GUBANOV, A.I.; KRIVKO, N.I.; REYNOV, N.M.

Experimental determination of polaron mass in cuprous oxide. Zhur. eksp.i teor.fiz. 38 no.2:341-344 F '60. (MIRA 14:5)

1. Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR.
(Copper oxide) (Semiconductors)

GUBANOV, A.I.

Band theory of partially ordered systems. Fiz.tver.tela 3 no.7:2154-2159 Jl '61. (MIRA 14:8)

1. Fiziko-tekhnicheskiy institut AN SSSR imeni A.F.Ioffe, Leningrad.
(Systems (Chemistry)) (Energy-band theory of solids)

27284

S/181/61/003/008/014/034
B102/B202

24,7700

AUTHOR: Gubanov, A. I.

TITLE: Theory of impurity levels in amorphous semiconductors

PERIODICAL: Fizika tverdogo tela, v. 3, no. 8, 1961, 2336 - 2341

TEXT: B. T. Kolomiyets et al. studied the effect of impurities on the conductivity of vitreous semiconductors (As_2Se_3-As_2Te_3). They found that in vitreous state, σ remains unaffected while in crystalline state it is considerably influenced. In the vitreous state $\ln\sigma = f(1/T)$ does not show the characteristic salient point of impurity semiconductors. I. Z. Fisher (FTT, I, 192, 1959) attempted to explain theoretically the lack of impurity conductivity in amorphous bodies. His concepts are, however, refuted in the present paper. The author assumes that the lack of an impurity conductivity is related to a considerable shift of the impurity levels, especially to a lowering of the donor level. This level shift can be explained by various hypotheses. One of them is analyzed here; it is the assumption that the impurity atoms in the amorphous body have about the same potential as in the crystal, that the local levels on

Card 1/3

the background of the quasiperiodic potential occupy, however, another position than in the crystal. A theoretical study shows that this hypothesis is impractical. The author then discusses a second hypothesis in which the following assumption is made: In the amorphous body the impurity atoms occupy about the same position as in a crystal, however, they cause a rearrangement of the surrounding atoms such that the donor levels approach the filled band, the acceptor levels approach the conduction band. The levels of the interstitial atoms were calculated by the method of the effective mass (according to H. Reiss). The method of the strongly bound electrons (F. E. Williams) leads to the same result: In an amorphous body, the impurity levels lie considerably lower. If such an atom acts as donor in the crystal it exerts the same function also in the amorphous body. Here, this lowering of the level is considerably stronger than the heightening with unchanged potential in the hypothesis discussed first. This hypothesis seems to be suitable to explain the non-existence of impurity conductivity in vitreous semiconductors. A third hypothesis, which is basically possible, and according to which the impurity atoms in the amorphous body have other positions than in the crystal, is not specially dealt with, since it cannot fully explain the

effect. I. M. Lifshits and N. D. Potekhina are mentioned. There are 15 references: 12 Soviet-bloc and 3 non-Soviet-bloc. The three references to English-language publications read as follows: G. T. Koster and J. C. Slater. Phys. Rev., 95, 1167, 1954; F. E. Williams. J. Chem. Phys., 19, 457, 1951; H. Reiss. J. Chem. Phys., 25, 681, 1956.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR Leningrad (Institute of Physics and Technology imeni A. F. Ioffe AS USSR, Leningrad)

SUBMITTED: February 6, 1961 (initially) and March 9, 1961 (after revision)

Card 3/3

S/057/61/031/005/017/020
B104/B205

26.2331

AUTHORS: Gubanov, A. I. and Pushkarev, O. Ye.

TITLE: The Hartmann problem in magnetoplasmadynamics

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 5, 1961, 621-623

TEXT: In magnetohydrodynamics, Hartmann et al. (Mat.-fys. Medd., 15, 6 and 7, 1937) studied the motion of plasma between two immobile plates. The plasma was assumed to have isotropic viscosity. The present authors have studied the case where the magnetic field is directed along the x-axis and perpendicular to the plates. A similar investigation has been carried out by Gubanov et al. (ZhTF, XXV, 1053, 1960). The symbols and equations introduced in this paper are also used here. These equations differ from those presented here:

Card 1/4

22786

The Hartmann problem in...

$$\left.\begin{aligned}
&\eta b_1' \frac{d^2 v_x}{dz^2} - \eta b_1'' \omega_1 \tau_1 \frac{d^2 v_y}{dz^2} + \frac{\sigma \frac{H_0^2}{c^2}}{1+\varkappa^2}(v_y \varkappa - v_x) = \\
&= \frac{1+\frac{1}{2}\varkappa^2}{1+\varkappa^2}\frac{dp}{dx} - \frac{H_0}{c}\sigma\frac{\varkappa E_x + E_y}{1+\varkappa^2}, \\
&\eta b_1' \frac{d^2 v_y}{dz^2} + \eta b_1'' \omega_1 \tau_1 \frac{d^2 v_x}{dz^2} - \frac{\sigma \frac{H_0^2}{c^2}}{1+\varkappa^2}(v_x \varkappa + v_y) = \\
&= \frac{\frac{1}{2}\varkappa}{1+\varkappa^2}\frac{dp}{dx} - \sigma\frac{H_0}{c}\frac{E_x - \varkappa E_y}{1+\varkappa^2}.
\end{aligned}\right\} \quad (1) \qquad (1)$$

only in the terms with dp/dx (the x-axis is directed parallel to the pressure gradient). In addition, $\omega_1 \tau_1 H_0/H = \varkappa$, is valid. The boundary conditions for the velocities are: $v_x = v_y = 0$ at $z = 0$ and $z = h$ (2); h is the spacing of the plates. Two cases are to be distinguished:
1) E_x and E_y are given; if the plates are conducting, $E_x = E_y = 0$.
2) $H_x = H_y = 0$ at $z = 0$ and $z = h$. From the system (1) and (2) the following solutions are obtained for the first case:

Card 2/4

The Hartmann problem in...

$$v_x + iv_y = (v_x^0 + iv_y^0)\left(1 - \frac{\operatorname{ch} k_1\left(z - \frac{h}{2}\right)}{\operatorname{ch} k_1 \frac{h}{2}}\right), \qquad (3)$$

$$v_x^0 = -\frac{dp}{dx}\frac{c^2}{\sigma H_0^2} + \frac{c}{H_0}E_y,\ v_y^0 = \frac{dp}{dx}\frac{c^2}{\sigma H_0^2}\frac{x}{2} - \frac{c}{H_0}E_x. \qquad (4)$$

In analogy to the previous paper, the following expression is then obtained:

$$j_x + ij_y = -\sigma\frac{H_0}{c}\frac{x - i}{1 + x^2}(v_x^0 + iv_y^0)\frac{\operatorname{ch} k_1\left(z - \frac{h}{2}\right)}{\operatorname{ch} k_1 \frac{h}{2}} + i\frac{c}{H_0}\frac{dp}{dx}, \qquad (5)$$

wherefrom it follows that

$$H_x + iH_y = (H_x + iH_y)_{z=0} + \frac{4\pi}{ic}\int_0^z (j_x + ij_y)\,dz = (H_x + iH_y)_{z=0} +$$

$$+ 4\pi\sigma\frac{H_0}{c^2}\frac{1 + ix}{1 + x^2}(v_x^0 + iv_y^0)\frac{\operatorname{sh} k_1\left(z - \frac{h}{2}\right) + \operatorname{sh} k_1\frac{h}{2}}{k_1 \operatorname{ch} k_1 \frac{h}{2}} + \frac{4\pi}{H_0}\frac{dp}{dx}z. \qquad (6)$$

By eliminating E_x and E_y from (3), (4), and (6), the solutions

Card 3/4

22786

The Hartmann problem in...

$$v_x + iv_y = -\frac{dp}{dx}\frac{h}{2}\frac{c^2}{eH_0^2}(1-ix)\frac{\operatorname{ch} k_1\frac{h}{2} - \operatorname{ch} k_1\left(z-\frac{h}{2}\right)}{\operatorname{sh} k_1\frac{h}{2}}, \quad (7) \quad (7)$$

$$H_x + iH_y = -\frac{dp}{dx}\frac{h}{2}\frac{4\pi}{H_0}\frac{\operatorname{sh} k_1\left(z-\frac{h}{2}\right)}{\operatorname{sh} k_1\frac{h}{2}} + \frac{dp}{dx}\frac{4\pi}{H_0}\left(z-\frac{h}{2}\right). \quad (8) \quad (8)$$

are obtained for the second case. If the magnetic field is parallel to the plates, the plasma will move like in hydrodynamics but with varying viscosity. If the direction of the magnetic field and the direction of the moving plasma form a right angle, a pressure gradient will appear. Yu. P. Lun'kin is thanked for discussions. There are 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR
Leningrad (Institute of Physics and Technology imeni
A. F. Ioffe, AS USSR, Leningrad)

SUBMITTED: December 7, 1960

Card 4/4

CHEVYCHELOV, A.D., GUBANOV, A.I.

Precise formulation of the kinetic theory of polymer strength.
Bond and cohesive energy in polymers.

Report presented at the 13th Conference on High-molecular compounds.
Moscow, 8-11 Oct 62

S/181/62/004/004/013/042
B104/B108

5.4100

AUTHORS: Gubanov, A. I., and Chevychelov, A. D.

TITLE: Theory of the breaking strength of solid polymers

PERIODICAL: Fizika tverdogo tela, v. 4, no. 4, 1962, 928 - 933

TEXT: This is a critical comment of F. Bueche's theory (J. Appl. Phys., 28, 784, 1957). The theoretical strength of a polymer is calculated on the assumption that the potential energy of interaction between neighboring atoms of polymer chains can be described by a Morse function

$$U(r) = D\{\exp(-2(r-R)/a) - 2\exp(-(r-R)/a)\}.$$

D is the maximum depth of the potential well; a characterizes the curvature of U(r) near its minimum, and R is the equilibrium interatomic distance. For the time until a sample breaks under a given load, the following relation is obtained:

$$\ln(\tau/\tau_0) = D/kT - \ln\left\{\exp\left[(a\sigma e/kTN)(1 + \ln(2DN/a\sigma))\right] - 1\right\}, \text{ where } \tau_0 = 1/\omega,$$

Card 1/2

Theory of the breaking strength ...

N is the total number of chains passing through unit cross section. In the case of polyvinyl chloride, polypropylene, and polyethylene, the calculated strength is considerably greater than the experimental one. Caprone is an exception. These results diverge from experimental data less than Bueche's results. Explanation: (1) Since polymer chains have finite dimensions, the effective value of N is influenced thereby; (2) irregularity was considered through the factor 1/3 in the calculation. This factor may be lower in an exact calculation. (3) The sample displays inhomogeneities. A fluctuation mechanism is assumed to be the principal cause of polymer destruction. In these calculations, intermolecular forces were assumed to be small. S. N. Zhurkov, Corresponding Member AS USSR, is thanked for having suggested the subject and for discussions. There are 3 figures and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR
Leningrad (Physicotechnical Institute imeni A. F. Ioffe, AS USSR, Leningrad)

SUBMITTED: November 23, 1961

Card 2/2

S/181/62/004/006/020/051
B104/B112

24.6710

AUTHOR: Gubanov, A. I.

TITLE: Electron spectrum in one- and three-dimensional models of a liquid

PERIODICAL: Fizika tverdogo tela, v. 4, no. 6, 1962, 1510-1513

TEXT: In a previous paper (FTT, 3, 2164, 1961), the author derived the system

$$E=\sum_{k=1}^{G}|C_{nk}|^2E_k+A\varepsilon^2+B\varepsilon, \qquad (1),$$

$$E_k=E_k^0+\varepsilon^2w_{kk}, \qquad (2),$$

$$A=\sum_{k}\frac{\sum_{k'}'|C_{nk'}|^2(|U_{kk'}|^2+U_{k'k}U_{kk'})}{E-E_k}, \qquad (3),$$

$$B=\sum_{k,k'}'\left(C_{nk}^*-\frac{\varepsilon C_{nk'}^*U_{kk'}^*}{E-E_k}\right)\left(C_{nk'}-\frac{\varepsilon C_{nk}U_{k'k}}{E-E_{k'}}\right) \qquad (4)$$

Card 1/2

* NOT SELECTED FOR TRANSLATION

Electron spectrum in...

for the n-th energy state of a disordered system, using the band theory of liquid and amorphous conductors. C_{nk} are the expansion coefficients of the wave functions of the n-th state; E_k^o is the energy of the n-th eigenstate of a crystal; ε is a parameter characterizing the degree of short-range perturbation; w_{kk} and U'_{kk} are matrix elements of the perturbation operators. The broadening of the allowed bands in one- and three-dimensional liquids is studied from (3). In a one-dimensional liquid, the mean broadening E of the allowed band is a linear function of ε. In a three-dimensional liquid, E is proportional to ε^2. For small ε, the band broadening in a three-dimensional liquid is considerably smaller than in a one-dimensional liquid. The model of a dimensional liquid cannot be used for investigating a three-dimensional body.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR
Leningrad (Physicotechnical Institute imeni A. F. Ioffe
AS USSR, Leningrad)

SUBMITTED: January 25, 1962

Card 2/2

S/181/62/004/010/036/063
B102/B112

AUTHOR: Gubanov, A. I.

TITLE: Local fluctuation levels in amorphous semiconductors

PERIODICAL: Fizika tverdogo tela, v. 4, no. 10, 1962, 2873 - 2879

TEXT: Earlier (ZhETF, 26, 139, 1954; 28, 401, 1955; FTT, 2, 651, 1960; 3, 2164, 1961), the author showed that also amorphous bodies and liquids may have an electronic band structure. Here it is shown that these energy bands also have local levels. The occurrence of such levels is attributed to atom fluctuations and is dealt with theoretically. These "fluctuational local levels" are studied in the same way that Koster and Slater (Phys. Rev. 95, 1167, 1954) studied the impurity levels of crystals (see Gubanov, FTT, 3, 2336, 1961). If the perturbing potential acts only on a small number z of localized wave functions φ_i the energy of the local level is determined by

$$\Delta = \left| \sum_{i=1}^{z} L_{si} V_{iq} - \delta_{sq} \right| = 0, \; s, q = 1, 2 \ldots z; \qquad (1)$$

$$V_{iq} = \int \varphi_i V \varphi_q d\tau; \quad L_{si} = \sum_{p=1}^{Q} \frac{c^*_{pi} c_{ps}}{E - E_p} = \frac{G}{\Omega} \int \frac{c^*_{pi} c_{ps} d\Omega}{E - E'(k)}, \qquad (2)$$

S/181/62/004/010/036/063

G is the number of cells in the basic region, E_p or $E'(\vec{k})$ the energy of levels of the unperturbed system, c_{ps} are the expansion coefficients of the wave function ψ_p with respect to the local functions φ_i, and Ω is the volume of the Brillouin zone. Eq. (1) is studied only for two extreme cases: semiconductors with a purely ionic bond and semiconductors with a purely covalent bond. In the former case

$$\sum_{\nu=1}^{z} \frac{\Delta r_\nu}{r_0} > b \equiv \frac{a_0}{a} \frac{r_0}{a} \frac{e}{e^*} \frac{m}{m^*}; \quad \text{where * stands for 'effective'} \qquad (5)$$

$$|V_{11}| > \frac{\Omega A^3}{8\pi m^{*3/4} \sqrt{2E_1}} . \qquad (7)$$

with $E < 0$, where $a_0 = \hbar^2/me^2$, e is the effective charge of the point ions, r_0 is the mean distance of neighboring ions, Δr_ν is their fluctuation, z_1 is the number of ions in the first sphere of coordinations; with $\Omega \simeq \pi^3/a^3$ and $E_1 \simeq \hbar^2/2m^*a^2$, (a is the cell dimension)

Card 2/5

Local fluctuation levels...

$$V_{11} \simeq e^2 \frac{e^2}{\varepsilon}\left(\sum_{\nu=1}^{r_1}\frac{1}{r_\nu}-\frac{r_1}{r_0}\right)\simeq -\frac{e^2}{r_0}\frac{e^2}{\varepsilon}\sum_{\nu=1}^{r_1}\frac{\Delta r_\nu}{r_0}. \qquad (6)$$

is obtained in first approximation; the concentration of local levels is given by

$$N = N_0 \frac{1}{\varepsilon\sqrt{2\pi r_1}}\int_b^\infty e^{-\frac{t^2}{2r_1}}dt \simeq N_0 \frac{\varepsilon\sqrt{r_1}}{b\sqrt{2\pi}} e^{-\frac{b^2}{2r_1}}, \qquad (9)$$

N_0 is the number of positive ions per cm^3, b is a material constant. The inequality for b is the condition for the occurrence of a local level. For a covalent semiconductor the perturbing potential for a conduction electron is $V \simeq -U^0_{ab}\Delta r/r_0$ and

$$U^0_{ab} \simeq E_1 + \frac{E_g}{2} \simeq \frac{\hbar}{2m^* a^2}.$$

The condition for the occurrence of a local level is $\sum_{q=1}^{z}\Delta r_q/r_0 > 2/\varphi$ and the concentration of the local levels is

Card 3/5

$$N = N_0 \frac{1}{\varepsilon\sqrt{2\pi_x}} \int_{\frac{1}{\varphi}}^{\infty} e^{-\frac{t^2}{2\pi_x}} dt \simeq N_0 \frac{\varphi\varepsilon\sqrt{2}}{2\sqrt{2\pi}} e^{-\frac{1}{\varepsilon^2\varphi^2}}, \qquad (17),$$

N_0 is the number of valence bond lines per cm^3. The effect of the fluctuational levels on the conductivity of vitreous semiconductors is studied. The duration τ of the existence of a local atomic configuration for liquids is, according to Frenkel, $\tau = \tau_0 \exp(W/kT)$ where τ_0 is the atomic oscillation period ($\approx 10^{-13}$ sec) and W the activation energy for the rearrangement of the atoms. For most of the salts $\tau = 10^{-11} - 10^{-12}$ sec, so that τ is much shorter than the time τ_{el} of electron capture by a local level ($10^{-9} - 10^{-11}$ sec). For vitreous semiconductors it is $\tau \gg \tau_{el}$ and the fluctuation levels, therefore, play the same part as the constant local levels. They act as carrier traps, which probably is the reason why vitreous semiconductors show no impurity conductivity.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute imeni A. F. Ioffe AS USSR, Leningrad)

Local fluctuation levels...

S/181/62/004/010/036/063
B102/B112

SUBMITTED: February 19, 1962 (initially)
June 2, 1962 (after revision)

Card 5/5

S/057/62/032/005/002/022
B108/B102

AUTHORS: Gubanov, A. I., and Pushkarev, O. Ye.

TITLE: Viscous boundary layer in magnetohydrodynamics in the case of finite

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 5, 1962, 657 - 662

TEXT: The magnetohydrodynamic equations for the boundary layer of a conducting fluid placed in a uniform magnetic field are derived. The dependence of conductivity on the magnetic field strength is taken into account, since this cannot be neglected when $\omega\tau$ is not negligible, i. e., in a rarefied gas which is in a strong magnetic field. The ion current is assumed negligible, temperature and viscosity constant, and the gas incompressible. It is shown that inside the boundary layer of thickness δ the electrical field E is constant, so that one has the equations

$$\rho\left(v_x\frac{\partial v_x}{\partial x}+v_z\frac{\partial v_x}{\partial z}\right)=-\frac{\partial p}{\partial x}+\eta\frac{\partial^2 v_x}{\partial z^2}+\frac{c\left(\frac{B}{c}\right)^2}{1+\omega^2\tau^2}\left(\omega\tau v_y-v_x\right)+$$

$$+\frac{\omega\tau}{1+\omega^2\tau^2}\left(\omega\tau E_x+E_y\right)+\frac{\omega\tau}{1+\omega^2\tau^2}\left(\omega\tau\frac{\partial p_e}{\partial x}+\frac{\partial p_e}{\partial y}\right), \quad (4)$$

CARD 1/3

[illegible] boundary layer in [illegible]

$$\rho\left(v_x \frac{\partial v_y}{\partial x} + v_z \frac{\partial v_y}{\partial z}\right) = -\frac{\partial p}{\partial y} + \eta \frac{\partial^2 v_y}{\partial z^2} - \frac{\sigma \left(\frac{B}{c}\right)^2}{1+\omega^2\tau^2}\left(v_y + \omega\tau v_x\right) + \frac{\sigma \frac{B}{c}}{1+\omega^2\tau^2}\left(\omega\tau E_y - E_x\right) - \frac{\omega\tau}{1+\omega^2\tau^2}\left(\frac{\partial p}{\partial x} - \omega\tau \frac{\partial p}{\partial y}\right), \quad (10), (11)$$

$$-\frac{\partial p}{\partial z} = 0,$$

$$\frac{\partial v_x}{\partial x} + \frac{\partial v_z}{\partial z} = 0. \quad (12)$$

These equations [illegible] thin plate [illegible] method of [illegible] Polhausen. The [illegible] that when the magnetic field is perpendicular to the [illegible] to the dependence [illegible] magnetic field [illegible] thickness of the boundary layer [illegible].

[illegible] 2/3

S/[illegible]/62/032/006/002/022
B108/B102

Viscous boundary layer in ...

SUBMITTED: July 14, 1961

Card 3/3

Investigation of the electrical conductivity of vitreous semiconductors of the type As_2Te_3. A. I. Gubanov, T. F. Mazets (10 minutes).

Study of semiconducting glasses by the electron paramagnetic resonance method. G. A. Karapetyan, V. A. Tsekhomskiy, D. M. Yudin.

Semiconducting silicate glasses based on titanium oxide. Ya. A. Kreznetsov, V. A. Tsekhomskiy. (Presented by V. A. Tsekhomskiy--15 minutes).

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

GUBANOV, Aleksandr Ivanovich; REGEL', A.R., doktor fiz.-matem. nauk, otv. red.; ZAYCHIK, N.K., red.izd-va; KONDRAT'YEVA, M.N., tekhn. red.

[Quantum-electron theory of amorphous conductors] Kvantovo-elektronnaia teoriia amorfnykh provodnikov. Moskva, Izd-vo AN SSSR, 1963. 249 p. (MIRA 16:11)
(Semiconductors--Electric properties)
(Quantum theory)

S/181/63/005/001/014/064
B102/B186

AUTHORS: Gubanov, A. I., and Chevychelov, A. D.

TITLE: Theoretical estimates of the chain rupture energy in solid polymers

PERIODICAL: Fizika tverdogo tela, v. 5, no. 1, 1963, 91-95

TEXT: The fact that the rupture energy D is different in different polymers even if it is always C-C bonds that are ruptured (except polyamides wherein C-N is ruptured) shows that three factors influence D. These factors are studied here. (1) If the exchange integrals (A) and the repulsion of neighboring carbon ions ($\Delta Q = (Z'-1)^2/R$) are taken into account, then the change in the bond energy on the transition from a nonpolar polymer (e.g. polyethylene) to a polar one is $\Delta D = -\Delta A - \Delta Q$; for teflon ΔD = 10 kcal/mole and $D = U_{C-C} + \Delta D$ = 69.6 kcal/mole. R is the C-C distance, for teflon it is 2.92 Å, Z' is the effective nuclear charge. (2) Co-reactions may occur when a bond is ruptured, e.g., in polychlorovinyl where HCl arises on its thermal destruction. This reaction energy has, of course, to be taken into account when D is calculated. (3)

Card 1/2

Allowance must also be made for the repulsive forces coming from the side radicals (cf. DAN SSSR, 137, 116, 1961). When these three factors are taken into account D values are obtained which no longer deviate appreciably from those determined by experiment (VMS, 3,441,450,1961): polyethylene 59.6; teflon 69.6 (73); polyvinylchloride 36(35); polyacrylonitrile 51(48); caprone 48.6(45); polypropylene 55(56); polystyrene 52.5(53). The values here cited are in kcal/mole, with the experimental values in parentheses. There is 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A.F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute imeni A.F. Ioffe AS USSR, Leningrad)

SUBMITTED: July 20, 1962

L 18577-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD

ACCESSION NR: AP3001290 S/0181/63/005/006/1678/1681

55

AUTHORS: Gubanov, A. I.; Nran'yan, A. A.

TITLE: Dependence of the frequency spectrum of a simple cubic lattice on deformation

SOURCE: Fizika tverdogo tela, v. 5, no. 6, 1963, 1678-1681

TOPIC TAGS: frequency spectrum, cubic lattice, tensional deformation, Grüneisen approximation, frequency distribution

ABSTRACT: The authors undertood this study because of disagreement between accepted theory of G. Leibfreid and H. Hahn (Z. Physik, 150, 497, 1958), and experimental data. They have computed the change in distribution function of frequency of a simple cubic lattice subjected to small deforming tension along the [100] direction. They found that for deformation along one of the cubic axes of a crystal the maximums on the frequency-distribution curve are smoothed out and shifted toward the lower frequencies. The upper maximum is greater than the lower, and the region between maximums shows a general increase in values of frequency distribution toward the higher frequencies. In their

Card 1/2

L 18577-63

ACCESSION NR: AP3001290

computations the authors found that the Grüneisen relationship was not realized. Orig. art. has: 2 figures, 1 table, and 11 formulas.

SUBMITTED: 05Feb63 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: PH NO REF SOV: 000 OTHER: 003

Card 2/2

GUBANOV, A.I.; CHEVYCHELOV, A.D.

Effect of intermolecular interaction on the strength of vitreous polymers. Fiz. tver tela 5 no.9:2599-2608 S '63. (MIRA 16:10)

1. Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR, Leningrad.

ACCESSION NR: AP4028424 S/0181/64/006/004/1023/1029

AUTHOR: Gubanov, A. I.

TITLE: Diffusion of hydrogen in metals

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1023-1029

TOPIC TAGS: gas diffusion, metal, lattice spacing, electron shell, valence electron, Thomas Fermi method

ABSTRACT: The relation of hydrogen diffusion in various metals was investigated, and it was concluded that this diffusion depends on the spacing between positive ions in the crystal lattice. The radius of the electron shell about protons immersed in a gas of valence electrons of various metals was computed, using the Thomas-Fermi method. This radius is compared with the radius of a sphere inscribed between ions of the lattice, and from this comparison the diffusion of hydrogen in actual metals may be predicted. On this basis all metals may be divided into three groups: 1) those with lattice spacing between ions greater than the radius of the electron shell (Al, Pb, Pd, Ir, Pt, Mo, Ta, α-W, Zr, Be, Ti, Ru, Rh, and Os), in which hydrogen obviously diffuses readily; 2) those in which the lattice spacing is smaller than the shell radius (Cu, Ag, Au, Li, Na, K, Rb, Cs, Ba, and α-Cr), in

Card 1/2

ACCESSION NR: AP4028424

which hydrogen diffuses with difficulty; and 3) those in which the lattice spacing is very near the value of the shell radius and for which the diffusion of hydrogen cannot be readily predicted. "In conclusion, the author expresses his sincere thanks to Professor N. I. Ionov for proposing the topic and for his interest in the work." Orig. art. has: 1 figure, 4 tables, and 15 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR)

SUBMITTED: 30Sep63 ENCL: 00

SUB CODE: MM, SS NO REF SOV: 006 OTHER: 010

Card 2/2

ACCESSION NR: AP4028425 S/0181/64/006/004/1030/1033

AUTHORS: Gashimzade, F. M.; Gubanov, A. I.

TITLE: Density of electron states in the "tail" of the band in amorphous semiconductors

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1030-1033

TOPIC TAGS: electron density, semiconductor, band theory, Gaussian distribution, Green function

ABSTRACT: The authors' purpose was to obtain an expression for density of electron states in the tail of the semiconducting band, i.e., in the zone where the edge becomes diffuse. They investigated the relative role of close-range and long-range orders, considering two cases: 1) small distortions of the neighboring cells are so correlated that the total relative deformation of cells in any part of the crystal is less than unity and long-range order is preserved; this corresponds to an unordered crystalline alloy, not to an amorphous body; 2) deformation changes weakly from cell to cell, close-range order prevailing in small zones, but, where cells are farther apart, the close-range order may be strongly

Card 1/2

ACCESSION NR: AP4028425

differentiated and long-range order may be destroyed; this case corresponds to an irregularly deformed crystal more commonly than to a true liquid. Considering these two cases, the authors find that the density of state in an amorphous body, far from the base of the band in the crystal, declines exponentially. It may be stated that the "tail" has a Gaussian distribution, and the disperse diffusion of the band edge is a more fundamental effect than the shift of the band edge. The "tail" of the band in amorphous semiconductors is a local fluctuating level. Orig. art. has: 15 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute AN SSSR)

SUBMITTED: 30Sep63 DATE ACQ: 27Apr64 ENCL: 00

SUB CODE: NP, SS NO REF SOV: 004 OTHER: 002

Card 2/2

L 6803-65 EWT(1)/EWG(k)/EWT(m)/T/EWP(q)/EWP(b) Pz-6/Pq-4 IJP(c)/ASD(m)-3/
AS(mp)-2/ASD(a)-5/ESD(t)/RAEM(t) RDW/JD/JW/AT/WH

ACCESSION NR: AP4044633 S/0048/64/028/008/1276/1278

AUTHOR: Gubanov, A.I.; Mazets, T.F.

TITLE: Investigation of the electric conductivity of vitreous semiconductors of the As_2Te_3 type /Report, Third All-Union Conference on Semiconductor Compounds held in Kishinev 16-21 Sept 1963/

SOURCE: AN SSSR. Izv. Seriya fizicheskaya, v.28, no.8, 1064, 1276-1278

TOPIC TAGS: semiconductor, conductivity, photoconductor, activation energy, arsenic compound, tellurium compound, selenium compound, arsenic telluride

ABSTRACT: The effect of light on the temperature dependence of the resistivity of semiconducting vitreous As_2Te_3 and As_2SeTe_2 was investigated. Samples that had never been illuminated exhibited no extrinsic conductivity at low temperatures, the activation energy being independent of temperature and equal to 0.8 eV for As_2Te_3 and 1 eV for As_2SeTe_2. When As_2Te_3 was illuminated at 152°K its resitivity decreased to 1% of the initial dark value and returned to only 10% of the initial value when the illumination was cut off. As_2Te_3 that had been illuminated at 77°K for 5 min behaved as an extrinsic semiconductor with an activation energy of 0.4 eV below 160°K.

1/ 2

L 6803-65
ACCESSION NR: AP4044633

As_2SeTe_2 behaved similarly, the activation energy of the previously illuminated material being 0.5 eV below 220°K. The low temperature activation energy of As_2Te_3 was determined from the thermostimulated current, both by the method given by R.H.Bube in his monograph, and by the method of I.I.Boyko, E.I.Rashba and A.N.Trofimenko (Fiz.tverdogo tela 2,109,1960) which involves observing the behavior at different rates of heating. The Bube method gave an activation energy of 0.25 eV which, however, is questionable owing to the uncertainty as regards the carrier mobility in the vitreous material. The method of Boyko et al gave an activation energy of 0.35 eV, which is close to the value 0.4 eV obtained from the temperature dependence of the resistivity. The above behavior is discussed briefly in terms of a theory previously developed by one of the authors (A.I.Gubanov,Fiz.tverdogo tela 3,2330,1961; 4,2873,1962). According to this theory, the fluctuations of short-range order characteristic of amorphous materials give rise to local energy levels which, when they are occupied by carriers produced by illumination, account for the observed impurity-type conductivity. Orig.art.has: 2 formulas and 5 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00

SUB CODE: SS,EM RE REF SOV: 002 OTHER: 002

2/2

L 10750-65 EWT(m)/EWP(b) AS(mp)-2/SSD/AFWL/ASD(f)-2/ASD(d)/AEDC(a) JD

ACCESSION NR: AP4046353 S/0057/64/034/010/1888/1894

AUTHOR: Gubanov, A.I.; Potekhina, N.D.

TITLE: Effect on desorption of the migration of atoms on the surface of a metal

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.10, 1964, 1888-1894

TOPIC TAGS: adsorption, surface diffusion, nonsteady flow, nonuniform adsorber

ABSTRACT: Adsorption on a nonuniform surface is discussed theoretically. It is assumed that the adsorbing surface consists of a finite number of regions with different properties, and that the rate of migration of adatoms from one region to another is proportional to the number of adatoms on the first region and the number of vacant sites on the other. A set of differential equations is derived for the time variation, under nonequilibrium conditions, of the numbers of adatoms on the various regions of the adsorber. These equations are replaced by a set of linear homogeneous differential equations by assuming that in each region the number of adatoms is small compared with the number of vacant sites, and the linear equations for the case of two regions are solved. Solutions for an adsorber initially in equilibrium are obtained both for the case of a sudden change of temperature and for ar-

1/2

L 10750-65
ACCESSION NR: AP4044353

bitrary continuous variation of temperature. Limiting forms are derived for the two cases when the loss of adatoms from a region by migration is large and when it is small compared with the loss by desorption. The dependence of the coefficients describing the migration rate on the shape of the regions is discussed briefly. The calculations are not applicable to surface ionization or to adsorption by semiconductors, where both adsorbed atoms and ions are present. "In conclusion, we convey our deep gratitude to Professors M.I.Ionov and E.Ya.Zandberg for suggesting the topic and for useful discussions." Orig.art.has: 43 formulas and 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im.A.F.Ioffe AN SSSR, Leningrad (Physico-technical Institute, AN SSSR)

SUBMITTED: 03Jan64 ENCL: 00

SUB CODE: GC, SS NR REF SOV: 003 OTHER: 000

2/2

L 18225-65 EWT(1)/EPA(s)-2/EWT(m)/EWP(j) Pc-4/Pt-10 IJP(c)/ASD(a)-5/ESD(t)/SSD(c)/ESD(dp)/ESD(gs) RM

ACCESSION NR: AP4049126 S/0020/64/159/001/0046/0048

AUTHOR: Gubanov, A. I.

TITLE: Single electron calculation of arbitrary atom systems

SOURCE: AN SSSR. Doklady*, v. 159, no. 1, 1964, 46-48

TOPIC TAGS: Schroedinger equation, atomic wave function, polymeric semiconductor, electron theory, amorphous substance

ABSTRACT: A new method was devised to solve the many-atom problem in the single-electron approximation for amorphous substances. The method is applicable to any degree of atomic irregularity and is suitable for glasses, liquids up to critical temperatures, polymeric semiconductors, etc. A G-atom system is assumed for which the binary distribution function is given. The probability distribution function ψ is defined by $\psi_k = \frac{1}{\sqrt{G}} \sum_n c_n e^{i\varphi_n} \chi(r - R_n)$, where R_n is the radius vector of the n-th atom. This is substituted in the Schroedinger wave equation, generating a set of G-equations to determine the expansion coefficients. All atoms are assumed identical, and a compact group is assumed with $N \ll G$, giving

Card 1/2

L 18225-65
ACCESSION NR: AP4049126

rise to a closed set of 2N equations

$$(E_k + \alpha_m - E^0)\, c_m = -\sum_{n \neq m} \cos(\varphi_n - \varphi_m)\, c_n \beta_{nm},$$

$$\sum_{n \neq m} \sin(\varphi_n - \varphi_m)\, c_n \beta_{nm} = 0$$

Utilizing the fact that the coefficient C_1 for the central atom in the chain can be defined most accurately, a normalization condition is introduced which is given by $\overline{c_1^2(k)} = 1$. An example is worked out to illustrate the proposed method. It consists of a one-dimensional chain of atoms characterized by the distribution function g(R), normalized to unity. For N = 1, $R_2 = R$ and symmetry condition $c_1 = c_2$, the above equations are solved, whence, $E_k = E^0 - \alpha - 2\beta \cos\varphi$. An expression is obtained from this for the allowed energy band width; this is in agreement with the electron theory of liquids. Orig. art. has: 19 equations.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe, Akademii nauk SSSR (Physico-Technical Institute, Academy of Sciences SSSR)

SUBMITTED: 23Apr64 ENCL: 00
SUB CODE: GP NO REF SOV: 001 OTHER: 001

Card 2/2

GUBC[illegible]

Dependence of the overloading coefficient of polymer chains on the degree of orientation. Vysokom.soed. 7 no.7:1192-1197 Jl '65. (MIRA 18:8)

1. Fiziko-tekhnicheskiy Institut imeni Ioffe.

L 00705-66 EWA(c)/EWT(l)/EWT(m)/EWP(i)/EWP(b)/T/EWP(e)/EWP(t) IJP(c) GG/WH/JD

ACCESSION NR: AP5022697 UR/0181/65/007/009/2626/2633

AUTHOR: Gubanov, A. I.; Shur, M. S.

TITLE: Dynamics of crystals with rutile structure

SOURCE: Fizika tverdogo tela, v. 7, no. 9, 1965, 2626-2633

TOPIC TAGS: titanium dioxide, vibration spectrum, spectrum analysis, Raman spectrum, IR spectrum, Brillouin zone

ABSTRACT: A group-theoretical analysis of the vibration spectrum for crystals with rutile structure ($A^{IV}B_2^{II}$) is made for all singular points in the Brillouin zone. Melvin projection operators are used to derive formulas and secular equations of the second and third orders for vibration frequencies at a wave vector value of $q = 0$, starting from a secular equation of the 18th order. The results of numerical calculations for rutile (TiO_2) are used for interpreting infrared and Raman spectra and for determining effective ion charge. The ratio of the effective charge to the charge on the ion is found to be 0.63. Orig. art. has: 3 figures, 11 formulas, 4 tables.

Card 1/2

L 00705-66

ACCESSION NR: AP5022697

3

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR) 44,55

SUBMITTED: 03Mar65 ENCL: 00 SUB CODE: SS, NP

NO REF SOV: 003 OTHER: 011

Card 2/2

L 9262-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(c) JD

ACC NR: AP5022708 SOURCE CODE: UR/0181/65/007/009/2701/2707

AUTHOR: Gubanov, A. I.; Nikulin, V. K.

ORG: Physicotechnical Institute im. A. F. Ioffe AN SSSR, Leningrad (Fizikotekhnicheskiy institut AN SSSR)

TITLE: Calculating the energy for penetration and diffusion of hydrogen in metals

SOURCE: Fizika tverdogo tela, v. 7, no. 9, 1965, 2701-2707

TOPIC TAGS: theoretic physics, hydrogen, gas diffusion, metal physics, nonferrous metal

ABSTRACT: Many-body theory is used as a basis for determining the energy shift of the ground state when a point charge is introduced into a crystal lattice. The configuration energy is isolated from this shift. This energy is determined by the dielectric constant of the electron gas in the lattice and that of the free gas of interacting electrons, and also by the pseudopotentials of the ions which make up the lattice. The pseudopotentials, which are determined from spectroscopic terms, are used for explaining anomalous diffusion of protons in noble metals. Orig. art. has: 14 formulas, 1 table.

SUB CODE: 20/ SUBM DATE: 26Mar65/ ORIG REF: 003/ OTH REF: 014

Card 1/1

L 5396-66 EPA(w)-2/EWA(h)/EWT(1)/T/EWA(m)-2 IJP(c) AT

ACC NR: AP5027384 SOURCE CODE: UR/0181/65/007/011/3145/3152

AUTHOR: Gubanov, A. I.

ORG: Physicotechnical Institute AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut imeni A. F. Ioffe, AN SSSR)

TITLE: The method of linear combination of atomic orbitals adapted to an arbitrary system of atoms

SOURCE: Fizika tverdogo tela, v. 7, no. 11, 1965, 3145-3152

TOPIC TAGS: atomic physics, semiconductor theory, energy band structure

ABSTRACT: The author proposes a new method for quantum mechanical calculation of electrons in a disordered system of atoms. The new technique is based on a previously proposed modification of the method of linear combination of atomic orbitals (A. I. Gubanov, *DAN SSSR*, 159, 46, 1964). In this previous paper, a system of $2N$ nonlinear algebraic equations was derived which may be difficult to solve for close approximations, i. e. when N is large. In the new modification proposed in this paper, a linear system may be substituted for the nonlinear system and the

Card 1/2

3

ACC NR: AP5027384

method can be generalized to the case of several wave functions per atom. It is assumed that the system consists of G atoms where G is a very large number, and that the binary distribution function of these atoms is known. A linear system of equations is derived in which the number of equations is limited by selecting a compact group of N_1 atoms with a single central atom (the "inner" atoms) surrounded by N_2 "intermediate" atoms so that $N = N_1 + N_2 \ll G$. All the remaining atoms are "outer" atoms. The system of equations is written only for N values of m ($m = 1,2,\ldots,G$). The proposed method may be used for calculating the energy spectrum and wave functions of liquid and vitreous semiconductors and of the impurity bands in heavily doped semiconductors. Orig. art. has: 34 formulas.

SUB CODE: NP/ SUBM DATE: 30Nov64/ ORIG REF: 001/ OTH REF: 004

Card 2/2

L 05857-67 EWT(1)

ACC NR: AP6015482 SOURCE CODE: UR/0181/66/008/005/1569/1573

39
B

AUTHOR: Gubanov, A. I.; Gushchina, N. A.

ORG: Physics Engineering Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Calculation of the disordered chain by the method of linear combination of atomic orbitals

SOURCE: Fizika tverdogo tela, v. 8, no. 5, 1966, 1569-1573

TOPIC TAGS: linear combination, atomic orbital, disordered chain, wave vector, approximate solution, wave function

ABSTRACT: The authors perform a numerical calculation of the power spectrum E(k) for a unidimensional disordered chain, consisting of identical atoms, using the LCAO method based on the statistical properties of the system of atoms, developed by one of the present authors (A. I. Gubanov. DAN SSSR, 159, 46, 1964; FTT, 7, 3145, 1965). The calculation is performed in the approximation of closest neighbors; moreover, the number of internal atoms N_1, the configuration of which is assumed given, was taken to equal 3, and the number of intermediate atoms N_2, in the first approximation was taken to equal zero. A considerable advantage of the

Card 1/2

method presented is the possibility of obtaining the coefficient C_1^2 and the phase ϕ_1 in the function of the configuration of the surrounding central atom, which allows to judge on the dependence of the wave function of the system on the neighboring order in each point of the chain. The results of the calculations for $C_1^2(q, 0)$, of the difference of the phases which is determined as

$$\operatorname{tg}\Delta\varphi(q, 0) = \frac{(\alpha^2 - \beta_1^2)^2 - \beta_2^4}{2\beta_2^2(\alpha^2 - \beta_1^2) + \cos\varphi^0\,(\alpha^2 - \beta_1^2)^2 + \beta_2^4\cos\varphi^0}, \quad (1)$$

as well as the local value of the wave vector $k_{loc} = \Delta\phi/q$ are presented in graphs. It is noted that C_1^2 substantially depends on the configuration of the surrounding neighbors and, evidently, cannot be considered constant as assumed by T. Kasuya (J. Phys. Soc. Japan, 13, 1906, 1287, 1958). Furthermore, the value of k_{loc} along the disordered chain is not constant and with a strong convergence of the neighbors of k_{loc} may even change sign. Orig. art. has: 20 formulas and 4 figures.

SUB CODE: 20/ SUBM DATE: 06Jul65/ ORIG REF: 003/ OTH REF: 002

kh

GUBANOV, A.I.

Discussion. Trudy VNII no.25:179-183 '59. (MIRA 15:4)

1. Gosudarstvennyy vsesoyuznyy issledovatel'skiy i proyektnyy institut neftyanoy promyshlennosti.
(Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; SAZONOV, B.F.; SOKHACHEVSKAYA, I.A.

Geology and oil potential of the Krasnyy IAr oil field and conditions of its development. Trudy Giprovostoknefti no.3:146-164 '61. (MIRA 14:12)

(Volga Valley--Petroleum geology)

ASHIROV, K.B.; GUBANOV, A.I.; SURGUCHEV, M.L.; GUSEVA, L.N.; GPURIN, N.V.; YUGIN, L.G.

Geology and development of the Tarkhany oil field of the Oil Field Administration of the Bugunuslan Petroleum Trust. Trudy Giprovostoknefti no.3:165-182 '61. (MIRA 14:12)
(Bugurusian region--Oil reservoir engineering)

ASHIMOV, K.B.; GUBANOV, A.I.; ILLARIONOVA, S.Ya.; SAZONOV, B.F.

Geology and development of the layer 1 of the lower Carboniferous in the Mukhanovskoye oil field. Trudy Giv[redacted]vostoknefti no.3:183-189 '61. (MIRA 14:12)
(Kuybyshev Province--Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; ILLARIONOVA, S.Ya.; SAZONOV, B.F.

Development of oil pools in layers 2,3,4-a, and 4-b of the lower Carboniferous in the Mukhanovskoye field. Trudy Giprovostoknefti no.3:191-204 '61. (MIRA 14:12)
(Kuybyshev Province--Oil fields--Production methods)

ASHIROV, K.B.; GUBANOV, A.I.; GROMOVICH, V.A.; SURGUCHEV, M.L.

Development of the Gorodetskoye field with directionally drilled wells. Trudy Giprovostoknefti no.3:205-213 '61. (MIRA 14:12)
(Kuybyshev Province--Oil fields--Production methods)

ASHIROV, K.B.; GUBANOV, A.I.; KHANIN, I.I., SURGUCHEV, M.I.; KOVALEV, V.S.; GROMOVICH, V.A.

Conditions governing the development of the Kuleshovka oil field. Geol. nefti i gaza 7 no.10:26-34 O '63.

(MIRA 17:10)

1. Gosudarstvennyy institut po proyektirovaniyu i issledovatel'skim rabotam neftedobyvayushchey promyshlennosti vostochnykh rayonov strany i Kuybyshevneft'.

AID P - 2691

Subject : USSR/Mining

Card 1/1 Pub. 78 - 9/21

Authors : Ashirov, K. B. and Gubanov, A. I.

Title : Reservoir pressure maintenance by letting through waters from water-bearing strata

Periodical : Neft. khoz., 33, 5, 41-44, My 1955

Abstract : To maintain the necessary pressure in oil beds, flooding is often used. In cases where the oil-bearing strata is located above a water-bearing strata, it is suggested that the water be drawn under pressure from such strata instead of forcing it from sometimes quite distant points. 2 Russian references (1948 and 1951).

Institution : None

Submitted : No date

GUBANOV, A.I.; SAZONOV, B.F.

Analyzing the development of the Kalinovka-Novostepanovka field.
Trudy Giprovostoknefti no.1:172-190 '58. (MIRA 13:9)
(Kuybyshev Province--Oil fields--Production methods)
(Orenburg Province--Oil fields--Production methods)

GUBANOV, A.I.

Well patterns in water-drive pools. Trudy Giprovostoknefti no.1:190-199 '58. (MIRA 13:9)
(Oil wells)

GUBANOV, A.I.

AUTHORS: Ashirov, K.B., Gubanov, A.I. 132-58-2-4/17

TITLE: Oil Flow From Layers by Employing the Water Pressure Method (Nefteotdacha plastov pri vodonapornom rezhime)

PERIODICAL: Razvedka i Okhrana Nedr, 1958, Nr 2, pp 14-18 (USSR)

ABSTRACT: The authors describe an experiment to determine the coefficient of the oil flow from separate oil-bearing layers, the highest final output being an indicator of efficient exploitation. The experiment was made by the "Giprovostokneft'" Institute. All details are given. There are 4 graphs.

ASSOCIATION: Institut "Giprovostokneft'" (The "Giprovostokneft'" Institute)

Card 1/1 1. Oil-Extraction 2. Water pressure-Applications

SHCHELKACHEV, Vladimir Nikolayevich; GUBANOV, A.I., kand.tekhn.nauk, retsenzent; PETROVA, Ye.A., vedushchiy red.; MOKHINA, E.A., tekhn.red.

[Production of oil and water layers operating under elastic compression] Razrabotka neftevodonosnykh plastov pri uprugom rezhime. Moskva, Gos.nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry, 1959. 467 p. (MIRA 12:10)
(Oil reservoir engineering)

GUBANOV, A.I.; SAZONOV, B.F.

Hydrodynamic investigation of petroleum beds of the Zol'noye, Mukhanovo, and Krasnyy Yar deposits in Kuybyshev Province. Trudy VNII no.29:258-265 '60. (MIRA 13:10)

1. Giprovostokneft'.
(Kuybyshev Province--Oil reservoir engineering)

GUBANOV, A.I.; ZADOV, L.P.; SAZONOV, B.F.; SURGUCHEV, M.L.; ASHIROV, K.B.

Problems in prospecting for commercial deposits and the complex of well tests for appraising oil reserves and programming the development in Kuybyshev Province. Trudy VNII no.33:55-66 '61.

1. Gosudarstvennyy institut po proyektirovaniyu i issledovatel'skim rabotam neftedobyvayushchey promyshlennosti vostochnykh rayonov strany.

(Kuybyshev Province--Petroleum geology)

ASHIROV, K.B.; GUBANOV, A.I.; SAZONOV, B.F.; SOKHACHEVSKAYA, I.A.

Geology and oil potential of the Krasnyy Yar field and systems for its development. Trudy Giprovostoknefti no.3:146-164 '61. (MIRA 16:7)

(Krasnyy Yar region(Kuybyshev Province)--Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; ILLARIONOVA, S.Ya.; SAZONOV, B.F.

Geology and development of layer 1 of the Lower Carboniferous in the Mukhanovo field. Trudy Giprovostokneft no.3:183-190 '61. (MIRA 16:7)
(Mukhanovo region--Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; ILLARIONOVA, S.Ya.; SAZONOV, B.F.

Development of oil pools in layers 2,3,4-a, and 4-b in the Lower Carboniferous of the Mukhanovo field. Trudy Giprovostoknefti no.3:191-204 '61. (MIRA 16:7)

(Mukhanovo region—Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; GROMOVICH, V.A.; SURGUCHEV, M.L.

Development of the Gorodetskoye field by directional drilling. Trudy Giprovostoknefti no.3:205-213 '61. (MIRA 16:7)

(Oil reservoir engineering)

GUBANOV, A.I.; KOLGANOV, V.I.; SAZONOV, B.F.; ZHUKOV, D.M.

Effect of forced production on the water encroachment and oil recovery as illustrated by the development of the Iablonovyy Ovrag field. Neft. khoz. 40 no.6:37-42 Je '62. (MIRA 15:6)

(Samara Bend--Oil fields--Production methods)

GUBANOV, A.I.; SURGUCHEV, M.L.; KOVALEV, V.S.

Flow diagrams of the development of oil pools in the layers A_3 and A_4 of the Kuleshovskoye field. Trudy Giprovostoknefti no.5:152-166 '62. (MIRA 16:8)

(Kuybyshev Province--Oil Reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; GROMOVICH, V.A.; SURGUCHEV, M.L.; YUGIN, L.G.

Geology and flow diagrams of the development of the Deryuzhevka field. Trudy Giprovostoknefti no.5:167-176 '62. (MIRA 16:8)

(Kuybyshev Province--Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; GUSEVA, L.N.; OPURIN, N.V.; YUGIN, L.G.

Geology and flow diagrams of the development of the Alakayevka field. Trudy Giprovostoknefti no.5:197-208 '62. (MIRA 16:8)

(Kuybshev Province--Petroleum geology)

ASHIROV, K.B.; GUBANOV, A.I.; GUSEVA, L.N.; OPURIN, N.V.; SHABANOV, V.A.

Geology and oil potential of Devonian layers in the Mikhaylovskoye-Kokhany field and basic prerequisites for its development. Trudy Giprovostoknefti no.5:209-221 '62. (MIRA 16:8)

(Kinel'-Cherkassy District--Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; ILLARIONOVA, S.Ya.; SAZONOV, B.F.

Geology and oil potential of the Dmitriyevskoye field and plan for its development. Trudy Giprovostoknefti no.5:222-239 '62. (MIRA 16:8)
(Kinel'-Cherkassy District--Oil reservoir engineering)

ASHIROV, K.B.; GUBANOV, A.I.; GUSEVA, L.N.; OPURIN, N.V.

Practice in the development of the pool in the layer B_2 of the Radayevskoye field. Trudy Giprovostoknefti no.5:240-256 '62. (MIRA 16:8)

(Kuybyshev Province--Oil reservoir engineering)

[illegible], A.I.: [illegible], I.V.

Effect of atom migration along a metal [illegible] on its corrosion.
Zhur. tekh. fiz. 34 no.10:[illegible] (MIRA 17:12)

1. Fiziko-tekhnicheskiy institut im. A.F. Ioffe AN SSSR, Leningrad.

GUBANOV, A.M.

Gubanov, A.M. "On X-ray diagnosis of ruptures of the diaphragm", Zdravookhraneniye Kazakhstana, 1948, No. 8, p. 7-13.

SO: U-3042, 11 March 53, (Letopis 'nykh Statey, No. 9, 1949)

RAKCHEYEV, A.D.; FOMIN, Yu.M.; BURIKOV, Ye.V.; GUBANOV, A.M.

New data on the age of pyrite mineralization of ore deposits in central Urals. Sov.geol. 1 no.7:148-150 Jl '58. (MIRA 11:11)

1. Moskovskiy gosudarstvennyy universitet im M.V. Lomonosova.
(Ural Mountains--Pyrites)

GUBANOV, A. N.

USSR/Physics - Semiconductors, Contact Mar/Apr 52

"Theory of Contact of Two Semiconductors," A.N. Gubanov

"Iz Ak Nauk, Ser Fiz" Vol XVI, No 2, p 202

Abbreviated text of report, published in "Zhur Eksper i Teoret Fiz" 21, 721, 1951. Diffusion and Poisson eqs are solved by method of approximations and volt-amp characteristics of contact of two semiconductors are obtained, in particular in the case of two semiconductors having opposite signs of current carriers. Derived formulas are in satisfactory agreement with exptl results by A.V. Ioffe.

220T92

GUBANOV, B.F.

Increasing the flow of petroleum in the multilayer and single layer exploitation of beds. Neftianik 9 no.9:29-30 S '64
(MIRA 18:2)

1. Zaveduyushchiy promyslom Neftepromyslovogo upravleniya Leningorskneft'.

KRIVONOSOV, I.V.; GUBANOV, B.F.

Completions of wells simultaneously working several beds of varying permeability. Neft. khoz. 42 no.11:61-66 N '64
(MIRA 18:2)

GUBANOV, B.P. [deceased]

Analyzing causes of traction rope breaking in the ESh-1 walking excavator. Trudy GISI no.25:108-120 '56. (MIRA 11:5)
(Excavating machinery)

GUBANOV, D.

TARTAKOVSKIY, B., inzhener; GUBANOV, D., inzhener.

Repairing a wooden elevator. Muk.-elev.prom. 20 no.11:25-26 N '54. (MLRA 8:3)

1. Ukrainskaya respublikanskaya kontora Zagotzerno.
(Grain elevators--Repairing)

TARTAKOVSKIY, B., inzh.; GUBANOV, D., inzh.

Section for processing seed corn at the Dobropol'ye grain procurement point in Stalino Province. Muk.-elev. prom. 24 no.8:18-19 Ag '58. (MIRA 11:10)

1. Tekhnicheskoye upravleniye Ministerstva khleboproduktov USSR.
(Dobropol'ye--Corn (Maize))

TEYTEL'BAUM, B.Ya.; YAGFAROVA, T.A.; DIANOV, M.P.; GUBANOV, E.F.

Thermal transformations of some rubbers studied by the method of thermomechanical curves. Dokl. AN SSSR 140 no.5:1132-1135 O '61. (MIRA 15:2)

1. Khimicheskiy institut im. A.Ye. Arbuzova i Institut organicheskoy khimii Kazanskogo filiala AN SSSR. Predstavleno akademikom B.A.Arbuzovym.
(Rubber--Thermal properties)

S/020/62/145/005/015/020
B106/B144

15.9300

AUTHORS: Teytel'baum, B. Ya., Gubanov, E. F., and Naumov, V. A.

TITLE: Crystallization of natural rubber

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 5, 1962, 1077-1080

TEXT: The crystallization in natural rubber was studied by thermomechanical and X-ray diffraction analyses. In the range from -80 to 60°C and under alternating loads of 0.64 and 3.2 kg/cm, a sharp increase of deformability occurs at 0°C, due to fusion of the crystallites. From -35 to 0°C, the deformability is smaller owing to an additional crystallization and solidification of rubber near optimum crystallization temperature (-25°C). When rubber is cooled from room temperature to below vitrification temperature within 1 hr, practically no crystallites are formed except at the optimum crystallization temperature, since crystallization takes longer at other temperatures; it can be completely prevented by quickly freezing the rubber with liquid nitrogen. The melting point of the crystallites depends on their temperature of formation. In "tanned" rubber melting at ~45°C, the deformability in the highly elastic state is much lower than in rubbers

Card 1/3

S/020/62/145/005/015/020
B106/B144

Crystallization of natural rubber

40

crystallizing at low temperatures, but rises suddenly at 45 - 48°C. Heating the "tanned" rubber to >50°C destroys the crystallinity. Such samples do not show any jump in the deformability at 0° or 45°C, but their deformability on transition to the highly elastic state (-60°C) is much higher than in the initial rubber. When a rubber heated previously to 53°C is kept at -25°C for 1.5 hrs, crystallites are formed which melt at 0°C. When "tanned" rubber is being cooled to low temperatures, crystallization occurs without the temperature needing to be kept constant for long. The crystalline phase, formed at room temperature, therefore initiates crystallization at low temperatures. X-ray analyses showed that the crystalline phases formed at different temperatures were independent of their melting points. This is explained by the fact that at -25°C the crystallites are formed so quickly that no equilibrium is attained. The low melting point may be due to strong internal stresses and/or to the small size of quickly formed crystallites. The results of the thermomechanical and the X-ray analyses are complementary and this combination may be useful for studies of other polymers also. There are 4 figures. The most important English-language references are: C. W. Bunn, Proc. Roy. Soc., A, 180, 40 (1942); D. E. Fischer, Proc. Phys. Soc., 60, 99 (1948).

Card 2/3

L 16975-63 EPR/EWP(j)/EPF(c)/EWT(m)/
BDS AFFTC/ASD Ps-4/Pc-4/Pr-4 RM/WW S/020/63/149/006/022/027

AUTHOR: Teytel'baum, B. Ya., and Gubanov, E. F.

TITLE: Thermomechanical characteristic of the molecular weight of linear polymers, with natural rubber as the example

PERIODICAL: Akademiya nauk SSSR. Doklady. v. 149, no. 6, 1963, 1384-1386

TEXT: Theoretical and experimental studies have demonstrated the possibility of estimating the molecular weight of polymers on the basis of the investigation of its thermomechanical properties. An equation has been offered relating the molecular weight M to the embrittlement temperature T_e and pour point $T_{p.p.}$ The pour point of a polymer can be largely established by determining the end point of penetration T_{ep}, found from the thermomechanical curve, which characterizes the viscosity and even molecular weight of the polymers. The authors verified this by their studies of specimens of natural rubber with different molecular weight. By special experiments they established that the value of T_{ep} is the same at temperatures below the embrittlement temperature and at room temperature, when recording the thermomechanical curve. Thus it is possible to determine T_{ep} as a function of molecular weight. This method can also be applied to crystallizing polymers, provided the melting point of the crystalline phase is below the pour point. There are 2 figures.

ASSOCIATION: Institut organicheskoy khimii im. A. Ye. Arbuzova Akademii nauk SSSR. (Institute of Organic Chemistry imeni A. Ye. Arbuzov, Academy of Sciences USSR)

SUBMITTED: December 27, 1962

Card 1/1

TEYTEL'BAUM, B.Ya.; GUBANOV, E.F.

Effect of the field of force on structural transformations in natural rubber. Dokl. AN SSSR 153 no.4:878-881 D '63. (MIRA 17:1)

1. Institut organicheskoy khimii AN SSSR, Kazan'. Predstavleno akademikom B.A. Arbuzovym.

ACCESSION NR: AP4042215 S/0020/64/157/002/0433/0436

AUTHOR: Gubanov, E. F.; Anoshina, N. P.; Teytel'baum, B. Ya.

TITLE: Effect of mastication on the crystallization processes in natural rubber

SOURCE: AN SSSR. Doklady*, v. 157, no. 2, 1964, 433-436

TOPIC TAGS: rubber, natural rubber, rubber crystallization, rubber mastication, deformation curve, isothermal deformation curve, thermographic curve, chain length, primary structure

ABSTRACT: The crystallization processes in masticated specimens of natural rubber have been studied by recording isothermal-deformation curves and by thermography. The experiments were conducted with specimens of smoked sheet rubber masticated in air at 45—50C on a laboratory mill for 5, 10, 20, 40, and 60 min. Deformation curves recorded under alternating loads of 7.04 and 0.64 kg/cm^2 at -25C (optimum crystallization temperature) are given in Fig. 1 of the Enclosure. The thermographic curves were recorded with a PK-52

Card 1/5

ACCESSION NR: AP4042215

pyrometer. The specimens were first heated to 50—55C, then crystallized at -25C, and finally cooled to below -50C. The recording was conducted during a steady temperature increase at the rate of 2 deg/min. The degree of crystallization of the specimens was evaluated by the area values of the endothermal effects, Q_{melt}, which correspond to the melting of the crystal phase. The dependence of Q_{melt} on the duration of mastication is given in Fig. 2. The results of the study indicate that mastication of natural rubber definitely affects the process of its low-temperature crystallization. An attempt is made to explain this phenomenon by evaluating factors which affect the origination and growth of crystals, such as decrease of the chain length and destruction of regular primary structures (bundles). The importance of similar studies of other crystallizing rubbers is stressed. Orig. art. has: 4 figures.

ASSOCIATION: Khimicheskiy institut im. A. Ye. Arbuzova Akademii nauk SSSR (Chemical Institute, Academy of Sciences, SSSR); Institut organicheskoy khimii Akademii nauk SSSR, Kazan (Institute of Organic Chemistry, Academy of Sciences, SSSR)

ACCESSION NR: AP4042215

SUBMITTED: 06Mar64 ATD PRESS: 3073 ENCL: 02

SUB CODE: MT, SS NO REF SOV: 005 OTHER: 001

Card 3/5

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000617210013-0"

ACCESSION NR: AP4042215

ENCLOSURE: 01

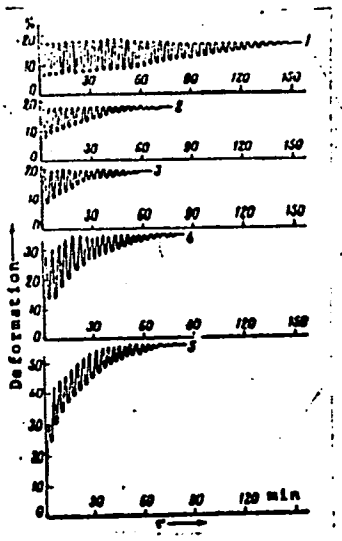

Fig. 1. Isothermal deformation curves at -25C

1 - Initial rubber; 2, 3, 4, and 5 - the same rubber masticated for 5, 10, 40, and 60 min.

Card 4/5

ACCESSION NR: AP4042215 ENCLOSURE: 02

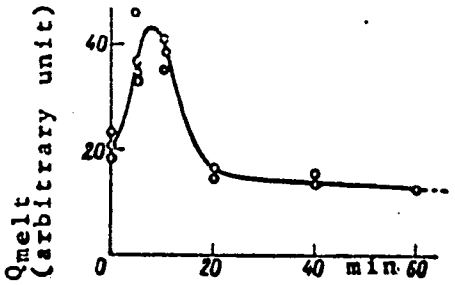

Fig. 2. Dependence of Q_{melt}, which is proportional to the quantity of the crystalline phase formed at -25C for 1 hr, on the mastication time.

Card 5/5

L 27185-65 EWT(m)/EPF(c)/EPR/EWP(j)/T Pc-4/Pr-4/Ps-4 RPL BW/WW/RM

ACCESSION NR: AP5005598 S/0190/65/007/002/0299/0304

AUTHOR: Teytel'baum, B. Ya.; Gubanov, E. F.; Adamovich, E. P.; Dianov, M. P.; Makarova, N. N.

TITLE: Determination of the molecular weight of linear polymers by the thermomechanical method

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 7, no. 2, 1965, 299-304

TOPIC TAGS: thermomechanical method, rubber, molecular weight

ABSTRACT: A new rapid and accurate method has been proposed for determining the molecular weight of amorphous linear polymers, based on thermomechanical curves. The method is based on the correlation of the temperature (T_k) of the completion of penetration of an indenter into the specimen with the intrinsic viscosity (η) of solutions of the specimen, and, hence, its molecular weight (M). Once a T_k versus M calibration curve has been plotted, the molecular weight determination is reduced to the plotting of a thermomechanical curve to find T_k and reading M from the calibration curve. In contrast to existing methods, the new method does not require the determination of the glass-transition flow and temperatures. It is applicable to polymeric homologs which do not exhibit high elastic properties. The correlation

Card 1/2

L 27185-65

ACCESSION NR: AP5005598

between T_k and M or n was shown experimentally for natural, isoprene, chloroprene (KR-A—type Nairit) and SKN-40 nitrile rubbers, polyisobutylene, and liquid thiocol. The thermomechanical measurement conditions which will ensure a reliable correlation were determined. Orig. art. has: 7 figures. [SM]

ASSOCIATION: Institut organicheskoy khimii AN SSSR, Kazan (Institute of Organic Chemistry, AN SSSR); Khimicheskiy institut im. A. Ye. Arbuzova AN SSSR (Chemical Institute, AN SSSR)

SUBMITTED: 23Apr64 ENCL: 00 SUB CODE: OC, NP

NO REF SOV: 006 OTHER: 002 ATD PRESS: 3191

Card 2/2

L 64480-65 EWT(m)/EPF(c)/EWP(j)/T/EWA(c) RPL WW/RM

ACCESSION NR: AP5021281 UR/0020/65/163/005/1151/1154

AUTHORS: Gubanov, E. F.; Sinayskiy, A. G.; Apukhtina, N. P.; Teytel'baum, B. Ya.

TITLE: On the crystallization and glass transition of polyesterurethane block-copolymers

SOURCE: AN SSSR. Doklady, v. 163, no. 5, 1965, 1151-1154, and insert facing p. 1152

TOPIC TAGS: polyester, polyurethane, polymer, resin, crystallization, glass transition, block copolymer

ABSTRACT: The glass transition temperature, Tg, and the effect of crystallization on the latter were determined for block-copolymers

(-A-OCONHRNHCOO-) 1-n (-B-OCONHRNHCOO-) n,

where A is polyethyleneglycol adipate (I) or polydiethyleneglycoladipate (II), and B is

$$[-OC_2H_4OC_6H_4OC_2H_4OCOC_4H_8CO-]_x.$$

Three different isomers of B were studied: para, meta, and ortho, designated in what follows as p-B, m-B, and o-B respectively. The glass transition

Card 1/5

L 64480-65

ACCESSION NR: AP5021281

6

temperature was determined after B. Ya. Teytel'baum and M. P. Dianov (Vysokomolek. soyed., 3, 594, 1961). The experimental results are shown graphically in Figs. 1, 2, and 3. It is concluded that crystallization processes influence the glass transition temperature of block-copolymers. Crystallization of component with lowest Tg lowers the Tg of the block-copolymer. The latter component acts as an internal plasticizer in the crystallization of the higher melting component of the block-copolymer. Orig. art. has: 3 graphs, 4 microphotographs, and 2 equations.

44,55

ASSOCIATION: Institut organicheskoy khimii, Akademii nauk SSSR Kazan' (Institute for Organic Chemistry, Academy of Sciences SSSR); Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo kauchuka im. S. V. Lebedeva, Leningrad (All-Union Research Institute for Synthetic Rubber)

44,55

SUBMITTED: 12Jan65 ENCL: 03 SUB CODE: OC, MT

NO REF SOV: 005 OTHER: 001

Card 2/5

L 64480-65

ACCESSION NR: AP5021281

ENCLOSURE: 01

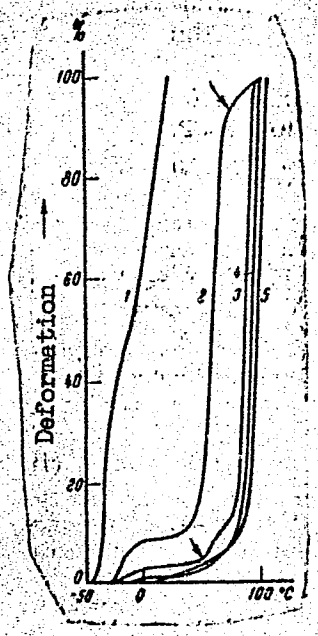

Fig. 1. Thermomechanical curves for the copolymer series II - m - B. Steady load 16 kg/cm^2. 1- 0; 2- 30; 3- 60; 4- 80; 5- 100 mole% m - B. Arrows indicate the onset of crystallization during heating.

Card 3/5

L 64480-65

ACCESSION NR: AP5021281

ENCLOSURE: 02

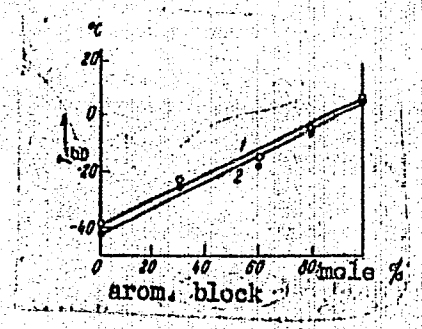

Fig. 2.
Dependence of Tg on the copolymer composition in the series II - m-B.
1- amorphous specimens; 2- specimens kept at room temperature for 6 months

Card 4/5

L 64480-65

ACCESSION NR: AP5021281

ENCLOSURE: 03

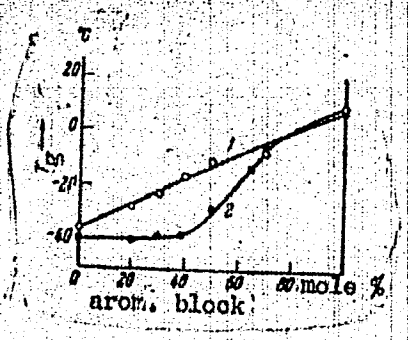

Fig. 3.
Dependence of Tg on the copolymer composition in the series I - m-B.
1- amorphous specimens; 2- specimens kept at room temperature for 6 months

Card 5/5

GUBANOV, E.F.; SINAYSKIY, A.G.; APUKHTINA, N.P.; TEYTEL'BAUM, B.Ya.

Crystallization and vitrification of polyester urethane block copolymers. Dokl. AN SSSR 163 no.5:1151-1154 Ag '65.
(MIRA 18:8)

1. Institut organicheskoy khimii AN SSSR. Kazan', i Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo kauchuka im. S.V.Lebedeva, Leningrad. Submitted January 20, 1965.

GUBANOV, E.P., inzhener.

Removing leaks in an oil cooler. Rab.energ. 3 no.5:10-11 My '53.
(MLRA 6:5)
(Steam turbines--Lubrication)