, including studies of effects of polyacetylene films' structure and morphology on their electrophysical and electrochemical properties; development of technology for obtaining polymer semiconductor films and research of their physical-mechanical properties; selecting designs of storage cells and converters; and studying effects of doping agents. In 1982, scientists of AF IREA and of the USSR Academy of Sciences' Institute of Chemical Physics developed the first models of power storage cells based on a plastic conductor--polyacetylene.

It is pointed out that Matnishyan's laboratory is operating on a semi-official basis and lacks facilities to conduct comprehensive research with participation of professionals from different fields. Despite these handicaps, the AF IREA scientists reportedly have found new and effective methods for obtaining organic semiconductor materials and films with different properties. Products based on these materials are said to compare favorably with foreign developments. The possibility of developing photoelectric solar-energy converters on the basis of an organic semiconductor was noted at an All-Union conference which took place in Yerevan in 1985. Organic-semiconductor research groups which have been organized under Matnishyan's direction are now operating at the chemical-physics institute and in Tashkent and Alma-Ata, and the laboratory has sent specimens of semiconductor materials to the Uzbek Academy of Sciences' Institute of Nuclear Chemistry and to Irkutsk University for study.

It is recalled that in 1983, the bureau of the Armenian Academy of Sciences' Department of Chemical Sciences proposed that a specialized laboratory be organized where chemists, physicists and engineers could work together on organic semiconductors. In May of 1985, the Academy called a conference in which T. Toroptseva, chief specialist in polymer materials of the All-Union Scientific Research Institute of Current, and N. Podkolzina, head of a technical department of the Ministry of the Electrical Equipment Industry, took part. This conference recommended that development of chemical sources of current based on new organic semiconductors be organized with the participation of five Armenian institutes, and that a temporary scientific collective be put in charge of this project. However, the heads of the Armenian Academy still have not acted on these proposals or taken other measures to promote organic-semiconductor R&D, the author complains.

/9835
CSO: 1841/424-E

UDC 543.06:621.793:546.224:677.494.745.32

SPECTROPHOTOMETRIC STUDY OF REACTION OF SOLUTION COMPONENTS USED IN CHEMICAL METALLIZATION

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 30, No 3, Mar 87 (manuscript received 26 Aug 85) pp 112-114

[Article by D. N. Akbarov and G. F. Vlasenko, Department of Chemical Technology of High Molecular Compounds, Tashkent Institute of Technology and Light Industry imeni Yu. Akhunbabayev]

[Abstract] Recently great interest is being shown in imparting special properties like electroconductivity to various polymers, including fibers. One such method is chemical metallization based on treating fibers in a solution containing a metal salt and a reducing agent. In the present study, absorption spectra were determined for the components of such mixtures used to metallize nitron fiber: $NiCl_2$, $NaOHCH_2SO_3$ (rongalite C), NaCNS as well as the interactive system $NiCl_2$-NaCHS-Rongalite C-NaCNS. $NiCl_2$ solutions showed three absorption bands and obeyed the Buger-Lambert-Baer Law; water solutions of NaCNS are practically transparent in the range studied. Rongalite C showed no absorption maxima but obeyed the law of light absorption. Keeping the concentration of NaCNS constant, various combinations of the above system were evaluated, showing that their absorptions exceeded the additive values; hence, reactions have occurred among components used for chemical metallization. Formation of the $Ni^{2+}$-$CNS^-$ complex increased the stability of the system. Figures 4; references 5: 4 Russian, 1 Western.

7813/9835
CSO: 1841/418

UDC 541(64+49)

STUDY OF COMPLEX FORMATION OF HYDROLYZED POLYACRYLAMIDES WITH FERRIC CHLORIDE

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHASKOY SSR: SERIYA KHIMICHESKAYA in Russian No 2, Mar-Apr 87 (manuscript received 12 Jul 84) pp 35-38

[Article by S. Ye. Kudaybergenov, V. A. Frolova, G. S. Kanapyanova, V. Ya. Kabo and Ye. A. Bekturov, Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata]

[Abstract] Breakdown in the continuity of ligand groups by introduction of inert or complexing links into a polymer chain affects the composition, properties and stability of polymer-metal complexes. In a previous work the complex-forming capability of macromolecules has been shown to be dependent on the distribution of ligand groups in copolymers and polyampholytes. In the present work complex formation between copolymers and

metal ions was studied for the case of hydrolyzed polyacrylamides and trivalent iron ions, using potentiometry, conductometry, viscosimetry and Mossbauer spectroscopy. It was demonstrated that ferric ion complexes combine with polyacrylamide, polyacrylic acid and hydrolyzed polyacrylamide with 5, 15, 25 and 35 mole % degrees of hydrolysis. Among the hydrolyzed polyacrylamides studied, the 5 mole % complex formed most readily. Figures 4; references 15: 7 Russian, 8 Western.

12765/9835
CSO: 1841/350

UDC 666.189.21;621.793;678.84

EFFECT OF POLYMETHYLPHENYLSILOXANE COATINGS ON MECHANICAL PROPERTIES OF GLASS FIBERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 4, Apr 86 (manuscript received 15 Jan 85) pp 869-872

[Article by E. V. Kukharskaya, V. M. Voronkova, Yu. I. Khudobin, N. P. Kharitonov and M. G. Voronkov, Northwest Correspondence Polytechnical Institute]

[Abstract] The strength of glass fibers may be increased by coating them with organic or elemental organic coatings. In the present work varnish KO-08 (polymethylphenylsiloxane) and KO-915 (polymethylphenylsiloxane plus a polyester modifier) were used as coatings on glass fiber and hardened with AGM-9 ((3-aminopropyl)triethoxysilylane) and AGM-3 (6-aminohexyl)amino-methyltriethylsilylane) with tetrabutoxytitanium. This resulted in 50-70% increase in the tensile strength of the fibers. References 7 (Russian).

12765/9835
CSO: 1841/571

UDC 532.783:536.42

MESOMORPHISM, VISCOSITY AND DENSITY OF CHLOROBENZENE LIQUID CRYSTAL SOLUTIONS IN n-BUTYL-4(4'-ETHOXYPHENYLHYDROXYCARBONYL)-PHENYLCARBONATE

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 30, No 3, Mar 87 (manuscript received 15 Oct 85) pp 63-68

[Article by A. I. Pirogov and I. V. Novikov, Department of Inorganic Chemistry]

[Abstract] Introduction of nonmesomorphic compounds into liquid crystals alters their physical-chemical properties which are of interest in developing compositions with improved properties for electrooptics. The goal of this study was to investigate the effect of chlorobenzene (II) on mesomorphic properties, density and viscosity of n-butyl-4(4'-ethoxyphenylhydroxycarbonyl)-phenylcarbonate (I). Temperature and concentration relationships were established for density in solid, nematic and isotropic phases and for viscosity in nematic and isotropic phases. Introduction of the nonmesomorphic compound into a nematic solvent destroyed the nematic order, leading to lower phase transition temperatures and narrower temperature intervals for the existence of mesophases with an increased content of II. At the same temperatures, increased concentration of II lowered the density of the system. A temperature increase lowers the viscosity just as in normal isotropic solutions. An increase of the nonmesogen together with temperature elevation increased the free volume. Figures 3; references 13: 7 Russian, 6 Western.

7813/9835
CSO: 1841/418

UDC 621.922.079(088.8)

EFFECT OF HIGHLY MODULAR FILLERS ON PROPERTIES OF DIAMOND-CONTAINING EPOXY MATERIALS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 87 (manuscript received 20 Nov 86) pp 28-31

[Article by V. V. Yefanova, Institute of Material Management Problems, UkSSR Academy of Sciences, Kiev]

[Abstract] Polymer bonds used in manufacturing diamond instruments are highly filled polymer composite materials (PCM). During normal operation of diamond instruments, mechanical loads, effects of solvents, and temperature lead to alteration of physical and chemical properties and eventual wear and tear of the instruments. The effect of fillers on the thermal stability of diamond-polymer material was studied using epoxy oligomer ED-20 and

monocyanoethyldiethylenetriamine hardener; methacrylic acid ester was used to lower the viscosity and to increase the wetting and impregnation ability. The most stable material contained a complex antigrictional filler, including copper, molybdenum sulfide, and fluoroplast. Inclusion of dispersive agents led to a higher glassing temperature. Solid substances also affected the glassing temperature and the behavior of the material in the highly elastic region. Thermal stability of composite materials can be increased by modifying epoxy-polymer with antifriction fillers. The compositions of diamond-polymer materials, based on modified epoxy polymer, were determined for diamond instruments used in preliminary and fine processing of titanium alloys. The thermal and electroconductivity properties of this material were also determined, making it possible to use the erosion control method for diamond instruments. Figure 1; references 4 (Russian).

7813/9835
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UDC 547.914.6:620.193.91

EFFECTS OF PHYSIOLOGICALLY ACTIVE MEDIA ON DEFORMATION PROPERTIES OF MEDICAL GRADE SILICONE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 7, Jul 86 pp 11-14

[Article by A. N. Romanovskaya and Yu. S. Zuyev]

[Abstract] Aerosil-filled silicone rubber SKTV, currently used to prepare endoprostheses for bone joints, has a hardness close to that of human cartilage. Although one factor governing the use of artificial materials inside an organism is their longevity, data on maintaining silicone rubber in the muscle tissue of a living organism and in a physiological solution (0.9% saline, pH = 6.1) are lacking. In the present work a study was made of the deformation of medical grade silicone rubber (over a 10 month period in stressed and unstressed states and in both synovial fluid and physiological solution at 37° C). Comparison of the resulting data on microhardness, relative deformation, swelling and other physical properties shows little difference, and therefore the physiological solution may be used as a substitute for synovial fluid for research purposes. Figures 4; references 8: 7 Russian, 1 Western.

12765/9835
CSO: 1841/589

UDC 678.01.537.311

FACTORS LIMITING CHARGE CARRIER MOBILITY IN FILLED RUBBER

Moscow KAUCHUK I REZINA in Russian No 6, Jun 87 pp 41-42

[Article by A. Ye. Kornev and V. M. Oskin]

[Abstract] An analysis was conducted on the conductance of cis-polyisoprene rubber filled with carbon P357E, varying the carbon content from 60-180 wt.no./wt.no. The measurements were conducted with a magnetic field strength of 4 x $10^5$ A/m at 50°C. The graphed data demonstrated that as the carbon filler increased from 60 to 120 wt. no., mobility of charge carriers increased 26-fold, while the concentration of charge carriers increased only 2.7-fold. However, a further increase in carbon from 120 to 180 wt. no. was accompanied by only a 1.2-fold increase in mobility and a 1.9-fold increase in charge carrier concentration. The data showed that above a certain limit of filler concentration, charge carrier mobility could not be further increased to any significant extent. This limitation was attributed to the existence of a polymer interlayer among the carbon particles, representing an energy barrier to mobility of the charge carriers. Figures 2; references 8: 5 Russian, 3 Western.

12172/9835
CSO: 1841/448

UDC 678.01.537.311

EFFECT OF STRUCTURAL-MECHANICAL CHARACTERISTICS OF INDUSTRY CARBON MODEL DISPERSIONS ON ELECTRIC PROPERTIES OF FILLED RESINS

Moscow KAUCHUK I REZINA in Russian No 5, May 87 pp 17-20

[Article by V. M. Oskin, A. V. Kornev and A. M. Bukanov]

[Abstract] The most widely-used principle of the formation of electro-conductive resins is based on introduction of highly dispersed and highly structured industrial carbon as a filler which forms spacial thixotropic structures in the elastomer matrix which facilitate the transport of electric charges. The properties of electroconducting resins from butadiene-styrene rubber were studied as a function of spacial structure of the carbons P 357-E, P 324, P 514 and P 803. It was shown that homogeneity and stability of electroconducting resins are directly related to the strength of the spacial structure of the industrial carbon used. A minimal level of the specific electric resistance by volume of the resins, achieved with a specific type of industrial carbon, is determined by the carbon's surface activity. The resins achieve stable electric properties with a degree of filling which allows a maximum model dispersion-shearing tension of about 15 atm. It is contraindicative to try to increase this value by increasing

filler content because the resin stability will not increase, and the physical, mechanical and technological properties will deteriorate significantly. Figures 2; references 11: 8 Russian (1 by Western authors), 3 Western.

7813/9835
CSO: 1841/420

UDC 678.4.058.3:678.4.06

VULCANIZATION PRESSES FOR COMPOUNDS USED IN RESIN TECHNICAL ARTICLES

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 6, Jun 87 pp 10-12

[Article by M. R. Sakovishch and V. A. Rusakov, engineers, and A. V. Popov, candidate of technical sciences]

[Abstract] Scientific research and experimental design work performed at the Scientific Research Institute of Tire Machinery led to development of a press for the formation and vulcanization of resin-fiber products. Calculation methods were developed for hydromechanical vulcanization of units 2 to 40 m long. The principal work parameters are pressure, temperature and time of vulcanization. Technical specifications for the hydromechanical presses, their component parts and operation mode were described. These presses may be operated manually or automatically. On the average each press shows economic savings of 40,000 rubles, although no denominator was specified. Further improvements of these processes are under way. Figures 2; references 5 (Russian).

7813/9835
CSO: 1841/422

UDC 338.26:061.6:678.4.065

TIRE INDUSTRY INSTITUTE NOW 25 YEARS OLD

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 87 pp 1-3

[Article by B. M. Petrov, candidate of technical sciences, Director NIIShINMASh]

[Abstract] The All-Union Scientific-Research and Design Institute for Equipment for the Tire Industry (NIIShINMASh) was founded in 1961 in Yaroslavl initially as a design-engineering institute for equipment for plastics and

rubber manufacture. In 1964, it was reorganized into NIIShINMASh, specializing in the development of fabrication-assembly equipment for the production and restoration of tires, press-forms, vulcanization, machines and assembly lines for briquetting, shaping, machining, drying and vulcanizing asbestos items, as well as several types of machines for production of pre-fabricated large-scale rubber parts. The institute has significant scientific and technical potential and an experimental plant to fabricate trial samples under new technology, which was established in 1970. The greatest economic effect from new equipment developed at the institute was achieved during the 11th Five-Year Plan, viz., 66.1 million rubles as opposed to 39.75 million rubles during the 10th. New and modernized equipment were developed in conjunction with machine-building plants for the assembly of radial tires for passenger vehicles, specifically the ASPR 360-600 machine for assembling tire casings for the "Zhiguli". This machine will raise labor productivity 1.9 times and is displayed in Moscow. The institute also developed continuous mechanized assembly lines on the LSPR series for truck radial tires. Work is also progressing on fully automated and robotic lines for tire manufacture. Figures 3.

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CSO: 1841/258

UDC [678.4.055.6+678.4.058]:681.325.5-181.4

IMPROVEMENT OF CONTROL SYSTEMS IN TIRE PRODUCTION

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 87 pp 9-10

[Article by V. B. Menshikov]

[Abstract] Programmed logical control systems are widely used in the automation of discrete processes in tire manufacture. These systems include numerical programmed control which may be programmed both sequentially and according to path (contour) of movement of a mechanism and a system of cyclic programmed control. Under cyclic control, the system contains in cipher form only the sequence and mode of operations, while the arrangement paths are left to a system of stops acting on sensor units. Many control systems for the equipment used in tire manufacture are of the cyclic programmed type, such as for bead shaping and diagonal cutting, casing assembly units, and automated lines for vulcanization of inner tubes. The dependability of these control systems can be increased by using contact-less element bases, microprocessors, and other devices for unifying and aggregating the design of control systems. At the present time work is progressing at the Scientific-Research Institute of Tire Machine Building (NIIShINMASh) on the application of the latest programmed controls designed with microcircuitry and microprocessors, such as for winding narrow band tire tread. One of the tasks remaining before enterprises and the fabricator and consumer ministries in microprocessor applications is the training of qualified personnel to service and repair modern control systems.

12765/9835
CSO: 1841/258

UDC 678.4.055.6:62.192

# BASIC TRENDS IN WORK ON GUARANTEEING DEPENDABILITY IN FABRICATION ASSEMBLY EQUIPMENT FOR TIRE MANUFACTURE

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 87 pp 12-14

[Article by N. M. Zvorykin]

[Abstract] Each year the fabrication and assembly facilities of tire production enterprises are being outfitted with more and more automated devices, robots, and manipulators with microprocessor control systems. While the demand for dependability of these devices increased markedly, the cost of downtime has become incomparably huge, and any new equipment being developed must provide dependability, raise the amount of non-rejectable work and bring downtime to a minimum. Dependability is a complex property that is built into a unit during its design, is maintained during usage and is restored when the unit is repaired. Therefore, dependability must be approached systematically. At the NIIShINMASh (Scientific-Research Institute of Machine Building for Tires) the basic trends of work on increasing dependability consist of providing dependability to equipment components as they are developed by the criteria of durability, rigidity, resistance to wear, fatigue, longevity and other criteria related to other components of the entire machine. Other work at the institute includes the development of algorithms and computer programs for aid in designing machine components, documentation to assist in repair and other means to increase dependability.

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CSO: 1841/258

UDC 546.799.4:631.42:581.19

## BEHAVIOR OF PLUTONIUM IN SOIL AND ENTRY IN PLANTS

Moscow AGROKHIMIYA in Russian No 12, Dec 86 (manuscript received 16 Jul 85) pp 83-88

[Article by Ye. A. Fedorov, A. S. Bakurov, M. N. Fedorova and M. F. Rasulev]

[Abstract] The ever increasing use of nuclear energy has heightened interest in the behavior of plutonium and other transuranium elements in the environment from the standpoint of their possible entry into the human body either by inhalation or the food chain. In the present work a study was made of the behavior of plutonium in the soil-plant system on a 12,000 sq meter field over a period of several years. It was demonstrated that the chief means of plutonium entry to plants is leaf contamination. Mechanized working of soil over a period of many years is the chief factor in the horizontal spread of plutonium in a plowed field. Quantitative estimates on plutonium entry through the roots of potatoes and wheat are presented. Figures 4; references 3: 1 Russian, 2 Western.

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CSO: 1841/189

UDC 631.811.98

## ENTRY OF THROIUM ISOTOPES INTO AGRICULTURAL CROPS

Moscow AGROKHIMIYA in Russian No 10, Oct 86 (manuscript received 13 May 85) pp 103-105

[Article by T. M. Ponikarova, T. A. Bekyasheva and E. P. Lisachenko, Scientific Research Institute of Radiation Hygiene, Leningrad]

[Abstract] An analysis of the soils and grain crops in seven agricultural zones in the RSFSR shows that the coefficient of accumulation (KN) of thorium 228 exceeds considerably that of Th-232. The high value for Th-228 accumulation in grain crops is evidently due to the Th-228 originating from Ra-228

and the greater ability of Th-228 to enter into solution in the soil. No reliable variance in KN values for thorium isotopes in grain crops in the various agricultural zones was detected. References 12: 10 Russian, 2 Western.

12765/9835
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UDC 661.632.2.001.5

DISTRIBUTION OF NATURAL RADIONUCLIDES IN PRODUCTION OF PHOSPHATE FERTILIZER AND SUPERPHOSPHATE

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 5, May 87 pp 278-280

[Article by E. P. Lisachenko, T. M. Ponikarova and Yu. Z. Lisitsyna]

[Abstract] Distribution of natural radionuclides was studied in the products and byproducts produced at several plants which manufacture superphosphate. Results of average annual samples and of single samples collected in different years were found to be superimposable, indicating uniform distribution of such radionuclides in crude material. During the manufacturing process a 2-4 fold enrichment of radionuclides takes place, depending on the starting material. Radioactive equilibrium in the uranium series ($^{238}U$, $^{226}Ra$, $^{210}Pb$ and $^{210}Po$) was not affected during the enrichment process. Superphosphate was not enriched in $^{228}Th$. Natural radionuclides did not separate during the enrichment and production processes of superphosphate. Figures 2; references 10: 5 Russian, 5 Western.

7813/9835
CSO: 1841/422

UDC 535.379

EFFECT OF IRRADIATION TEMPERATURE ON LYOLUMINESCENCE OF LITHIUM FLUORIDE

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 6, Nov-Dec 86 (manuscript received 7 Aug 85) pp 711-714

[Article by T. Ye. Kreyshmane, K. Yu. Veydemanis, Yu. E. Avotinsh and Yu. Ye. Tiliks, Riga Medical Institute; Latvian State University imeni P. Stuchki]

[Abstract] The rapid development of radiation technology employing high levels of radiation has made it necessary to develop reliable dosimeters capable of handling large doses of radiation over wide temperature ranges. Chemical dosimeters which measure lyoluminescence seem to be the most promising. In

the present work a study was made of the effects of radiation temperature on the lyoluminescence of lithium fluoride at 308-473 K. Lithium fluoride crystals were irradiated with a Co-60 source, and optical absorption spectra were then measured and the concentration of F-centers in LiF calculated. Electron F-centers are precursors of lyoluminescence at 1000-10,000 Gr. Irradiation of LiF at 353-473 K alters the molecularity of F- and $V_2U$-centers in comparison to irradiation at room temperature from pseudomonomolecular to bimolecular. Apparently, paired distribution of F- and $V_2U$-centers takes place in LiF crystals during irradiation at 353-473 K. The lyosystem LiF/sulfuric acid can thus be used for dosimetry in the 353-473 K temperature range. Figures 2; references 8: 6 Russian, 2 Western.

12765/9835
CSO: 1841/181

UDC 630*86:62.001.7

## RENOVATING AND REFITTING WOOD CHEMICAL INDUSTRY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 8, Nov-Dec 86 pp 1-2

[Abstract] The current state of wood chemical industry must be improved vastly to meet the goals of the new five-year plan. Newer and more effective rosin collecting methods and growth stimulants must be assimilated to maintain 105,000-106,000 tons of annual output on 140,000 hectares less area. This must be overcome through improved mechanization. Labor productivity must increase by 15% from 1985 to 1990 through new growth stimulants, nutrient yeast, peat oxidants, etc. New pay and premium systems must be worked out for personnel. The volume of tar-impregnating work must increase to 560,000 cubic meters by 1990, largely as a result of brigade contracts. Although the needs of the national economy for rosin and acetates were met by the end of the 11th Five Year Plan, shortages still remain for charcoal. Output of grade A butyl acetate must be increased by at least 10,000 tons per annum. Rosin-turpentine production is still not being carried out by a continuous process.

12765/9835
CSO: 1841/168

UDC 630*863.002.62:66.094.8

## COMPARISON OF METHODS OF HYDROLYSIS-RESIDUE NEUTRALIZATION

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 8, Nov-Dec 86 pp 13-14

[Article by M. V. Kozhurova, L. V. Dmitrenko, S. F. Morozova and V. N. Adzhigitova, All-Union Scientific Research Institute of Hydrolysis of Plant Matter]

[Abstract] Neutralization of gypsum-saturated solutions during neutralization of sulfate hydrolyzates may be carried out by two recommended methods.

According to the first method, the hydrolyzate is neutralized at 80-90 degrees C with milk of lime in the first stage. The resulting gypsum dihydrate is then maintained for one hour at pH 3.5-3.6, and the sludge is separated, after which the solution is further neutralized with ammonium water to pH 4.2-4.4. In another so-called "parallel" method, the neutralization is carried out in two streams, the basic stream being first neutralized by the two-stage method and the secondary stream with ammonia water only. In the present work both methods were compared using hydrolyzates from the Bobruysk and Arkhangelsk Hydrolysis Plants and the Kirov Biochemical Plant. Tests showed that the gypsum content in the hydrolyzate resulting from the "parallel stream" method is 1.2-1.3 times greater. References 6 (Russian).

12765/9835
CSO: 1841/168

UDC 630*863.002

REORGANIZATION IN PAPER INDUSTRY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Apr-May 87 pp 3-5

[Article by S. N. Yumshanov, USSR Ministry of Forestry and Paper Industry]

[Abstract] Forest industry workers achieved the goals set for productivity in 1986; in many areas it was even higher than in 1985. Individual plants and workers were recognized for excelling in their activities. The principal factors responsible for these improvements were overall reorganization, increased individual and collective interest in jobs, introduction of new technology, and reduction of poor management. Some of the increased productivity was achieved at the expense of the quality of the product; these deficiencies will be corrected in the future. More attention will be paid to the production costs and to the cost of final products, both of which must be lowered. Transportation of final products should be improved to increase overall tonnage of moved goods. Great tasks are ahead of scientists in various Institutes, who should concentrate on increasing the effectiveness of productivity in the forestry industry. Portfolios of all scientific studies should be reviewed to select the most promising discoveries. Conversion to regional organizations will bring innovations and also some problems. The overall goal must be effective utilization of the human factor, good management, and rapid introduction of scientific-technological advances.

7813/9835
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INSTITUTES OF MACROKINETICS AND OIL-AND-GAS OF USSR ACADEMY OF SCIENCES

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 9, 5-18 May 87 p 2

[Article by A. Mikhaylov]

[Excerpt] By a decision of the presidium of the USSR Academy of Sciences, an Institute of Structural Macrokinetics (ISMAN) of the USSR Academy of Sciences has been created, using the facilities of the department of macrokinetics and gas dynamics of the Institute of Chemical Physics.

Doctor of Physical-Mathematical Sciences A. G. Merzhanov, one of the developers of the process known as self-propagating high-temperature fusion, has been named to head this new research institution. It has become the chief organization of an interbranch scientific-technical complex (MNTK) called "Termosintez". Design and technological services, experimental production facilities, a pilot plant and an educational center for training specialists have been placed under the direction of ISMAN.

The Institute of Structural Macrokinetics is responsible for drafting specifications for development of specialized equipment, employing high-temperature fusion technology for producing materials and other products, for preparing drafts of scientific-technical programs and plans for research and experimental work, and for creating information archives and computerized information systems in which data on the latest Soviet and foreign achievements in the field of self-propagating high-temperature fusion will be stored.

ISMAN, like the MNTK "Termosintez" as a whole, is subordinate to the USSR Academy of Sciences and the USSR Ministry of Nonferrous Metallurgy.

The Presidium of the USSR Academy of Sciences has approved the organization in Moscow of an Institute of Oil and Gas Problems (IPNG) of the USSR Academy of Sciences and the USSR Ministry of Higher and Specialized Secondary Education (Minvuz). The new institute will belong to the Academy's Department of Geology, Geophysics, Geochemistry and Mining Sciences. Doctor of Technical Sciences V. N. Vinogradov, president of USSR Minvuz's Moscow Institute of Oil and Gas imeni Gubkin, has been appointed organizing director of IPNG.

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# MAIN COMPONENT METHOD AND CONSTANCY OF RESULTS IN PREDICTING TOXICITY OF 8-AZASTEROIDS

Minsk VESTSI AKADEMII NAVUK BELARUSKAY SSR: SERYYA KHIMICHENYKH NAVUK in Russian No 1, Jan-Feb 87 (manuscript received 21 Mar 86) p 120

[Synopsis of article by Yu. A. Sokolov and V. P. Golubovich, Bioorganic Chemistry Institute of the BSSR Academy of Sciences: "Constancy of the Results of the Prediction of the Toxicity of 8-Azasteroids Found by Means of the Main Component Method"; manuscript deposited at the Scientific and Technical Institute 28 Aug 86, No 6252-B86]

[Text] Correlation equations have been found, linking the toxicity of some 8-azasteroids to their main components, based on quantum-chemical characteristics. The dependence of constancy of results in predicting toxicity on the dimensions of the "teaching" samples and on the size of the molecules used to determine the main components was studied.



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