S/199/62/003/004/002/002
B112/B104

AUTHOR: Zubov, V. I.

TITLE: On the theory of recurrent functions

PERIODICAL: Sibirskiy matematicheskiy zhurnal, v. 3, no. 4, 1962, 532-560

TEXT: General properties of recurrent functions are investigated and a class $H^N(\gamma_1(t), \ldots, \gamma_N(t))$ of ergodic recurrent functions is constructed. The real, linearly independent functions $\gamma_1(t), \ldots, \gamma_N(t)$ satisfy the condition

$$\lim_{T\to+\infty} T^{-1} \int_D^{D+T} \exp\left(i \sum_{j=1}^{N} c_j \gamma_j\right) dt = 0,$$

where $c_1, \ldots, c_N$ are arbitrary real constants at least one of which is different from zero. The class $H^N(\gamma_1(t), \ldots, \gamma_n(t))$ is the set of all the recurrent functions f(t) that satisfy the following condition: For each $\epsilon > 0$, there is a finite set of linear forms $P_{k\epsilon}(t)$ $(k \leq n_\epsilon)$ of

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$\gamma_1, \ldots, \gamma_N$, and a number δ such that all compatible real solutions τ of the system of inequalities

$$|P_{k\varepsilon}(t + \tau) - P_{k\varepsilon}(t)| < \delta \pmod{2\pi}, \quad k \leqslant n_\varepsilon,$$

are ε-almost-periods of the function $f(t)$ for any fixed t. The construction of the class H^N is based on the application of a generalized Kronecker-Weyl theorem concerning compatible solutions of a system of inequalities (cf. H. Weyl, Über die Gleichverteilung von Zahlen mod Eins, Math. Ann., 77 (1916)).

SUBMITTED: March 11, 1960

ACC NR: AM6013865 Monograph UR/

Zubov, Vladimir Ivanovich

Theory of optimum control of ships and other moving objects (Teoriya optimal'nogo upravleniya sudnom i drugimi podvizhnymi ob"yektami) Leningrad, Izd-vo "Sudostroyeniye", 1966. 351 p. 2800 copies printed.

TOPIC TAGS: navigation equipment, ship navigation control, optimal automatic control

PURPOSE AND COVERAGE: The book deals with the development of the mathematical theory of control and the solution of some applied problems of this theory: stabilization of programmed motion, construction of optimal automatic control systems and problems of approximation of optimal controls. An analysis of automatic control systems based on the application of digital automata is included. The obtained results are applied, in particular, to solving ship control problems. The book is intended for engineers in various fields, senior and graduate students and scientific workers specializing in the field of analysis and synthesis of automatic control systems.

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Card 1/2 UDC: 629.12:532.5.075

ACC NR: AM6013865

SUB CODE: 17,05 / SUBM DATE: 21Nov65

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KRUGLOV, B. I.[Kruhlov, B. I.]; ZUBOV, V. I.; SHCHEPINOV, S. A.

Preparation of methyl alcohol by catalytic hydration of dimethyl ether. Khim. prom.[Ukr.] no.1:10-13 Ja-Mr '62.
(MIRA 15:10)

1. Lisichanskiy khimicheskiy kombinat.

(Methanol) (Methyl ether)

ZUBOV, V. I. (Leningrad)

"Das Problem der Stabilisierung in der Regelungstheorie."

report submitted for 3rd Conf on Nonlinear Oscillations, E. Berlin, 25-30 May 64.

ZUBOV, V.I. (Leningrad)

Concerning the theory of the anlytical design of controllers.
Avtom. i telem. 24 no.8:1037-1041 Ag '63. (MIRA 16:8)

(Automatic control)

ZUBOV, V.I.

Industrial television equipment. Mashinostroitel' no.9:45-46 S '61.
(MIRA 14:10)
(Industrial television—Equipment and supplies)

ZUBOV, V.M., dotsent, kand.tekhn.nauk; OBUKHOV, V.Ya., inzh.; SAMOTUGA, M.F.

Accuracy of survey control in open-pit mines. Ugol' Ukr. 4 no.5:18-20 My '60. (MIRA 13:8)

1. Novocherkasskiy politekhnicheskiy institut (for Zubov, Obukhov). 2. Glavnyy marksheyder tresta Aleksandriyaugol' (for Samotuga).
(Strip mining) (Mine surveying)

ZUBOV, V.M., dots.

"Naturpantograf-4." Izv.vys.ucheb.zav.; gor.zhur. no.2: 28-33 '59. (MIRA 13:4)

1. Novocherkasskiy politekhnicheskiy institut im. S.Ordzhanikidze Rekomendovana kafedroy marksheyderskogo dela.
(Mine surveying--Equipment and supplies)
(Pantograph)

ZUBOV, V.M., dots.

Advantage and possibility of a transition from large-scale mine surveys to pantographing from nature. Izv.vys.ucheb.zav.; gor.zhur. no.5:36-40 '58. (MIRA 12:1)

1. Novocherkasskiy politekhnicheskiy institut.
(Mine surveying) (Pantograph)

ZUBOV, V.M., kand.tekhn.nauk, dotsent

Type of survey control points in open pit mines. Ugol' 37 no.2:35-37 F '62. (MIRA 15:2)

1. Novocherkasskiy politekhnicheskiy institut.
(Mine surveying)

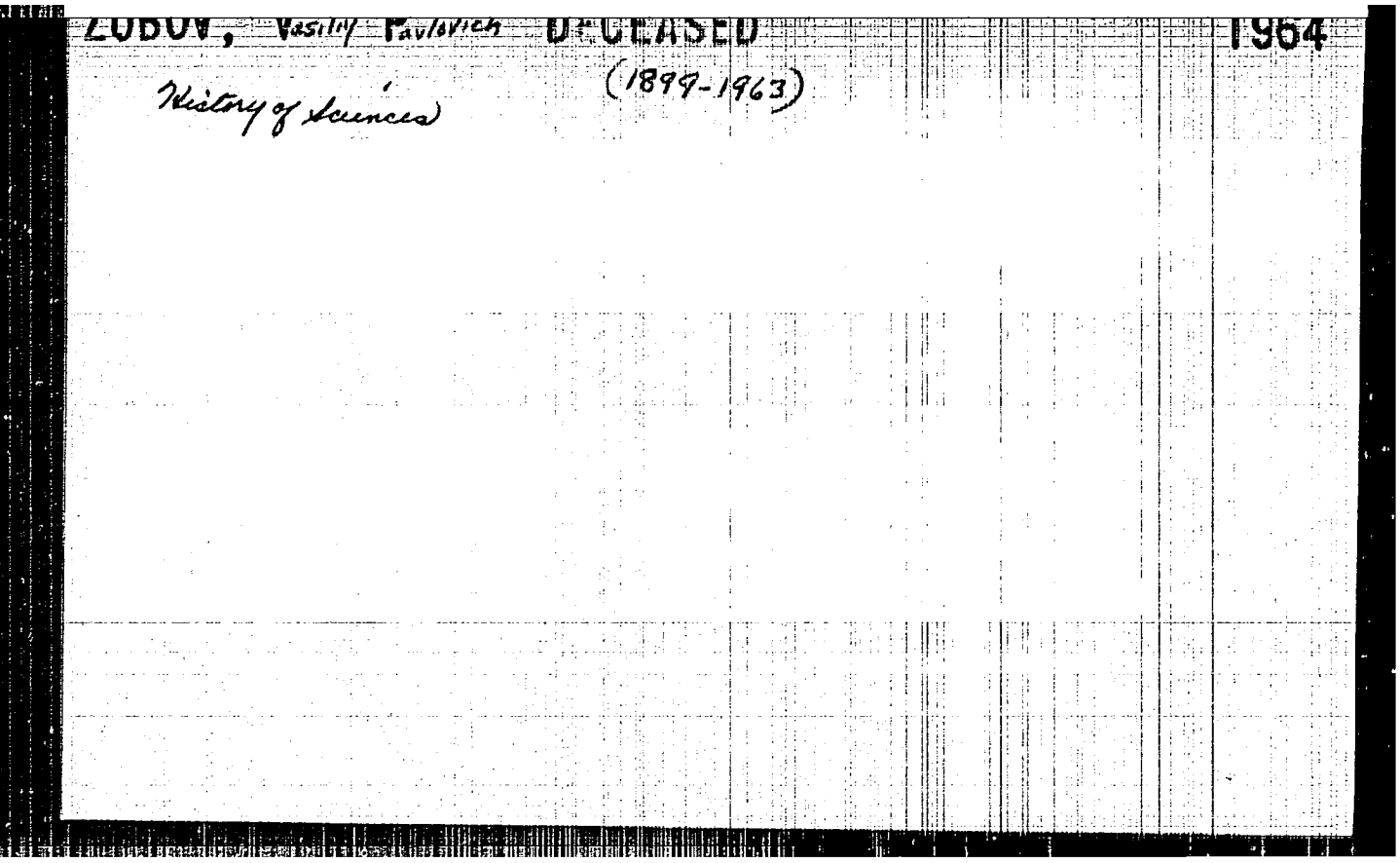
GREBENNIK, Georgiy Ivanovich; VASYUTIN, Nikolay Dmitriyevich; GENKIN, Arkadiy Lazarevich; STOLBOV, Gennadiy Radionovich; ZUBOV, Vladimir Osipovich; LETUCHIY, Nikolay Vasil'yevich; GORODETSKIY, Vladimir Il'ich; YESYUNIN, Boris Stepanovich; RENSKAYA, T.A., red.; SKOBELING, L.V., red. izd-va; LAVRENOVA, N.B., tekhn. red.

[Operating DR-30/50 engines on ships of the Caspian Ship Line] Opyt ekspluatatsii dvigatelei DR-30/50 na sudakh Kaspiiskogo parokhodstva. Moskva, Izd-vo "Morskoi transport," 1961. 50 p. (MIRA 14:10)
(Marine diesel engines)

POLONSKIY, M.S.; ZHURAVIN, M.A.; LADYZHENSKIY, Ye.B.; PINSKER, B.I.; ZUBOV, V.O.; SHESTERIKOV, A.A.; YAKUN', F.V.; KRYNITSA, M.N.; AREF'YEV, B.A.; YEVZIKOV, L.I., starshiy stroitel' sudov; PAVLENKO, I.F.; YEKOVLEV, B.M., inzh.; MARKOV, A.P., inzh.

Readers' response to the article by engineer M.A. Daikhes entitled "Method of mounting the main engines with minor deformations of the foundation frame and the crankshaft". Sudostroenie 30 no.10:57-66 O '64. (MIRA 17:12)

1. Gruppovoy inzh.-mekhanik SSKh parokhodstva "Kaspar" (for Zubov). 2. Inzh.-inspektor Registra SSSR (for Yakun'). 3. Glavnyy inzh.-inspektor inspektsii Registra SSSR Baltiyskogo basseyna (for Aref'yev). 4. Starshiy mekhanik teplokhoda "Tadzhikistan" (for Pavlenko).



KARGIN, V.A.; KABANOV, V.A.; ZUBOV, V.P.

Polymerization in systems obtained by the molecular beams.
Vysokom.soed. 1 no.2:265-268 F '59. (MIRA 12:10)

1. Moskovskiy gosuniversitet im. M.V.Lomonosova, Khimicheskiy fakul'tet, Kafedra vysokomolekulyarnykh soyedineniy.
(Polymerization)

KABANOV, V.A.; ZUBOV, V.P.; KARGIN, V.A.

Polymerization of styrene on a Ziegler type catalyst with the aid of the molecular beam method. Vysokom. soed. 1 no.9:1422-1427 S '59. (MIRA 13:3)

1.Moskovskiy gosudarstvennyy universitet im. Lomonosova.
(Styrene) (Titanium chloride) (Aluminum organic compounds)

KABANOV, V.A.; SERGEYEV, G.B.; ZUBOV, V.P.; KARGIN, V.A.

Electron resonance study of polymerization in the system acrylonitrile - magnesium, obtained by molecular beam condensation. Vysokom.soed. 1 no.12:1859-1861 D '59. (MIRA 13:5)

1. Moskovskiy gosudarstvennyy universitet.
(Polymerization--Spectra) (Acrylonitrile) (Magnesium)

81611

S/190/60/002/02/10/011
B004/B061

5.3831

AUTHORS: Kargin, V. A., Kabanov, V. A., Zubov, V. P.

TITLE: Synthesis of Isotactic Polymethylmethacrylate by Polymerization of the Frozen Monomer

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 2, pp. 303 - 305

TEXT: This is a continuation of the work of the authors in Refs. 1 and 2. It was established there that methylmethacrylate (MMA) can be polymerized in the solid state if it is condensed in vacuo with magnesium vapor on a surface cooled by liquid nitrogen. The polymerization sets in between -100 and -110°C, proceeds rapidly and even explosively if heat dissipation is insufficient. The polymethylmethacrylate obtained in this way is a homogeneous polymer containing no free magnesium but 0.5 wt% of bound Mg. It forms transparent solutions in toluene and dichloroethane. Fig. 1 shows the thermomechanical curve of such a polymer. Its softening temperature of +50°C is considerably lower than that of

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B004/B067

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AUTHORS: Kargin, V. A., Kabanov, V. A., Zubov, V. P.

TITLE: Formation of Isotactic Polymethylmethacrylate on Photopolymerization in the System Methylmethacrylate - Zinc Chloride

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 5, pp. 765-769

TEXT: Proceeding from papers on the formation of stereoregular polymers (Refs. 1-4) the authors studied the influence exerted by inorganic salts capable of fixing a short-range order on the microstructure of a polymer chain. The experiments were made in a special set of ampoules (Fig. 1). Ampoule 1 contained methylmethacrylate, ampoule 2 $ZnCl_2$, and ampoule 3 benzoyl peroxide. The dehydration of the reagents by heating and evacuation is described. The monomer was then condensed in ampoule 2. A saturated solution of $ZnCl_2$ was produced in the monomer and polymerized in ampoule 3 under the action of ultraviolet light of a ПРК-2 (PRK-2) 2

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mercury lamp at 20°C. The polymer obtained, which was purified by dissolution and reprecipitation, showed isotactic structure. It had a density of 1.22 g/cm^3 and a vitrification temperature of about 65°C, whereas the syndiotactic polymer (Refs. 5, 6) had a density of 1.18 - 1.19 g/cm^3 and a vitrification temperature of 115 - 135°C. The authors discuss the change in the probability of formation of d,l- or d,d- (1,1-) configurations during the polymerization (Figs. 2, 3), caused by the crystal field fixing the short-range order. Isotactic polymerization requires a screw-like structure which is stabilized by $ZnCl_2$ molecules through complex formation with the ester groups of the polymer radicals and with the monomer molecules (Fig. 4). There are 4 figures and 8 references: 4 Soviet and 4 US.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: February 2, 1960

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S/190/60/002/011/022/027
B004/B060

AUTHORS: Zubov, V. P., Kabanov, V. A., Kargin, V. A., Shchetinin, A. A.

TITLE: Effect of Pressure on the Formation of the Microstructure of Polymer Chains in the Polymerization Process

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 11, pp. 1722 - 1727

TEXT: The ratio k_i/k_s of the reaction rates of the formation of isotactic and syndiotactic structures of a polymer can be influenced by stereospecific catalysts, and also, according to T. G. Fox (Ref.1), by the reaction temperature. The authors wanted to study the effect of pressure on the said ratio k_i/k_s. Proceeding from the theory of absolute reaction rates and taking into account a different compressibility of the initial components and the intermediate complex they obtained the equation: $\ln(k_i/k_s) = \delta V_o^* p/RT - \Delta a^* p^2/2RT + 2\Delta b p^3/3RT + \ln(k_{oi}/k_{os})$ (7).

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Here, δV_o^* denotes the difference between the volumes of the syndiotactic and isotactic intermediate complexes at normal pressure, Δa^* is the difference between the coefficients of compressibility of the initial components, Δb the difference between the coefficients of compressibility of the intermediate complexes, k_{oi} and k_{os} the rate constants of iso- and syndiotactic addition at normal pressure. The validity of this equation was proved experimentally, by way of producing polymethyl methacrylate in a pressure range of 2000-7500 atm. The vitrification temperature of the polymer dropped with pressure increase. Since the isotactic polymer has a vitrification temperature of 50-55°C, and the syndiotactic polymer has one in the range of 130-135°C, the drop of the vitrification temperature means an increase of the isotactic structure content, and thus, an increase of the value of k_i/k_s. It was found by the determination of density ϱ and by taking into account the relation $k_i/k_s = \varrho_i(\varrho - \varrho_s)/\varrho_s(\varrho_i - \varrho)$ that k_i/k_s increases from 0.33 at 1 atm to 0.54 at 7500 atm. The isotactic structure content increases

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AUTHORS: Kargin, B. A., Academician, Kabanov, V. A., Zubov, V. P., and Papisov, I. M.

TITLE: Polymerization of Acetone

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 5, pp. 1098-1099

TEXT: On the basis of an approximate estimation of the thermal effect of the polymerization of carbonyl compounds, for instance of acetaldehyde or acetone, the authors find that this polymerization is impossible in the homogeneous liquid phase. The picture is, however, considerably changed if the transition from a monomeric liquid to a system of arranged monomer molecules is effected in the initial state, i.e. if the entropy of the initial system is much reduced. One method of molecular arrangement is freezing. Here, the entropy of the system is reduced during crystallization by the quantity of the melting entropy. This reduction in entropy gives rise to a reduction of the negative polymerization entropy which, at sufficiently low temperatures, may even change its sign. In this case, a

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Polymerization of Acetone

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polymerization accompanied by a negative thermal effect would be possible. Guided by such considerations, the authors attempted the polymerization of acetone on the double bond C=O by their method (Refs. 5-7). The experiments were carried out in an apparatus and by methods of Refs. 5,6. The initiator used was metallic magnesium whose vapors were slowly condensed in vacuo together with vapors of carefully dried acetone on a surface cooled with liquid nitrogen. The ratio acetone : magnesium was about 200 : 1. A vitrified molecular layer of an acetone-magnesium mixture was precipitated as a condensate on the cooled wall. With growing thickness of this layer, the temperature of the surface of this vitreous layer finally reaches a value at which a spontaneous process of coordinate regrouping of monomer molecules is setting in. In the absence of initiation centers, this process would lead to a crystallization of the monomeric glass. An instantaneous polymerization sets in, however, due to the mobility of particles originating in the phase transition "disorder - order". The same phenomenon is observed in a gradual temperature increase of the wall used for the condensation. This leads to the formation of the acetone polymer, an elastic white substance which is soluble in its own monomer. Polyacetone is very unstable at room temperature, and decomposes into

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S/190/61/003/003/007/014
B101/B204

AUTHORS: Kargin, V. A., Kabanov, V. A., Zubov, V. P., Papisov, I.M.

TITLE: Initiation of low-temperature polymerization in systems that have been obtained by the molecular beam method

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 3, 1961, 426-434

TEXT: In earlier papers, (Ref. 1: Vysokomolek. soyed. 1, 265, 1959; Ref. 2: Vysokomolek. soyed., 1, 1422, 1960; Ref. 3: Vysokomolek. soyedineniya, 1, 1859, 1959; Ref. 6: Vysokomolek. soyed. 2, 303, 1960, Ref. 4: V. A. Kabanov, Thesis, Moscow, 1960) the present authors showed that a few monomers when condensed together with metals, inorganic salts, or oxides may enter polymerization upon a cold surface at the melting temperature or even below it. When the usual methods are used, these substances (metals, salts, oxides) are absolutely inert. It was the aim of the present investigation to disclose the initiation in these systems. A) The systems monomer + metal: Rapid, explosive polymerization was attained by simultaneous condensation of vaporized magnesium and

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acrylonitrile, methacrylonitrile, methacrylate, isopropylacrylate, methyl methacrylate, acryloamide, methacryloamide, butylester of ethylene sulfonic acid, dibutylester of vinylphosphinic acid, formaldehyde, acetaldehyde, and acetone upon a surface cooled with liquid nitrogen. The authors employed the arrangement shown in Fig. 1 in order to explain this mechanism. This apparatus may reduce the overlapping of both molecular beams in the gaseous phase in the case of simultaneous condensation of the monomer (1) and magnesium (2) upon the cooled surface (3). It was found that in this case a polymer does not form. Thus, polymerization takes place only when the vapors interact. From epr spectra it was found that free magnesium-organic radicals form when magnesium and acrylonitrile vapor are condensed simultaneously. The analyses showed that the polyacrylonitrile formed under these circumstances contained Mg which could be extracted by hydrolysis with diluted HCl. In this case, the molecular weight (130,000 and 110,000) dropped to about half of its former value. From this, the authors concluded the following course of the reaction:

$$Mg\text{-}CH_2\text{-}\dot{C}HCN + (n + m)CH_2{=}CHCN \longrightarrow (-CH_2\text{-}\underset{CN}{CH}\text{-})_n\text{-}Mg\text{-}(-CH_2\text{-}\underset{CN}{CH}\text{-})_{m+1}$$

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Further experiments showed that also atomic hydrogen initiates the polymerization of acrylonitrile, methyl methacrylate, and styrene. When Mg was heated on a tungsten spiral up to 2500°C it reacted also with less active monomers, as vinyl acetate. In the same way Zn, Cd, and Hg could be activated. The authors assume that, similar to the results obtained by Steacie (Ref. 9: see end of abstract) and Laidler (Ref. 10: see end of abstract), initiation is due to the excitation of the metal atoms: $CH_2=CHR+Me^* \longrightarrow MeH + \dot{C}H-CHR$. Lead or tin vapors do not initiate the polymerization of acrylonitrile, but even hinders it when Mg is present, due to an addition of the free radicals. B) The systems monomer + salt and monomer + oxide: Joint condensation of molecular beams of styrene, α-methyl styrene, or isoprene with water-free $BeCl_2$, $ZnCl_2$, $TiCl_3$, and of the first two compounds with MoO_3 leads to a rapid polymerization near the melting point of the intensely colored molecular mixture. The formation of π complexes with double bonds is characteristic of the mentioned organic compounds. They only initiate the polymerization of monomers which contain a dense electron cloud at the double bond. The authors assume a cationic mechanism, according to A. R. Gantmakher and S. S. Medvedev (Ref. 11: Vysokomolek. soyed. 1, 1331, 1959). Perfect crystals

of these catalysts were not very active, whereas polymerization could be brought about at room temperature through vacuum-vaporized crystal films containing enough surface defects. NaCl and KCl do not initiate the polymerization of monomers with electropositive substituents. However, with negatively substituted monomers, as acrylonitrile, polymerization occurred below the melting point of acrylonitrile in the case of joint condensation, when the salt was heated by means of a tungsten spiral. This process is explained by a partial dissociation. Small regions with non-stoichiometric metal atoms in the lattice are forming, and thus F centers which initiate polymerization by giving their electron to the monomer and forming an anionic radical. As the ionization potential of the F center (2.2 v for KCl) is lower than that of a free atom (4.3 v for a K atom), these F centers are intense initiators. The phase of the catalysts and initiators of the investigated systems depends on the ratio of the aggregation rate of the molecularly dispersed catalyst to the rate of polymerization. Thus, a continuous transition from homogeneous to heterogeneous catalysis may be attained. In all the cases investigated the processes were found to be highly specific due to the nature of the monomer and of the catalyst or initiator. There are

Initiation of low-temperature... S/190/61/003/003/007/014
B101/B204

4 figures and 17 references: 14 Soviet-bloc and 3 non-Soviet-bloc. The 3 references to English-language publications read as follows: P. F. Onyon, J. Polymer Sci., 37, 315, 1959; E. W. R. Stacie, Atomic and Free Radical Reactions, N. Y., 1946; K. J. Laidler, J. Chem. Phys. 15, 712, 1947.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: August 1, 1960

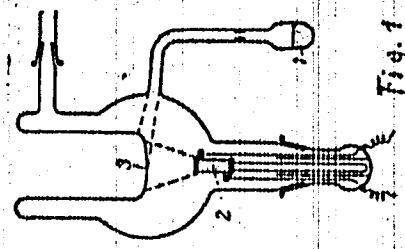

Fig. 1

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KARGIN, V.A., akademik; KABANOV, V.A.; ZUBOV, V.P.; ZEZIN, A.B.

Polymerization of acetonitrile and other nitriles. Dokl. AN SSSR 139 no.3:605-607 Jl '61. (MIRA 14:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Nitrile) (Polymerization)

15-8050 1373, 2409, 1436
5.4800 1273, 1297, 2209

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B103/B226

AUTHORS: Kargin, V. A., Academician, Kabanov, V. A., Zubov, V. P., and Zezin, A. B.

TITLE: Polymerization of acetonitrile and other nitriles

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 3, 1961, 605-607

TEXT: The authors proved the possibility of adding another multiple bond (C≡N) to the bonds undergoing polymerization. This is possible when applying the principle of preliminary ordering of the monomer molecules. Thus, the formation of a new class of polymers having conjugated bonds in the principal chain becomes possible. For this purpose, the authors used nitriles (acetonitrile, propionitrile, tolyl nitrile, benzonitrile, trifluoroacetonitrile, and others). Under standard conditions, polymerization of these compounds on the C≡N bond is not possible, because these bonds should form a C=N- and a C-N bond each. In this case, a heat absorption of about 11 kcal/mole would be caused (M. Kh. Karapet'yants, Ref. 2: Khimicheskaya termodinamika (Chemical thermodynamics), M. 1953), without considering conjugation energy. The latter energy, which is

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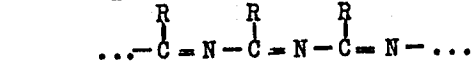
released in the formation of the bond system $-C=N-C=N-\ldots$ would, at best, cover the deficiency mentioned. In this way, the thermal effect of the reaction would be nearly zero. However, the transition from a liquid monomer to a solid polymer is always accompanied by an entropy decrease ($\Delta S<0$) (with a change of heat contents $\Delta H=-Q\cong 0$ and $\Delta S<0$ the change of isobaric-isothermal potentials $\Delta Z=\Delta H-T\Delta S>0$). The authors have ordered the monomer molecules in solid complexes which are readily formed by nitriles with such coordination-unsaturated metal halides as $ZnCl_2$, $BeCl_2$, $TiCl_4$, $AlCl_3$, $SnCl_4$. These complexes are crystalline substances of constant composition (usually $MeX_n \cdot 2RCN$). During their formation the entropy of the system is essentially decreased. There is reason to believe that the monomer molecules in these complexes form packings favoring their combination into molecular chains. Heating of these complexes to 180-350°C in hermetically sealed glass ampoules or in the autoclave in the absence of moisture and air oxygen resulted in polymerization of the ordered nitrile molecules with the formation of conjugated



chains. In this process, the metal halide

Polymerization of acetonitrile and...

plays the part of agents which displace the chemical monomer-polymer equilibrium in favor of the polymer formation. After polymerization the inorganic salt can be washed out by water, ammonia, or acids. Other experiments (heating of nitriles in which only small quantities of the above-mentioned salts are dissolved, 10,000 atm pressure) are unsuccessful, since they lead only to the formation of cyclic trimers. The above-mentioned structural formula of polynitriles is confirmed by data of infrared spectroscopy (Fig. 1). According to the authors' opinion, polymerization proceeds step by step. The molecular weight of the polymer increases with time. The yellow, low-molecular, water-soluble products forming at first gradually become dark brown and black. From the acetonitrile complex with $ZnCl_2$ heated to 250°C for 5 hr, a dark brown powder is formed, which is soluble in dimethyl formamide. Further heating yields polymers that are soluble only in concentrated (formic, phosphoric, sulfuric) acids. After 10 hr and more, black insoluble polymers are formed. This is confirmed by the increasing viscosity of polymer solutions in H_2SO_4. Similar relationships can be noted when increasing the reaction temperature. On the assumption that each of the

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polymer chains in the complex increases step by step independently of the other chains, the change of the polymerization degree (P) in time (t) can be written as $dP/dt = k$ or $P = kt$, where, in first approximation, k can be assumed as a constant depending on the temperature and structure of the complex. The intrinsic viscosity is related with P by $[\eta] = KP^{\alpha}$. For very hard polymers, such as polynitriles, α is probably ~ 2. Therefore, $[\eta] \cong k^2Kt^2 = Kt^2$. In fact, the experimental function $[\eta]$ of t^2 can be described by a straight line which is extrapolated up to the origin of the coordinates. Polynitriles exhibit a high thermal stability, semi-conductive properties, and the electron paramagnetic resonance spectra characteristic of polyconjugated systems. The electrical conductivity of polymer powders changed within wide limits with good reproducibility on a change of the polymerization temperature. It increases with increasing time and temperature of polymerization. For a temperature increase between 20 and 200°C, conductivity is rigorously changed according to the equation $\sigma = \sigma_o e^{-E/RT}$. The activation energy of electrical conductivity decreases with increasing time and temperature of polymerization between

0.35 and 0.2 ev. From the increase in σ_o, the authors conclude that "compensated effects" are absent. There are 3 figures, 1 table, and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: H. J. Emeleus, G. S. Rao (Ref. 3: J. Chem. Soc., 1958, 4245).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 4, 1961

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B103/B101

15.8050

AUTHORS: Kargin, V. A., Academician, Kabanov, V. A., Zubov, V. P., Papisov, I. M., and Kurochkina, G. I.

TITLE: Polycondensation of acetone and other carbonyl-containing compounds

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 1, 1961, 122-124

TEXT: The authors produced highly stable high-molecular polyvinylenes on the basis of ketones and aldehydes (acetone; 1,1',1"-trifluoro acetone; acetophenone; acetaldehyde, and others). These substances were subjected to polycondensation in the presence of comparatively large amounts of dehydrating catalysts such as $ZnCl_2$, $BeCl_2$, or $TiCl_4$, which are capable of forming complex compounds with molecules of monomers. The order of monomer molecules in such complexes permits extensive polycondensation processes. In previous papers, the authors showed (Vysokomolek. soyed., 1, 265 (1959); 1, 1859 (1959); 3, 426 (1961); Internat. Symposium on Macromolecular Chemistry, Section 2, M., 1960, p. 453; V. A. Kabanov, Dissertation for the degree of candidate, M., 1960) that the ordered

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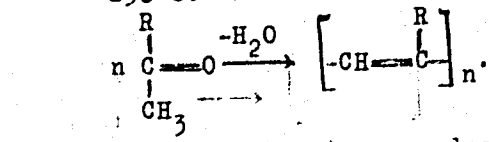
Polycondensation of acetone...

position of the monomer molecules may lead to very high, often explosive polymerization rates of solid monomers, even at very low temperatures. S. M. Skuratov's data (A. V. Volokhina, G. I. Kudryavtsev, S. M. Skuratov, A. K. Bonetskaya, Internat. Symposium on Macromolecular Chemistry, Section 2, M., 765, 1960, p. 465) indicate that this order must have an effect also upon polycondensation. The authors achieved the polycondensation by heating the reactant mixtures in sealed glass ampuls or in an autoclave with exclusion of atmospheric oxygen to temperatures from 70 to 250°C. This reaction can be represented in a general form by the equation:



In this reaction, acetaldehyde produces polyacetylene, acetone produces polymethyl acetylene, acetophenone produces polyphenyl acetylene, and so on. The polymers obtained are dark-brown or black powders with increased heat resistance characteristic of high-molecular, polyconjugate systems. They display semiconductor properties and characteristic epr spectra. The solubility of polymers in organic solvents, such as acetone or benzene, depends on the degree of polycon-

densation; they are soluble at low degrees but unsoluble at high degrees. The degree of polycondensation and the yield of solid polymers rise with increasing amount of catalyst, temperature, and reaction time. The structure of polyvinylenes is confirmed by infrared spectra. The spectrum of polymethyl acetylene (obtained from acetone in the presence of $ZnCl_2$) has many features in common with that of polyacetonitrile which, according to its structure, is related with polymethyl acetylene. A wide, intensive band at 1593 cm^{-1} corresponds to the absorption by the system of conjugate C=C bonds. The bands at 1352 and 1380 cm^{-1} may be ascribed to symmetric deformation vibrations of CH_3 groups. The band at 960 cm^{-1} corresponds to nonplanar C-H vibrations in the principal chain. An extensive polycondensation of carbonyl-containing monomers can be obtained by previous ordering of monomer molecules in complexes with metal halides unsaturated with respect to coordination which simultaneously play the part of dehydrating catalysts. Thus, various heat-resistant polyvinylenes of a considerable molecular weight can be produced. There are 1 figure, 1 table, and 11 Soviet references.

29823
S/020/61/140/006/022/030
B107/B101

11.8300

AUTHORS: Ayzatullin, T. A., Voronkov, V. G., and Zubov, V. P.

TITLE: Dependence of the limiting pressure of the explosiveness of gaseous hydrazoic acid on the spark pulse intensity

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 6, 1961, 1356 - 1357

TEXT: It is assumed that the limiting pressure of the explosiveness drops with increasing spark energy and then reaches a constant value. This is explained by assuming the occurrence of two different ignition mechanisms (L. N. Khitrin, Fizika goreniya i vzryva (Physics of combustion and explosion explosion), M., 1957). It is shown in the present paper that these assumptions do not hold for gaseous hydrazoic acid. In this case the limiting pressure was found to decrease continuously with increasing spark pulse intensity. The experiments were carried out in an 11-cm diameter spherical glass vessel. Fused-in electrodes gave a 3 mm spark gap in the center of the vessel. The electrodes were connected to an auto-transformer secondary, while capacitors of defined capacitance were discharged over the primary. Hydrazoic acid was prepared by the reaction of pure stearic acid

Card 1/3

Dependence of the limiting pressure...

with sodium azide. The tests were carried out at room temperature. Result: The logarithm of the limiting pressure P of the explosiveness is a linear function of $1/C^{0.2}$ (C = capacitance). Fig. 1 gives P as a function of C. Another test series was carried out with a mixture of 25% hydrazoic acid and 75% calcium-chloride dried air. The results may be expressed by $\log P = A/C^n + B$, where A, B, and n are constants dependent on the respective mixture. The expression $\log (P/T^{1+2/n} = A/T_0 + B$ derived by N. N. Semenov (N. N. Semenov, Tsepnyye reaktsii (Chain reactions), M. 1934) for thermal self-ignition evidently represents a more general rule applying not only to oxidation reactions and thermal self-ignition, but also to decomposition reactions and spark ignition of widely varying explosive systems. There are 3 figures and 8 references: 6 Soviet and 2 non-Soviet. The reference to the English-language publication reads as follows: M. V. Blance, P. G. Guest, G. Elbe, B. Lewis, J. Chem. Phys., 15 11, 798 (1947).

Card 2/3

29823 S/020/61/140/006/022/030
B107/B101

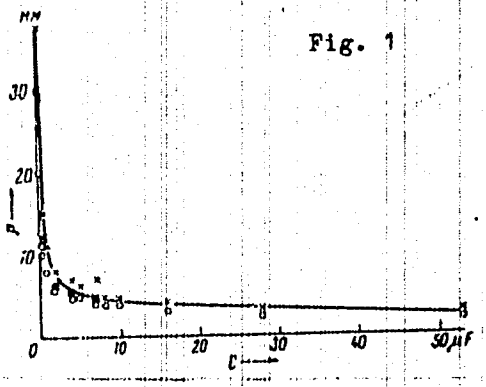
Dependence of the limiting pressure...

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: May 24, 1961, by N. N. Semenov, Academician

SUBMITTED: April 18, 1961

Fig. 1



Card 3/3

S/020/61/141/002/018/027
B101/B147

5.3830 2209

AUTHORS: Kargin, V. A., Academician, Kabanov, V. A., Papisov, I. M., and Zubov, V. P.

TITLE: Role of phase transitions in polymerization processes of solid monomers

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 2, 1961, 389-392

TEXT: The problem of rapid polymerization in solid state at low temperatures is discussed. A 0.03 mm thick layer of acrylonitrile (melting point -83°C) and magnesium (100 : 1) was condensed in vacuo onto a glass plate which was placed at the face of a copper cylinder cooled with liquid N_2. The condensate was a crystal-clear film. After N_2 was removed the copper cylinder was slowly heated (2°C/min). Temperature was measured with thermocouples, and the thermogram (Fig. 2) was recorded by an ЭПП-09 (EPP-09) electronic voltmeter. Samples activated with Mg underwent explosive polymerization either at -160°C or at -135°C. The degree of conversion was 100%. At these temperatures, the thermogram of non-activated acrylonitrile shows exothermic effects. The effect observed at

Card 1/0 3

S/020/61/141/002/018/027
B101/B147

Role of phase transitions ...

-160°C is ascribed to the crystallization of monomer glass on reaching Tamman temperature. The effect observable at -135°C, and the reason why polymerization starts once at -160° and once at -135°C, are still unexplained. At -135°C a secondary, additional orientation of the resulting microcrystalline substance might take place. The two transitions are irreversible. In methylmethacrylate and Mg condensed onto a glass sphere which was cooled to -75°C (apparatus described in Vysokomolek. soyed., 1, 265 (1959)), the polymerization process in polarized light could be observed due to birefringence of the crystals. At this temperature, the molecules could already migrate and add to the forming crystallization nuclei. Spherolites were formed. The characteristic Maltese cross could clearly be seen. In this system, slow polymerization took place. It began at the edges of the spherolites and in fissures. Shifting of the crystal - polymer interface could be observed with the aid of birefringence which vanished during polymerization. Contrary to N. N. Semenov's hypothesis (Khimiya i tekhnologiya polimerov, no. 7-8, 196 (1960)) that rapid polymerization takes place preferably in ideal crystals, experimental data showed that this effect occurs in defect crystals while ideal crystals polymerize slowly. Lattice defects are

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produced in the latter by the growing polymer chain and cause disruption of it. Reactivation is only possible after relaxation of stress. These processes occur at interfaces and can be accelerated by factors which facilitate the regrouping of monomer molecules, e.g., adsorbed layers of solvents. Rapid polymerization takes place if easier migration of defects is possible. This is the case with phase transitions in which the molecules become mobile. A paper by E. I. Adirovich (DAN, 136, 117 (1961)) is mentioned. There are 2 figures and 14 references: 11 Soviet and 3 non-Soviet. The two most recent references to English-language publications read as follows: A. J. Restaino, R. B. Mesrobian et al., J. Am. Chem. Soc., 78, 2939 (1956); T. A. Fadner, H. Morawetz, J. Polymer Sci., 45, 475 (1960).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 19, 1961

ACCESSION NR: AT4034000 S/0000/63/000/000/0147/0153

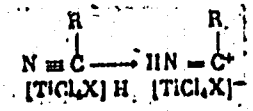
AUTHOR: Zubov, V. P.; Terekhina, I. P.; Kabanov, V. A.; Kargin, V. A.

TITLE: Polymerization of benzonitrile

SOURCE: Geterotsepny*ye vy*sokomolekulyarny*ye soyedineniya (Heterochain macromolecular compounds); sbornik statey. Moscow, Izd-vo "Nauka," 1963, 147-153

TOPIC TAGS: polymer, benzonitrile, titanium tetrachloride, boron fluoride, zinc chloride, polymerization kinetics, polymerization mechanism, benzonitrile polymer, benzonitrile trimer, polymer spectral analysis

ABSTRACT: Specially purified benzonitrile (b.p. 191.3C/760 mm, $n_D^{22.5} = 1.5310$) was polymerized in a series of reactions, mostly with titanium tetrachloride (134C/735 mm) as well as with zinc chloride or boron fluoride, to determine the mechanism and kinetics of the polymerization process. The structure of the polymerization products is analyzed in terms of the results of an infrared spectral analysis (see Fig. 1 in the Enclosure). Polymerization in the presence of HPO_3 is illustrated by



(1)

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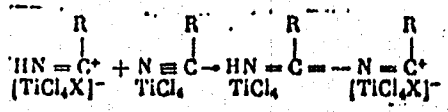
for initiation and



(2)

for chain growth. R = C_6H_5. The formation of a trimer, its accumulation and participation in the polymerization process are discussed. Orig. art. has: 3 graphs, 1 illustration and 6 chemical formulas.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 01Oct62 DATE ACQ: 30Apr64 ENCL: 01

SUB CODE: OC NO REF_SOV: 005 OTHER: 006

APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R002065610005-6"

ACCESSION NR: AT4034000

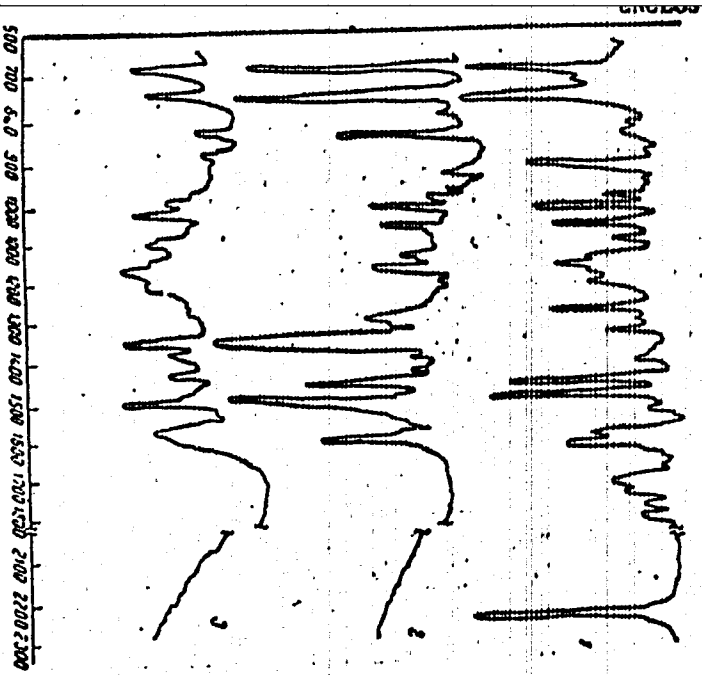


Fig. 1. Infrared spectra of benzonitrile monomer (1), trimer (2) and polymer (3); ordinate = transmission.

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ACCESSION NR: AT4034005 S/0000/63/000/000/0186/0191

AUTHOR: Zubov, V. P.; Zakharenko, Ye. T.; Kabanov, V. A.; Kargin, V. A.

TITLE: Aliphatic nitrile polymerization

SOURCE: Geterotsepny*ye vy*sokomolekulyarny*ye soyedineniya (Heterochain macromolecular compounds); sbornik statey. Moscow, Izd-vo "Nauka," 1963, 186-191

TOPIC TAGS: organic semiconductor, semiconducting polymer, polynitrile, electrical polyacetonitrile, propionitrile

ABSTRACT: Semiconducting polymers have been prepared by the polymerization of propionitrile and capronitrile as complexes with $ZnCl_2$ and $ZnCl_2$ or $TiCl_4$, respectively. The purpose of this research was to obtain fusible and processable conjugated polymers which would retain the electrical properties of such polynitriles as polyacetonitrile and polybenzonitrile. The complexes were prepared by mixing stoichiometric amounts of specially purified monomer and metal chloride in the absence of atmospheric moisture. The solid complex

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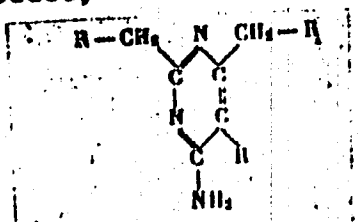
ACCESSION NR: AT4034005

was placed in ampuls which were then evacuated to high vacuum, sealed, and heated to 150—300C. Depending upon the reaction conditions, high- and low-molecular-weight products were obtained. On the basis of IR and UV spectra, the following structure was assigned to the low-molecular-weight product, which was assumed to be a trimer:



The trimer is probably an intermediate in the reaction which proceeds through the formation of macromolecules having a linear system of conjugated C=N bonds. It was found that in contrast to polyaceto-nitrile, the presence in the conjugated backbone of polypropionitrile and polycapronitrile of long aliphatic pendent groups, results in the formation of readily moldable and even fusible products which retain

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ACCESSION NR: AT4034005

sufficiently high electrical conductivity. Determination of electrical conductivity was carried out for pellet samples at different temperatures in air or in vacuum. A pronounced compensation effect was observed, i.e., the preexponential factor rose with the activation energy. The electrical conductivity at 20C ranged from 8.13×10^{-12} to 1.5×10^{-7} ohm^{-1} cm^{-1}. Hence the combination of relatively high electrical conductivity and the presence of the compensation effect was observed for conjugated polymers containing nitrogen hetero atoms in the backbone with hydrocarbon pendant groups. The cause of this phenomenon requires additional investigation. Orig. art. has: 3 tables, 3 figures, and 3 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 23Nov62 DATE ACQ: 30Apr64 ENCL: 00

SUB CODE: CH,PH NO REF SOV: 005 OTHER: 003

Card 3/3

SHREYER, E.S.; ZUBOV, V.P.; KABANOV, V.A.; KARGIN, V.A., akademik

Effect of the phase state of diketene on the chemical structure of macromolecules formed during its polymerization. Dokl. AN SSSR 156 no. 2:396-399 My '64. (MIRA 17:7)

ACC NR: AR6008641 SOURCE CODE: UR/0081/65/000/017/S012/S012

AUTHOR: Kabanov, V. A.; Zubov, V. P.

56
55
B

TITLE: The role of crosslinking and complexing in the thermodynamics of polymerization

SOURCE: Ref. zh. Khimiya, Abs. 17S72

REF SOURCE: Zh. Vses. khim. o-va im D. I. Mendeleyeva, v. 9, no. 6, 1964, 620-629

TOPIC TAGS: polymerization, depolymerization, heat of polymerization, thermodynamic process, thermodynamic property

ABSTRACT: The general problems of the thermodynamic theory of polymerization (PM), the thermodynamics of crystallizing polymer formation, the thermodynamics of polymers of crystalline monomers and the thermodynamics of PM monomers, bound in stoichiometric complexes with other substances were studied. Some equilibrium characteristics of monomerpolymer, in particular the constant independence of the polymerization-depolymerization equilibrium from the activity of the polymer and the sudden disappearance of the polymer in the system when the temperature limit is passed permits considering the polymerization-depolymerization equilibrium as a heterogeneous. It is analogous to the equilibrium crystal-melt (in the case where the polymer is insoluble in the reaction medium), or to liquid-vapor, where the polymer is soluble. In this

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L 29934-66
ACC NR: AR6008641

sense, even individual macromolecules in a solution can be considered as parts of a polymer phase, and the PM, as a peculiar phase transformation. The effect of forming polymer crystallization on the PM thermodynamics for the cases where the melting temperature of the crystalline polymer is lower and higher than the upper limit polymer temperature, characteristic for the corresponding amorphous polymer, is analyzed. It is shown that in this case irreversible polymer crystallization increases the upper limit temperature of the polymer. It is also shown that binding of monomers into stoichiometric complexes with other substances brings qualitative changes in the polymer thermodynamic characteristics, and in a series of cases, permits obtaining polymers from low-molecular substances, the polymer preparation of which, in a pure form, is either impossible or hindered by thermodynamic characteristics. Authors' summary.

SUB CODE: 07/ SUBM DATE: none

Card 2/2 CC

KARGIN, V.A., akademik; KABANOV, V.A.; ZUBOV, V.P.

Behavior of macromolecules as particles of a separate phase in polymerization-depolymerization equilibrium. Dokl. AN SSSR 160 no.4:857-860 F '65. (MIRA 18:2)

1. Moskovskiy gosudarstvennyy universitet.

KARGIN, B.A.; KABANOV, V.A.; ZUBOV, V.P.; PAPISOV, I.M.

Initiation of low temperature polymerization in systems obtained by the molecular beam method. Vysokom.soed. 3 no.3:426-434 Mr '61. (MIRA 14:6)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Polymerization) (Molecular beams)

KARGIN, V.A., akademik; KABANOV, V.A.; ZUBOV, V.P.; PAPISOV, I.M.; KUROCHKINA, G.I.

Polycondensation of acetone and other carbonyl-containing compounds. Dokl. AN SSSR 140 no.1:122-124 S-O '61. (MIRA 14:9)
(Carbonyl compounds) (Condensation products (Chemistry))

KABANOV, V.A., ZUBOV, V.P., KOVALEVA, V.P., KARGIN, V.A.

Polymerization of nitriles and pyridine,

Report submitted for the International Symposium of Macromolecular chemistry, Paris, 1.6 July 63

KABANOV, V.A., kand.khim.nauk; ZUBOV, V.P.

New ways of synthesizing polymers by polymerization methods.
Zhur.VKHO 7 no.2:131-140 '62. (MIRA 15:4)
(Macromolecular compounds) (Polymerization)

ZUBOV, V.P.

"The development of science; in memory of Joachim Jungius, 1587-1657." Reviewed by V.P. Zubov. Vop.ist.est. i tekh. no.11:150-151 '61. (MIRA 14:11)
(Jung, Joachim, 1587-1657)

AYZATULLIN, T.A.; VORONKOV, V.G.; ZUEOV, V.P.

Limit pressure for the explosiveness of gaseous hydrazoic acid as a function of the spark impulse power. Dokl. AN SSSR 140 no.6: 1356-1357 O '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Hydrazoic acid) (Explosions)

KARGIN, V.A., akademik; KABANOV, V.A.; PAPISOV, I.M.; ZUBOV, V.P.

Role of phase transitions in the polymerization of monomers in the solid state. Dokl. AN SSSR 141 no.2:389-392 N '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Polymerization)

S/063/62/007/002/002/014
A057/A126

AUTHORS: Kabanov, V.A., Candidate of Chemical Sciences; Zubov, V.P.

TITLE: New methods for polymer synthesis by polymerization

PERIODICAL: Zhurnal vsesoyuznogo khimicheskogo obshchestva im. D.I. Mendeleyeva, v. 7, no. 2, 1962, 131 - 140

TEXT: Methods for stereospecific polymerization and new polymers published in literature are discussed, citing in general investigations carried out by the Italian team of G. Natta. The scope of the present discussion is to indicate correlations between basic principles of processes in biosynthesis of macromolecules and those observed in syntheses of polymer materials. Consequently there could be discovered model systems imitating steps of complex biological processes and allowing a better understanding of their nature. Several examples demonstrate that regular polymers with different structural properties can be synthesized by stereospecific polymerization from the same monomer using different stereospecific catalysts. Thus, new possibilities are given for polymer chemistry by employing the principle of structural selection in the production of new polymers from well known monomers. This principle is also realized in living

New methods for polymer synthesis by polymerization

cells in the formation of macromolecules from a minimum number of initial substances. It was assumed that the crystalline surface of the catalyst plays the role of a matrix in stereospecific polymerizations. This assumption seems to be erroneous according to observations made in homogeneous media. However, the present authors hold that the stereospecific catalyst has the function of a single element of a matrix in the formation of simple regular sequences of chains in macromolecules. So, more complex regular sequences could probably be formed by means of a more complex series of such elements. More advanced results were obtained until now in an improvement of specificity of the "matrix element" of a catalyst by preparation of optically active catalysts and formation of optically active polymers from monomers without asymmetric centers. A further development in the synthesis of optically active polybenzofuran (carried out by Natta, et al) would be a catalytic system capable of a selection similar to the "key and lock" principle which is characteristic for ferment processes. Formation of oriented fibrous structures was effected experimentally by means of radiation polymerization and formation of canal complexes. Another characteristic of biocatalysis is a specific shift of chemical equilibrium. This phenomenon was also observed in organic synthesis and is effected by orientation of monomer molecules in polymerization processes. Thus Soviet investigators polymerized solid frozen ace-

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tone (which is not possible in liquid state), or various oriented nitryles in melts of corresponding metal complexes. Formation of macromolecules of the latter increases the polymerization entropy and effects, apparently, an additional decrease of specific heat. Moreover, orientation of the monomer molecules affects the polymerization rate. Thus can be observed slow (effected by gamma-irradiation), or quick polymerization (near, or considerably below the melting point of the polymer). It can be assumed that high polymerization rates, observed in solid-phase polymerization, are connected to a special mechanism of chain growth possible in systems with oriented monomer molecules. Soviet authors suggested a hypothesis which states the transfer of initiation energy as electron, or oscillation excitation along the oriented monomer molecules resulting in the formation of a polymer chain. Excited states are important in biological reactions occuring on matrix catalysts too. There are 2 figures and 49 references: 18 Soviet-bloc and 31 non-Soviet-bloc. The most important English-language reference reads as follows: D.L. Glusker, E. Stiles, B. Goncoskie, J. Polym. Sci., 49, 297 (1961); D.L. Glusker, I. Lisloff, E. Stiles, ibid., 49, 315 (1961).

Card 3/3

ZUBOV, Vasiliy Timofeyevich; SANDOMIRSKIY, A.S., nauchn. red.; MOKRETSOV, A.M., red.

[Principles of industrial mechanization and automation] Osnovy mekhanizatsii i avtomatizatsii proizvodstva. Moskva, Vysshaia shkola, 1964. 197 p. (MIRA 17:11)

1. ZUBOV, Eng. V.T.

2. USSR (600)

4. Standards, Engineering

7. Standardization in the service of the socialist homeland. (From the work experience of the Mytishchinsk Instrument Plant), Vest. mash., 32, No. 9, 1952.

9. Monthly List of Russian Accessions, Library of Congress, April, 1953, Uncl.

SIL'CHENKO, Serafim Semenovich; ZUBOV, V.T., inzh., nauchnyy red.; GLAZKOVA, Ye.I., red.; NESMYSLOVA, L.M., tekhn. red.

[Mechanization and automation of fitting and assembling work] Mekhanizatsiia i avtomatizatsiia slesarno-sborochnykh operatsii. Moskva, Proftekhizdat, 1962. 147 p. (MIRA 16:4)
(Machine-shop practice) (Automation)

ZUBOV, V.T., kombayner

Our experience in harvesting corn with KU-2 and KU-2A combines. Mekh. sil'. hosp. 11 no.7:9-10 Jl '60. (MIRA 13:10)

1. Kolkhoz im. Kotyubinskogo, Novobuzhskogo rayona, Nikolayevskoy oblasti.
(Corn(Maize)-Harvesting) (Combines(Agricultural machinery))

ZUBOV, V. V.

Potatoes

New effective method for storing seed potatoes. Dost. sel'khoz., No. 9, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952. Unclassified.

ZUBOV, V. V.

USSR/ Agriculture

Card 1/1 Pub. 86 - 18/36

Authors : Zubov, V. V., Cand. of Biol. Sc.

Title : Fodder and sugar beets in saliferous soil

Periodical : Priroda 2, 98-101, Feb 1954

Abstract : The quantity and quality of fodder and sugar beets grown in saliferous soil are analyzed. Table; illustrations.

Institution : Acad. of Scs., Lith-SSR, The Botanical Garden, Kaunas

Submitted : .....

ZUBOV, V.V.

Cultivation of beets on alkali soils. Biul.Glav.bot. sada no.18: 73-74 '54. (MLRA 8:3)

1. Botanicheskiy sad Akademii nauk Litovskoy SSR.
(Beets) (Alkali lands)

ZUBOV, V.V., kandidat biologicheskikh nauk.

Forage and sugar beets on solonetz soils. Priroda 43 no.2:98-101 F '54. (MLRA 7:3)

1. Kaunasskiy botanicheskiy sad Akademii nauk Litovskoy SSR.
(Beets) (Solonetz soils)

L 23862-66 EWT(l)/EWT(m) IJP(c) JD/HW

ACC NR: AP6013462 SOURCE CODE: UR/0139/66/000/002/0103/0105

AUTHOR: Zubov, V. V.

ORG: Rostov-on-the Don Agricultural Machine Building Institute (Rostovskiy-na-Donu Institut sel'khozmashinostroyeniya)

TITLE: Temperature investigation of Co-ferrite magnetostriction

SOURCE: IVUZ. Fizika, no. 2, 1966, 103-105

TOPIC TAGS: magnetostriction, ferrite

ABSTRACT: Magnetostriction λ and coercive force H_c were investigated in a ferrite specimen whose composition was close to $CoFe_2O_4$ (Co_2O_3, 40.92% by weight; Fe_2O_3, 59.08% by weight). The specimen had the form of a rod to tapered at the ends (d = 5 mm, l = 100 mm). The preliminary annealing of the charge lasted 3 hr at 900C. The specimen was also annealed for 3 hr but at 1230C. The specimen was investigated at temperatures ranging from room temperature to Curie point. The relative error of λ and H_c measurements did not exceed 5%. Temperatures were determined with an accuracy of ±1C. Analysis of the isotherms λ showed that they depend on temperature to considerable degree. The investigation demonstrated that the use of Co-ferrites as high magnetostrictive materials is possible only at temperatures near 200C, where at a sufficiently high value of $|\lambda_s|$ the residual magnetostriction is practically equal to zero, while H_c is low. Orig. art. has: 5 figures. [DW]

SUB CODE: 09/ SUBM DATE: 16May64/ ORIG REF: 005/ OTH REF: 002

Card 1/1 dda

L 09566-67 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) JD/HW

ACC NR: AP6023425 SOURCE CODE: UR/0139/66/000/003/0176/0177

AUTHOR: Bogma, K. K.; Zubov, V. V.

ORG: Rostov-on-Don Institute of Agricultural Machinery Building (Rostovskiy-na-Dony institut sel'skokhozyaystvennogo mashinostroyeniya)

TITLE: Dependence of the Hall effect of the ε and λ phases of cobalt on the magnetization

SOURCE: IVUZ. Fizika, no. 3, 1966, 176-177

TOPIC TAGS: cobalt, phase transition, crystal lattice structure, magnetized structure, magnetization, Hall effect

ABSTRACT: The purpose of the investigation was to determine the effect of the $\varepsilon \rightarrow \lambda$ transformation on the magnetization dependence of the Hall emf. A forged cobalt sample was prepared in accord with a procedure described by N. V. Volkenshteyn and G. V. Fedorov (FMM v. 2, 2, 377, 1965). The sample dimensions and the arrangement of the leads were such as to ensure homogeneous current distribution through the sample section. Plots of the Hall emf against magnetization were experimentally obtained at temperatures ranging from 210 to 605C, which includes the $\varepsilon \rightarrow \lambda$ transition temperature and turned out to be strongly nonlinear, in spite of published statements to the contrary. The shapes of the curves are similar above and below the transition tempera-

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L 09366-67

ACC NR: AP6023425

tube, in spite of the fact that the hexagonal lattice of the cobalt becomes cubic, and both the magnetization and the Hall effect, taken separately, experience changes on going through this point. Orig. art. has: 1 figure and 1 formula

SUB CODE: 20/ SUBM DATE: 18Jan65/ ORIG REF: 007/ OTH REF: 001

magnetic materials 18

Card 2/2 gl

L 18482-63 EWT(1)/EWG(k)/BDS/EEC(b)-2/ES(w)-2 AFFTC/ASD/ESD-3/AFWL/
LJP(C)/SSD Pz-4/Pi-4/Po-4/Pab-4 AT
ACCESSION NR: AP3005509 S/0057/63/033/008/0967/0972

82
80

AUTHOR: Zubov, V.V.; Chistyakov, P.N.

TITLE: Comparison of the microwave and probe methods for measuring plasma densities

SOURCE: Zhurnal tekhnicheskoy fiziki, v.33, no.8, 1963, 967-972

TOPIC TAGS: plasma diagnostics, Langmuir probe, microwave absorption, electron density

ABSTRACT: In order to compare the two diagnostic methods, the electron density in the positive column of a steady mercury-vapor discharge was measured with a plane Langmuir probe and by microwave absorption. The discharge was contained in a glass tube 54 mm in diameter, the electrode separation being 320 mm. A hot oxide-coated cathode was employed. The gas pressure was controlled by adjusting the temperature of a side tube containing liquid mercury. The Langmuir probe was 3 mm in diameter, 0.3 mm thick and was located in the center of the tube 120 mm from the anode with its plane parallel to the axis. Curves of electron density versus discharge current at constant pressure, obtained in the usual way by analysis of the probe characteristic, were linear for discharge currents greater than 0.3 A. The microwave

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ACCESSION NR: AP3005509

2

measurements were made at six wavelengths from 2.3 cm to 4.4 cm. The discharge tube was located between two waveguide matching sections and the attenuation was determined at a fixed wavelength while the discharge current was varied. Small variations in the attenuation (amounting to 3-5 db and showing maxima and minima) were observed at low discharge currents. These variations were sensitive to tuning, but the large attenuation indicating critical density was not. The curves of electron density versus discharge current obtained from these measurements were linear. The ranges of current in which the two types of measurement were possible did not overlap. To compare the two methods, the density-current relations for fixed gas pressures were extrapolated linearly to a common current and two curves of density versus gas pressure, one for each method, were constructed. These two curves agree well (within 10-15%) for gas pressures below 1.5×10^{-2} mm Hg, but they deviate considerably from each other above this pressure. At 4×10^{-2} mm Hg the density obtained from the microwave measurements exceeds that obtained with the probe at about 75%. "In conclusion the authors convey their gratitude to Professor B.N.Klyarfeld and to Docent V.Ye.Golant for consultations on problems relating to the work."
Orig.art.has: 1 formula and 7 figures.

ASSOCIATION: none
SUBMITTED: 07Jul62 DATE ACQ: 06Sep63 ENCL: 00
SUB CODE: PH NO REF SOV: 003 OTHER: 000

Card 2/2

ZUBOV, V. V. 176T97

USSR/Physics - Magnetostriction
Alloys, Nickel

11 Apr 50

"Magnetostriction of Ni-Mn Alloys in Longitudinal and Transverse Fields," D. I. Volkov, V. V. Zubov, Sci Res Inst Phys, Moscow State U imeni M. V. Lomonosov

"Dok Ak Nauk SSSR" Vol LXXI, No 5, pp 863-865

Experiments on the 2d rule of even effects in magnetostriction of Ni-Mn alloys. Rule states: Longitudinal effect in saturation depends upon the transverse; and if in the anisotropy tensor terms higher than 2d order are small and the paraprocess, magnetic and crystallic texture are absent, then longitudinal effect is opposite to transverse and twice as great. Submitted by Acad S. I. Vavilov 13 Feb 50.

PA 176T98

ZUBOV, V. V.

Zubov, V. V. -- "Magnetostriction of Superstructural Alloys." Cand Phys-Math Sci, Moscow State U, Moscow 1953. (Referativnyy Zhurnal-Fizika, Jun 54)

SO: SUM 168, 22 July 1954

SOV/137-58-9-19773

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 237 (USSR)

AUTHOR: Zubov, V.V.

TITLE: Relationship of Magnetostriction of the Fe_3Al Alloy and Temperature (Zavisimost' magnitostriktsii splava Fe_3Al ot temperatury)

PERIODICAL: Sb. nauchn. tr. Kuybyshevsk. industr. in-ta, 1957, Nr 7[a], pp 143-149

ABSTRACT: The relationship of the saturation magnetostriction and the temperature in the Fe_3Al alloy was studied. The measurements were carried out both after the bringing of the alloy into the ordered state and after annealing it at different temperatures up to the state of equilibrium. The Curie point (CP) of the Fe_3Al alloy in the ordered state is equal to the Kurnakov point (505°C), whereas the CP of the disordered alloy is equal to 580°. The characteristic maximum of the magnetostriction of the paraprocessus is observed in the region of CP. A.Z.

1. Aluminum-iron alloys--Heat treatment 2. Magnetostriction--Measurement 3. Temperature--Measurement

Card 1/1

18.8100
24.2200

26021 S/139/61/000/003/001/013
E073/E335

AUTHOR: Zubov, V. V.

TITLE: Temperature Dependence of Certain Magnetic Properties of the Fe_3Al Alloy

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1961, No.3, pp.3-8

TEXT: The Fe_3Al alloy is an ordering alloy with a complex elementary cell. As a result of the order-disorder transition of the alloy, changes occur in almost all the physical properties and this is of scientific and practical interest. The main aim of the work was to investigate the temperature dependence of the magnetostriction λ of an Fe_3Al alloy with an aluminium content corresponding strictly to the stoichiometric composition. Furthermore, a qualitative evaluation is given of the temperature dependence of the internal stress σ_i in the alloy on the basis of the theories of Ye. I. Kondorskiy (Ref. 2: Sow.Phys., 11, 957, 1937) and M. Kersten (Ref.3: M. Kersten, Symposium "Probleme der Technischen Magnetizierungskurve", Berlin, 42-72, 1938).

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Temperature Dependence of ... 26021 S/139/61/000/003/001/013
E073/E335

The dependence of the magnetostriction λ on the temperature t was determined by the "removable pick-up" method. Sliding contacts were used in the magnetostriction head onto which the lower ends of the strain-gauge wires were soldered. To ensure that all the $\lambda(t)$ measurements are made at practically the same tension and resistance of the pick-up, the strain gauges are stretched prior to recording each successive isotherm by helical springs or by the contacts, the weight of which has to be suitably chosen. The glued-on strain gauges permit measuring λ with an accuracy up to 3%. It was used for determining the saturation magnetostriction $\lambda(s)$ of the alloy at room temperature. The isotherms λ were calculated on the basis of simple proportionality, as a result of which the error increased by 2 - 2.5%, owing to changes in the sensitivity of the stretched pick-ups on fixing the mobile contacts. The dependence of the saturation magnetisation on the temperature $I_s(t)$ was measured ballistically and the initial

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S/139/61/000/003/001/013
E073/E335

Temperature Dependence ....

permeability μ_o and the coercive force H_c of the alloy were determined by means of an astatic magnetometer with an accuracy of 3%. The specimens were produced from electrolytic aluminium and armco iron which was first annealed in an initial vacuum at 900 °C for 10 hours, followed by cooling in the switched-off furnace. As a result of that, the alloy was almost entirely in the ordered state. The Fe_3Al alloy has a high magnetic viscosity at 500 °C and therefore the specimens were soaked at a given temperature for at least two hours when recording the isotherms λ. For investigating the dependence of λ on the tempering temperature, up to equilibrium states, the specimen was heated to 800 °C and then cooled to the required temperature by gradually reducing the current intensity in the heating furnace and maintained at the given temperature for some time, after which rapid quenching in water was applied. Additional measurements showed that the equilibrium state of the specimen could be obtained at a given tempering temperature without additional soaking at that temperature, provided the cooling is sufficiently slow. The process of ordering of this alloy

is sufficiently rapid from 200 °C onwards and therefore $\lambda_s(t)$ curves were recorded only for the ordered alloy. Curves are plotted for the magnetostriction isotherms in the temperature range 27 - 580 °C. To exclude the influence of the paraprocess, the λ_s values were determined by extrapolating the λ values to the axis $H = 0$ in the range of the paraprocess. Due to decreasing magnetic anisotropy, λ_s is reached at weaker fields if the temperature is increased. The $\lambda_s(t)$ relation for this alloy is plotted in Fig. 3 (Curves A, B and C). The straight-line extension of AB intersects the axis of $\lambda_s = 0$ at the point $t = 500$ °C, which can be considered as being the Kurnakov temperature for the Fe_3Al alloy. Up to 460 °C the relations are satisfactorily expressed by:

Temperature Dependence ....

$$\lambda_s = \lambda_{so}\left(1 - \frac{T}{\Theta}\right) \qquad (1)$$

where λ_{so} is the value of λ_s for $T = 0^{\circ}K$. Fig. 3 also shows the temperature dependence of the magnetostriction of the paraprocess. The results confirm the validity of the classical formula of N.S. Akulov (Ref. 10 - Ferromagnetism, GTTI, 1939):

$$\frac{\partial \lambda_p}{\partial H} = \frac{C}{\sqrt{\Theta - T}} \qquad (2)$$

where C is a constant which is not temperature-dependent. Evaluation of the temperature dependence of internal stresses was effected utilising the $\chi_0(t)$ and $I_s(t)$ results obtained earlier by the author (Ref. 7 - Dissertations, MGU, 1953).

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Temperature Dependence ....

It can be seen from Fig. 4 (σ_i, kg/mm^2 - p versus temperature, °C) that σ_i has a sharp maximum at 480 °C. The parameter p shows a sharp maximum in the temperature range 450 - 520 °C, where the alloy has the greatest heterogeneity; it drops sharply at temperatures exceeding 520 °C and this is attributed to the fact that the alloy will again be in the disorder state, i.e. it will be homogeneous. The author has established that for the annealed Fe_3Al alloy λ_s decreases linearly in the temperature range 27 - 475 °C and its value can be expressed by Eq. (1), provided that Θ = 500 °C is assumed. At the same temperature a maximum in the value $\partial\lambda_p/\partial H$ is observed, as follows from classical theory. A purely qualitative evaluation of σ_i in the Fe_3Al alloy based on the Kondorskiy-Kersten theory showed that the σ_i maximum is at 480 °C (Ref. 4 - K.P. Belov and V.V. Schmidt - ZhTF, 23, 1953). The dependence of λ_s and H_c

Card 6/8

Temperature Dependence ....

for the Fe_3Al alloy on the temperature of tempering to the equilibrium state was established and is plotted in Fig. 5 ($\lambda.10^6$ and H_c Oe vs. °C). There are 5 figures and 22 references: 14 Soviet and 8 non-Soviet. The three English-language references quoted are: Ref. 1 - Bradley et al - J. ISI, 125, No. 1; 339, 1932; Ref. 15 - Kirkham - Phys. Rev., 52, 1162, 1937; Ref. 20 - Sykes and Evans - J. Iron and Steel Inst., 131, 225, 1935.

ASSOCIATION: Kuybyshevskiy industrial'nyy institut imeni V.V. Kuybysheva (Kuybyshev Industrial Institute imeni V.V. Kuybyshev)

SUBMITTED: November 16, 1959 (initially)
November 21, 1960 (after revision)

Card 7/8

ACCESSION NR: AP4043860 S/0139/64/000/004/0003/0005

AUTHOR: Zubov, V. V.

TITLE: Investigation of some magnetic properties of Fe-Al alloys

SOURCE: IVUZ. Fizika, no. 4, 1964, 3-5

TOPIC TAGS: iron alloy, coercivity, saturation magnetization, magnetic susceptibility, internal stress

ABSTRACT: A comprehensive study was made of the saturation magnetization I_s, coercive force H_c, saturation magnetostriction λ_s, and the initial susceptibility χ_0 of hardened and annealed alloys of Armco iron containing from 7.1 to 32.3 at.% electrolytic 00 aluminum. The results are compared with the theoretical expressions given in various sources. A quantitative estimate is also made of the internal stresses and in the parameter "p" which is involved in the

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ACCESSION NR: AP4043860

Kondorskiy-Kersten relation for H_c (Ye. I. Kondorskiy, Sow. Phys., v. 11, 957, 1937; M. Kersten, Collection: "Probleme der technischen Magnetisierungskurve", Berlin, 42-72, 1938). It is shown that under different heat treatments the H_c of ferromagnetic alloys of the Fe-Al system is directly proportional to λ_s and inversely proportional to χ_0. A qualitative estimate of the internal stress σ_i has shown that σ_i (like H_c) changes little in hardened and annealed alloys close in composition to Fe_3Al, and the maxima of $\Delta\sigma_i$ and H_c occur for the same composition of the alloy. The value of the parameter p is larger in annealed alloys than in hardened alloys, but does not exceed 0.26 Oe/G. The obtained results are in agreement with theory. Orig. art. has: 5 figures and 3 formulas.

ASSOCIATION: Rostovskiy institut sel'khozmashinostroyeniya (Rostov

Card 2/3

ACCESSION NR: AP4043860

Institute of Agricultural Machinery Building)

SUBMITTED: 29Jan63 ENCL: 00

SUB CODE: EM, MM NR REF SOV: 002 OTHER: 005

Card 3/3

L 6973-66 EWI(m)/EWP(t)/EWP(k)/EWP(b)/EWA(c) IJP(c) JD/HM

ACC NR: AP5018865 SOURCE CODE: UR/0126/65/020/001/0135/0138

46
B

AUTHOR: Bogma, K. K.; Zubov, V. V. 44, 55 44, 55

ORG: Rostov-on-the-Don Institute of Agricultural Machine Building (Rostovskiy-na-Donu. Institut cel'khozmashinostroyeniya) 44, 55

TITLE: Galvanomagnetic effect in cobalt in the transformation region $\varepsilon \rightleftarrows \gamma$ 55, 27

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 1, 1965, 135-138

TOPIC TAGS: magnetic effect, magnetic hysteresis, metal rolling, cobalt, cobalt base alloy 44,55 18

ABSTRACT: Cylindrical specimens (l = 100 mm, d = 5 mm) were prepared from rolled cobalt of not less than 99.25% Co, 0.35% Ni, 0.20% Fe, and 0.05% Cu. Annealing in hydrogen at 1000°C for 10 hrs removed internal stresses and inhomogeneity and lessened the degree of inclusion in the γ phase. Specimens were "furnace cooled" through the $\gamma \rightarrow \varepsilon$ transformation range and subsequent slower cooling through the $\gamma \rightarrow \varepsilon$ (500°C--300°C) range did not influence the results. Silver wires and thermocouples were soldered to the ends of the specimen. For the measurement of $\Delta R/R$ a PKL-48 potentiometer and low resistance galvanometer (sensitivity 10^{-7} v/div.) were used. Magnetization was measured ballistically. The maximum value of $\Delta R/R$ (H) was taken as the magnitude of practical saturation $(\Delta R/R)_s$. Dilatometric measurements were carried out

UDC: 539.292 : 536.63

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ACC NR: AP5018865

on a Shevenar differential optical dilatometer. $\Delta R/R$ vs H isotherms were measured at 12 temperatures between 170° and 605°C for heating and 13 temperatures between 100° and 605°C for cooling in the transformation vicinity. Specimens approach the practical saturation at lower field strengths upon heating at temperatures up to 270°C. This is explained by the approach of the anisotropic constant to zero over the temperature range making magnetization easier. Upon further increase in temperature from 300-450°C, the accompanying heterogeneity caused by γ nucleation and ε → γ transformation makes magnetization more difficult and saturation is not reached even at H = 2000 oersted. After ε → γ transformation (455-605°C) the susceptibility χ_0 increases and saturation of $(\Delta R/R)$ is reached at approximately 500 oersteds, $(\Delta R/R)$ vs (H) isotherms for cooling exhibit a similar character. $(\Delta R/R)_s$ vs (T) hysteresis curves show the difference between heating and cooling (see Fig. 1.). Point B represents two opposing processes contributing to the change in magnitude of $(\Delta R/R)_s$ with increasing temperature; a decrease in $(\Delta R/R)_s$ due to the presence of ε phase and an increase due to the growth of γ crystals. The latter is at first negligible and then leads to an abrupt increase in $(\Delta R/R)_s$ (part BC). CD represents disappearance of the remaining ε phase. The change of $(\Delta R/R)_s$ upon cooling is explained in similar fashion. Regions on the curve where transformation has not yet begun or has just been completed appear linear. Dilatometer measurements establish these temperature regions (390-320°C and 400-470°C) as the transformation range. The equation

$$\frac{\Delta R}{R} = \alpha J^2,$$

where (J is the intensity of magnetization), was studied for heating and cooling by

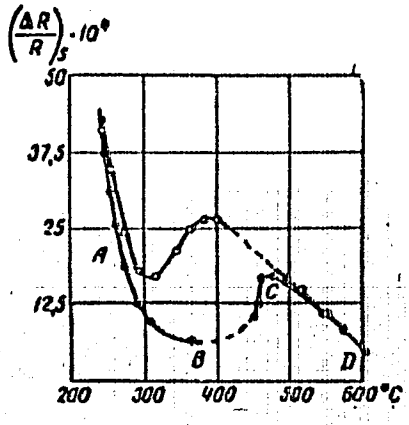

Fig. 1. Dependence of the saturation magnitude of the galvano-magnetic effect in cobalt on temperature during heating (lower curve) and cooling (upper curve).

plotting $\frac{\Delta R}{R}$ vs J^2 and was found to apply both to the cubic and post transformation hexagonal structures. Orig. art. has: 4 figures, 1 formula.

SUB CODE: MM/ SUBM DATE: 24Jul64/ ORIG REF: 004/ OTH REF: 002

Card 3/3

ZUBOV, V.V.

Magnetic properties of cobalt in the region of $\varepsilon \rightleftarrows \gamma$ phase transformations. Fiz. met. i metalloved. 19 no.3:468-470 Mr '65. (MIRA 18:4)

1. Rostovskiy-na-Donu institut sel'skokhozyaystvennogo mashinostroyeniya.

L 09007-67 EWT(m)/EWP(w)/EWP(t)/ETI IJP(c) JD/HW
ACC NR: AP6027784 SOURCE CODE: UR/0126/66/022/001/0045/0048

53
52

AUTHOR: Zubov, V. V.; Skrebneva, M. I.

ORG: Rostov-on-Don Institute of Agricultural Machine Building (Rostovskiy-na-Donu institut sel'khozmashinostroyeniya)

TITLE: Temperature studies of certain magnetic properties of Co-ferrite

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 1, 1966, 45-48

TOPIC TAGS: ferrite, cobalt iron, magnetic property, temperature dependence, magnetostriction

ABSTRACT: A specimen of the ferrite $CoFe_{1,67}O_4$, was prepared in the shape of a rod sharpened at both ends (d = 5 mm, l = 100 mm), with subsequent annealing for 3 hr at 1230°C. Its residual magnetostriction J_r, saturation magnetostriction λ_s, initial susceptibility χ_0 and coercive force H_c were determined by the ballistic method and with the aid of an extension pickup, over the temperature range of from 15°C to Curie point. Findings: J_r, H_c, λ_s, λ_r decrease linearly with increase in temperature. For λ_s, J_r and H_c a sharp change in their

Card 1/3 UDC: 538.245

course is observed in the neighborhood of 200°C, with λ_r at the same time decreasing to zero. It is suggested that in the neighborhood of 200°C a phase transformation of the second kind occurs in ferrite. In the neighborhood of the Curie point χ_0 reaches a sharp maximum. Of special interest is a joint investigation of the functions λ_s (T) and λ_r (T). It can be readily seen (Fig. 1) that for this specimen, over the temperature range considered, saturation magneto-

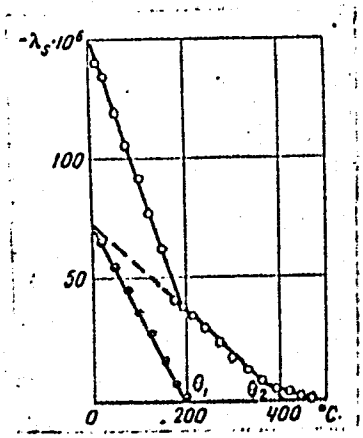

Fig. 1. Temperature dependence of saturation magnetostriction (o) and residual magnetostriction (•)

L 09007-67
ACC NR: AP6027784 O

striction can be sufficiently rigorously separated into two parts one of which is conditioned by irreversible magnetization processes and the other, by reversible processes. Orig. art. has: 6 figures, 2 formulas.

SUB CODE: 11, 20/ SUBM DATE: 28Jun65/ ORIG REF: 005/ OTH REF: 005

Card 3/3 nst

POZIN, M.Ye.; TARAT, E.Ya.; TERESHCHENKO, L.Ya.; ZUBOV, V.V.; TREUSHCHENKO, N.N.

Kinetics of nitrogen oxide absorption with aqueous salt solutions. Izv.vys.ucheb.zav.; khim.i khim.tekh. 8 no.4:628-632 '65. (MIRA 18:11)

1. Leningradskiy tekhnologicheskiy institut imeni Lensoveta, kafedra tekhnologii neorganicheskikh veshchestv.

POZIN, M.Ye.; TARAT, E.Ya.; ZUBOV, V.V.; TEMESHCHENKO, L.Ya.

Rate and mechanism of absorption of nitrogen oxide by aqueous solutions of salts. Izv.vys.ucheb.zav.; khim. i khim. tekh. 6 no.6:974-981 '63. (MIRA 17:4)

1. Leningradskiy tekhnologicheskiy institut imeni Lensoveta, kafedra tekhnologii neorganicheskikh veshchestv.