PALATNIK, L. S.

S. S. Urazovskii, L. S. Palatnik, and B. D. Luft, On the mechanism of crystallization of glassy selenium in the nitrogen containing compounds. P. 1034.

By methods of rontgenographic, microscopic and other forms of analysis, the process of spreading of crystallization into glass selenium sticks in contact with various amines at room temperatures is investigated. In diethylamine samples a process of recrystallization has been observed.

State University
Chemico Technological Institute, Kharkov
November 26, 1947

SO: Journal of Physical Chemistry (USSR) 22, No. 9, 1948

CA

3

X-ray method for determining the thickness of coatings by a superposition method. L. S. Palatnik (Kharkov State Univ.). *Zavodskaya Lab.* 15, 1043-54(1949).—After reviewing the methods of intensity ratio, variable (incident) wave length, and standard mixt., P. proposes that samples of the pure coating material and the underlying phase be exposed alternately on the same film, the exposure periods being short compared to the total exposure, but of const. relative duration for a given picture. When the ratio of exposure periods is such that the ratio of the intensity of a line from the coating phase to that of a line from the supporting phase in this exposure is equal to the same ratio in the sample exposure, then $x_1\mu\nu = \ln(1 + \nu_1/\nu)$, where x_1 is the coating thickness, μ is the absorption coeff. of the coating, $\nu = \operatorname{cosec}\beta + \operatorname{cosec}(2\theta - \beta)$, β is the angle of incidence of the primary beam, θ is the angle of reflection, and ν_1/ν is the ratio of the exposure periods of coating and underlying phases. The method is used here to det. the thicknesses of oxide layers on steels, but is also applicable to cases of coatings or substrates consisting of phases of unknown structure, mixed phases, or solid solns. of light and heavy elements. Cyrus Feldman

CH

3

X-ray investigation of the transformation occurring in the surface layers of metals subjected to electric discharges. I. S. Palatnik (Kharkov Univ.). *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 15, No. 5(1951).—Samples of Armco Fe and "U8" steel were cut and hardened in a condenser spark discharge (Lazarenko method) at 110–280 v., 1–8 amp., 8–400 microfarad. The samples were sparked either in liquid (transformer oil, aniline) or in air; in the 2nd case the opposing electrode was WC steel. It is shown that in

liquid, C from the medium penetrates the surface to form austenite, ε-phase, and cementite. Samples processed in air contain 10% W in their surface but not as WC. The carbide phases in this case could not be identified. If the opposing electrode was graphite, carbides more complex than cementite were formed. It is presumed that the process takes place in 2 steps: first the liquid metal is "cemented" by C or other elements; second, through cooling of the spark-treated surface in 10^{-4} sec. metastable structures are formed. S. Pakswer cA

2

Phase x-ray structure analysis by a superposition method. L. S. Palatnik (Kharkov Univ.). *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 15, 130-44(1951); cf. *C.A.* 45, 2318h).—The proposed method of semiquant. x-ray analysis consists in a comparison of a line in a binary mixt. with the intensity ratio of 2 lines of the components photographed in small exposition periods τ_1 and τ_2. The ratio of concns. by wt. $c_1:c_2 = (I_1/I_2)(I_2'/I_1')(\tau_1(\mu_2/\rho_2)/\tau_2(\mu_1/\rho_1))$ where I_1, I_2 are the line intensities of the mixt. I_1', I_2', the intensities of the superposition x-ray picture, μ_1/ρ_1 and μ_2/ρ_2 the mass absorption coeff. of the phases. A visual method is described in which the pictures of the mixt. are directly compared to superposition pictures. The error of the method is given by $|\Delta c_1| \leq c_1c_2(|\Delta S_1 - \Delta S_2|/\sigma_1 + |\Delta S_2 - \Delta S_3|/\sigma_2)$ where ΔS_1, ΔS_2 and ΔS_3 are the differences in the blackening of the lines and the background in the superposition and the sample pictures, σ_1 and σ_2 the differences between the absolute blackenings of the lines and the background. The influence of the grain size is discussed and some exptl. results are given on systems Zn-ZnO, MgO-Al_2O_3 and Ag-Ni. A comparison of results obtained by microphotometry and by the visual method shows their equivalence; the absolute error $|\Delta c|$ does not exceed 5% and for Ag-Ni is smaller than 1%. S. Pakswer

USSR/Metals - Iron, Spark Treatment Jul/Aug 51

"Transformations in the Superficial Layer of Metal Under Action of Electric Discharges," L. S. Palatnik, Khar'kov State U imeni Gor'kiy, Khar'kov Electromech Plant imeni Stalin

"Iz Ak Nauk SSSR, Ser Fiz" Vol XV, No 4, pp 467-471

Palatnik investigates some details of specified phase and structural changes described by him previously (cf. "Iz Ak Nauk, Ser Fiz" Vol XV, No 1, 1951). Iron (trademark VIT) cathode and

195T49

USSR/Metals - Iron, Spark Treatment (Contd) Jul/Aug 51

graphite (over 99% C) anode were chosen for electric spark treatment under atm pressure. X-ray and electron-microscope study showed microscopic changes, sepd into 3 concentric zones: central, which vaporizes; medium, which liquifies; and peripherial, solid even when heated.

195T49

PALATNIK, L. S.

PA 195T49

/10

cA

Polymorphic change in 2-methoxy-7-acetamido-9-fluorenone. M. Kh. Gluzman, L. S. Palatnik, and D. I. Plotkina (Kharkov State Univ.). *Zhur. Fiz. Khim.* 25, 10-12(1951). Acetylation of 2-methoxy-7-amino-9-fluorenone (Eckert and Langecker, *C. A.* 22, 1969) gives yellow (I) and red (II) cryst. polymorphic modifications of the N-Ac deriv. On heating at 208-210°, I gives II, m. 237°, within 10-15 min. Slowly cooling a PhCl soln. of II gives I; rapid cooling of the same soln. gives II but on standing in the mother soln. the red crystals become yellow after 1-2 hrs. Recrystn. of II from AcOEt soln. gives I. The mol. wts. of I and II are identical. Both I and II contain the same no. of Ac groups. No weight change is observed during the transition. No Cl is detected in I recrystd. from PhCl. Solns. of I and II have the same color at the same concn.: yellow in dil. and red in concd. solns. Both modifications have identical absorption spectra in the visible and ultraviolet, but give different x-ray patterns. Michel Boudart

1951

184T113

PALATNIK, L. S.

USSR/Physics - Crystallography 21 Jun 51

"Quantitative Formulation of the Crystallogeometric Relation," L S Palatnik, Khar'kov State U imeni A M Gor'kiy

"Dok Ak Nauk SSSR" Vol LXXVIII, No 6, pp 1141-1144

By volumetric, planar, or linear coherent linkage of 2 crystallic lattices (of crystallographic planes or directions) one must understand their quasi-equilibrial coexistence such that "continuous" bond and periodicity in 3, 2, or 1 dimensions are conserved. Phenomenon of coherent linkage is observed in: martensitic conversion; aging of alloys; electrolytic growth; vacuum distillation and condensation of metals and alloys; cryst from supersaturated solns on anisotropic base; and oxidation and reduction of metals. This phenomenon also occurs in various chem and chemicothermal manipulations: cementation, nitridation; decompn of crystallic salts and compounds -- and also during mech deformation (bending, shear, twinning) in monocrystals. Eqs for conditions of coherent linkage of crystallographic lines, planes, and vols are resp: $\vec{G}'_1 = \vec{G}'_2$, $\vec{S}'_1 = \vec{S}'_2$, $V'_1 = V'_2$, $D'/N = d'_1/n_1 = d'_2/n_2$. Moreover for volumetric linkage we have: $\vec{D}'_1 = \vec{D}'_2$. Here $\vec{G}$ is generalized period of identity of linear linkage. $\vec{S} = [\vec{G}\vec{Q}]$ is the vector perpendicular and equal to area of generalized planar elementary cubicle of linkage. $V = (\vec{D}[\vec{G}\vec{Q}])$ is vol of generalized elementary cubicle of linkage. $\vec{G}, \vec{Q}$ are unit vectors of planar generalized cubicle of linkage. D and d are "generalized" and ordinary interplanar distances between corr plane elementary cubicles parallel to planes of linkage. N, n are number of atoms in cubicles. Submitted 20 Apr 51 by Acad D. S. Belyankin.

184T113

USSR/Metals - Alloys, Aging Nov 51

"On Thermodynamic Interpretation of Phenomena in Aging Alloys," L. S. Palatnik, Khar'kov State U imeni A. M. Gor'kiy

"Dok Ak Nauk SSSR" Vol LXXXI, No 1, pp 39-42

Discusses possibility of using geometrical method for representing Al-Cu system by various sections of thermodynamic surfaces, which express qual relationship between thermodynamic potential or free energy and certain thermodynamic parameters such as temp and concn of alloy. Analyzes quasi-equil diagram which, according to Palatnik permits

198T76

USSR/Metals - Alloys, Aging Nov 51
(Contd)

explanation of various phenomena and anomalies in aging process of binary or more complex alloys. Submitted by Acad I. P. Bardin.

198T76

PALATNIK, L. S.

PALATNIK, L. S.

Crystallography

Crystallo-geometric principle of conformity and its application. Dokl. AN SSSR [illegible] no.
6:905-908 F '52.
Khar'kovskiy Gosudarstvennyy Universitet
im. A.M. Gor'kogo rcd. Jun 1953

SO: Monthly List of Russian Accessions, Library of Congress, Jul. 1953, Uncl.

TUGARINOVA, K. N., PALATNIK, P. S.

USSR (600)

Woolen and Worsted Manufacture

New woolen fabrics Tekst. prom no. 5 (1952)

Monthly List of Russian Accessions, Library of Congress, August 1952. UNCLASSIFIED.

PALATNIK, L. S.

Calculation of projection and cross section of the base of complex lattices. L. S. Palatnik and V. I. Peresada. *Uchenye Zapiski Khar'kov Univ.* 49, *Trudy Fiz. Otdel., Fiz.-Mat. Fakultet.* No. 4, 201-10(1953); *Referat. Zhur., Fiz.* 1955, No. 2731.—On the basis of a general whole-no. solution of the equation $\sum_{i=1}^{3} h_i m_i = N$ (h_1, h_2, h_3 are simple integers, N is an arbitrary integer, and m_1, m_2, m_3 are unknown), analytic methods of calcn. are set forth for: (*a*) distribution of the junctions of the arbitrary cryst. lattice in the crystallographic surface fixed by the indexes (h_1, h_2, h_3), (*b*) projection of the cryst. lattice on the surface perpendicular to the crystallographic direction (n_1, n_2, n_3), (*c*) distribution of the junctions of the lattice in the crystallographic series fixed by the direction (n_1, n_2, n_3). The solution in general form of the above equation is based on the theorem of Euler (Vinogradov, *Bases of the Theory of Numbers* 1949, p. 47). The formulas obtained make it possible to solve readily the problems indicated above on the basis of the fixed parameter of the cryst. lattice. Application to the case of white tin is cited as an example. M. K.

21

GLUZMAN, M.Kh.; GERSHUNS, A.L.; PALATNIK, L.S.; PLOTKINA, D.Ye.; MIL'NER, R.S.

Quasi-equilibrial eutectics in systems of the type anhydride - amine. Zhur. fiz.khim. 27 no.9:1304-1310 S '53. (MIRA 6:11)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo.
(Phase rule and equilibrium) (Eutectics) (Amines)

PALATNIK, L. S.

Metallurgical Abst.
Vol. 21 May 1954
Properties of Metals

3 **Phase Changes During Electrospark Treatment of Metals and an Attempt to Establish Criteria for the Observed Interactions.** L. S. Palatnik (*Doklady Akad. Nauk S.S.S.R.*, 1953, [illegible], (3), 455-458).—[In Russian]. The structural changes accompanying sparking between ~100 different combinations of electrodes (110 V., 2 amp., 20-280 μF) have been studied by X-ray analysis, microhardness measurements, and spectro- and micro-analysis. Three types of interaction were observed: (*a*) coating of cathode by anode material, (*b*) formation of alloys on the cathode, and (*c*) no coating of cathode, but transfer to anode. The type of interaction does not generally change with polarity, and it is assumed that the interactions occur in the locally heated regions after the discharge has occurred. The following criterion is developed which explains the types of interaction observed in terms of the durations (τ_1 and τ_2) of the initial stages of intense heating, melting, and evaporation of the metals 1 and 2: $\frac{\tau_1}{\tau_2} \cong \frac{c_1\rho_1\lambda_1(T_1 - T_0)^2}{c_2\rho_2\lambda_2(T_2 - T_0)^2}$, where $c\rho$ = thermal capacity/unit vol., λ = conductivity, T_0 = initial electrode temp., and T is given by $T_s \leqslant T \leqslant T_k$, where T_s = m.p. and T_k = b.p. If $\tau_1 \ll \tau_2$, type (*a*) interaction occurs since the vapours of 1 condense on 2 before 2 has melted; if $\tau_1 \cong \tau_2$, type (*b*) interaction occurs as a result of evaporation of 1 and 2 at the same time; and type (*c*) corresponds to $\tau_1 \gg \tau_2$. The criterion agrees with the observations, and practical implications are discussed. 6 ref. (Translated by the U.S. National Science Foundation (NSF-tr-53)).—D. M. P.

Palatnik, L.S.

USSR/ Physics - Spectral analysis

Card 1/1 Pub. 43 - 24/97

Authors : Lyulichev, A. N., and Palatnik, L. S.

Title : Adaptation of spectral analysis to the study of electro-spark treatment processes

Periodical : Izv. AN SSSR, Ser. fiz. 18/2, page 259, Mar-Apr 1954

Abstract : Investigations were conducted to determine the spectra of 342 combinations of electrodes prepared from technically pure Be, Mg, Al, Si, Ti, Cr, Fe, Co, Ni, Cu, Zn, Mo, Ag, Cd, Sn, Sb, W, Pb and Bi metals. The effect of the material and electrode form on the process of electro-spark treatment was studied by making a spectral analysis of the vaporous phase originating during electro-spark treatment. The results obtained confirm the suitability of the spectral analysis method for the study of all physico-chemical processes involved during electro-arc treatment of metals. Two USSR references (1946-1953).

Institution : The A. M. Gorkiy State University, Kharkov

Submitted : ....

PALATNIK, L.S.

USSR/Chemistry - Physical chemistry

Card 1/1 Pub. 147 - 10/27

Authors : Palatnik, L. S., and Kontorovich, V. M.

Title : Analytical investigation of multi-component heterogeneous systems by the method of generalised law "of center of gravity".

Periodical : Zhur. fiz. Khim. 28/9, 1599-1614, Sep 1954

Abstract : The development of an analytical, generalised center-of-gravity method for the study of multi-component heterogeneous systems, is announced. This method was found to be mathematically quite simple and its application to concrete systems consists in actual calculation of the determinants. The advantages of such analytical methods over geometrical methods are listed. Mass ratios for phases forming during crystallisation processes of any given variance are presented. The various possible ways of the invariant process in relation the component concentration in the basic solution, were discussed. Four USSR references (1937-1954).

Institution : The A. M. Gorkiy State University and the V. I. Lenin Polytechnicum, Kharkov

Submitted : December 21, 1953

PALATNIK, L. S.

USSR/Physical Chemistry

Card 1/1

Author : Palatnik, L. S.

Title : A generalized law, called of "center of gravity" for multi-component systems.

Periodical : Dokl. AN SSSR 95, 6, 1227 - 1230, 21 Apr 1954

Abstract : The article explains an analytical method called "center of gravity"
which can be applied to the analysis of, so-called, congruent and non-
congruent processes in multi-component nonvariant systems with a given
chemical formation of disappearing and forming phases.

Institution : A. M. Gorkiy's State Inst. at Kharkov.

Submitted : 22 Feb 1954

PALATNIK, L. S.

USSR/Physics - Technical Physics

Card : 1/1

Authors : Palatnik, L. S., and Levitin, V. V.

Title : X-ray investigation of alloys Sn-Se, Zn-Se, Cd-Se and Ag-Se

Periodical : Dokl. AN SSSR, 96, Ed. 5, 975 - 978, June 1954

Abstract : In the present article, the authors present the results of the chemical and thermal investigations of the binary systems of alloys, as listed in the heading of this article. The preparation of the types of samples used in testing by means of X-rays is dealt with, and the effect of the various heat treatments on the properties of the individual alloys, relative to their stability aging, and transparency of some of the vitreous films, is described. Five references published in USSR (1936-1942), and one German reference of 1931. One table.

Institution : The A. M. Gorkiy State University of Kharkov

Presented by: Academician, S. A. Vekshinskiy, April 10, 1954

PALATNIK, L.S.

4

Phase composition of carburized layers of steel. L. S. Palatnik, I. M. Lyubarskii, A. P. Lyubchenko, and I. A. Tananko (V. I. Lenin Polytech. Inst. and A. M. Gor'kii State Univ., Kharkov). *Fiz. Metal. i Metalloved., Akad. Nauk S.S.S.R., Ural. Filial* 1, 500-5(1955).—Specimens of steel contg. C 0.18, Cr 1.5, Ni 4.45, and W 1.02% were carburized at 910° for 15-17 hrs. producing a carburized zone 1.8 mm. thick. Carbides were removed from the carburized zone by electrolysis in 20% HCl soln. X-ray examn. of the carburized layer and chem. and spectrographic analysis of the carbides indicated the formation of carbides of the Fe_3C and $(Fe, Cr, W)_{23}C_6$ types. The latter contained Fe 50-70, Cr 7-10%, and W and C balance. No $(Fe, Cr, W)_{23}C_6$ was formed on the surface; at a depth of 0.2-0.3 mm. it reached a max. of 4-5% and then decreased to 2-3% at increased depth. Residual austenite reached a max. of 90% at a depth of 0.3-0.5 mm. The formation of max. amts. of residual austenite and $(Fe, Cr, W)_{23}C_6$ was due to intermediate transformations in the metastable system.

H. W. Rathmann

Met

PALATNIK,

LYULICHEV, A.N.; PALATNIK, L.S.

Investigation of the spark temperature of electric-spark metal hardening apparatus. Izv. AN SSSR. Ser. fiz. 19 no.1:66-67 Ja-F '55. (MIRA 8:9)

1. Khar'kovskiy gosudarstvennyy universitet imeni A.M.Gor'kogo
(Spectrum analysis) (Spectrometer)

USSR/Thermodynamics. Thermochemistry. Equilibria. Physico-Chemical B-8
Analysis. Phase Transitions.

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 20126.

Author : L.S. Palatnik, A.I. Landau.

Title : Study of Processes Occurring with Change of Degree of Freedom in Multicomponent Heterogeneous Systems. I, II.

Orig Pub : Zh. fiz. khimii, 1955, 29, No 10, 1764-1803; No 11, 2054-2073

Abstract : I. The processes are studied, which occur in multicomponent heterogeneous systems and are connected with a change of the degree of freedom (variance) of these systems, the variance of the system changing during the process with some limitations concerning the disappearing and appearing phases. The results are presented in a shape allowing the generalization for a case without the above mentioned limitations. A system of equations is derived, which determines the boundaries between the separation regions on an equilibrium graph of a multicomponent system. The above mentioned equation system allows numerically to plot the complete equilibrium graph of a multicomponent thermodynamic system, if the concrete form

Card : 1/3

USSR/Thermodynamics. Thermochemistry. Equilibria. Physico-Chemical B-
Analysis. Phase Transitions.

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26126

of the functional dependence of the chemical potentials on the pressure, temperature and the concentration of components in phases was known. Basing on the derived equation system, the connection between the separation regions and their hyperconnodes (RZhKhim, 1956, 21948) is investigated. The rule of contiguous separation regions (known under the name of the law of contiguous spaces of states in the application to ternary systems) is proved and generalized in reference to multicomponent systems. An example is given, how to apply the rule of contiguous separation regions to the topological analysis of a concrete equilibrium graph.

II. Generalization of results obtained in the part I. The general formulation of the rule of contiguous separation regions (RCSR) is given: $R - R_1 - \alpha^- - \alpha^+ - \beta^- - \beta^+ \geqslant 0$ where R is the dimensionality of the equilibrium graph of a multicomponent heterogeneous system or of a non-nodal (regular) section of this graph; R_1 is the dimensionality of the boundary between two adjacent separation regions in the above graph or

Card : 2/

USSR Thermodynamics, Thermochemistry, Equilibria, Physico-Chemical BO
Analysis, Phase Transitions.

Abs Jour : Ref Zhur - Khimiya, No 6, 1957, 20126

section; α' and α'', β' and β'' are the numbers of pure components that have disappeared and originated and of solutions that have disappeared or originated at the transition from one separation region into another respectively. Liquid, solid and gaseous phases or chemical compounds are understood under the term of solutions, and phases, each of which consists of only one pure component, are understood under the term of pure components. RCSR is applicable to an equilibrium graph or to non-nodal sections of an equilibrium graph on condition of removing the degeneration of certain separation regions. The non-nodal sections are defined as such, which do not intersect any nodes of the equilibrium graph (i.e. eutectic and peritectic points, lines etc.), and the degenerated separation regions are defined as such, the dimensionality of which is less than that of the corresponding equilibrium graph or of the corresponding section. Examples of nodal (i.e. of node intersecting) and non-nodal sections of various equilibrium graphs are given, and the application of the RCSR to non-nodal sections is demonstrated.

Card : 3/3

Category : USSR/Atomic and Molecular Physics - Statistical Physics D-3

Abs Jour : Ref Zhur - Fizika, No 1, 195, No 821

Author : Palatnik, L.S., Landau, A.I.
Title : Investigation of Processes Occurring with a Change in the Number of Degrees of Freedom in Multicomponent Heterogenous Systems

Orig Pub : Zh. fiz. khimii, 1955, 29, No 11, 2054-20 3

Abstract : No abstract

Card : 1/1

PALATNIK, L.S.

Investigation of processes proceeding with changes of the number of degrees of freedom in multicomponent heterogeneous systems. II. L. S. Palatnik and A. I. Landau (A. M. Gor'kii State Univ., Khar'kov). *Zhur. Fiz. Khim.* 29, 2051-73(1955).—The *K-L* transformations (cf. *C.A.* 50, 9120*b*), i.e. the conversion of the *K*-variant thermodynamic system into an *L*-variant system was studied in the most general way. The principal equation system of a given *K-L* transformation is derived. A most general form of the rule expressing the relation between the size of the boundaries between 2 partition surfaces on the equil. diagram of pure components was derived and formulated from the difference between the no. of pure components and the no. of solns. (liquid, solid, or gas phases, or chem. compds.) in a given range of sepn. The rule of contact surfaces of sepn. at different cross sections of the equil. diagram is discussed. All possible cross sections were classified into 2 principal types: the nodal and non-nodal sections. A rule was derived from the contact surfaces of sepn. for non-nodal sections. The question was discussed of the degenerated sepn. ranges, and the methods of application of the contact surface rule to such equil. diagrams or cross sections are given. The rule includes the degenerated sepn. surfaces.

W. M. Sternberg

PALATNIK, L.S.

USSR/Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 31/49

Authors : Palatnik, L. S., and Landau, A. I.

Title : On the theory of equilibrium of heterogeneous poly-component systems

Periodical : Dok. AN SSSR 102/1, 125-128, May 1, 1955

Abstract : Systems with certain partially closed thermodynamic parameters were investigated to determine the equilibrium processes in poly-component heterogeneous systems. General phase rules as well as equation systems are presented for the determination of the equilibrium in such systems and it is shown that these rules and equations can well be applied to real equilibrium and quasi-equilibrium thermodynamic systems. The external and internal parameters (in addition to the thermodynamic), which affect the physical properties of real systems, are discussed. Seven USSR references (1935-1954).

Institution : The Kharkov State University im. A. M. Gorkiy

Presented by : Academician N. V. Belov, December 24, 1954

Palatnik, L. S.

11470* Study of the Structure of Steels 30 KhMA and Kh(ShKh-15) After the Bainitic Transformation. ~~Issledovanie struktury stalei 30 KhMA i Kh(ShKh-15)~~ posle promezhutochnogo prevrashcheniia. (Russian.) L. S. Palatnik and B. A. Leont'ev. *Fizika Metallov i Metallovedenie*, v. 2, no. 1, 1956, p. 43-53.

Bainitic transformation has traits in common with the perlitic and martensitic transformations. Bainitic transformation consists of three processes: oriented precipitation of supersaturated ferrite; enriching surrounding austenite with C and formation of carbides; and tempering of supersaturated ferrite. Table, graph, micrographs, phase diagram. 28 ref.

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PALATNIK, L.S.

3

Structure of the "white zone." L. S. Palatnik, I. M. Lyubarskii, and B. T. Boiko (V. I. Lenin Polytech. Inst. and A. M. Gor'kii State Univ., Kharkov). *Fiz. Metal. i Metalloved., Akad. Nauk S.S.S.R., Ural. Filial* 2, 285-93 (1956).—Metallographic and x-ray study of the galled areas on the surface of heavily loaded gears showed it to be of an austenitic-martensitic nature free from oxides, nitrides, and Cr carbides. The structure is produced by secondary quenching of the working surface and has an austenite lattice parameter of 3.59 A. as compared with 3.60 A. for residual austenite outside of the galled areas. L. D. G.

Palatnik, L.S.

1

The mechanism of intermediate austenite transformation. B. A. Leont'ev and L. S. Palatnik. Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk 1956, No. 10, 28-36.— Electron-microscope structure studies of the austenite transformation process (Russian trade marks 30-CrMA, 55C2, and ShCr17) showed that the decompn in the steel was always initiated in the α phase. At the lower-temp. interval of the intermediate range indications are observed of the α-phase supersatn. with C, which is not observed in the upper temp. interval. The formation of the low-C α phase during the intermediate transformation can be explained by the formation of nuclei in the modification impoverished in C, and by a coherent nuclear growth during the initial C migration from the sepn. boundary. The growth of the ferrite section is accomplished by a C enrichment of the surrounding austenite, or the formation of carbides in it. The autoinhibition of the intermediate transformation becomes manifest during the carbide formation process in austenite.

W. M. Sternberg

18

PALATNIK

K

Category : USSR/Optics - Spectroscopy

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5005

Author : Palatnik, L S., Lyulichev, A N.

Title : Investigation of the Temperature in the Vapor Phase Occurring During the Electrical Spark Metal Working

Orig Pub : Zh tekhn. fiziki, 1956, 26, No 4, 832-838

Abstract : A spectral method is used to determine the temperature of the plasma of the spark obtained in the setup for electric-spark metal hardening. The parameters of the setup are capacitance from 0.25 to 280 microfarad. The current from 0.5 to 3 amperes, and voltage from 70 to 220 volts. The exposure used in the photography with the aid of the ISP-22 spectro- graph using dispositive plates was 1 to 10 minutes. The spark tempera- ture was measured by the Ornshteyn method with the aid of ten Fe II lines in the 2562-2756 A interval. It turned out to range from 7200 to 10200°. The spectra have a purely spark nature at a temperature of 9,000-10,000°, and are of a spark-arc nature at 7,000-8,000°. It is proposed to measure the spark temperature by comparison of the intensity of the arc and

Card : 1/3

Kharkov State U im Gorky

K

Category USSR/Optics - Spectroscopy

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5005

spark lines of iron For this purpose, four pairs of Fe I/Fe II lines were chosen, namely 2592-2593 A, 2594-2593 A, 2733-2731 A, and 2735-2731 A The graphs of the temperature dependence of log (I_{FeI}/I_{FeII}) were plotted for these pairs in the 6,000-10,000° interval The spectra of sparks were between iron electrodes and electrodes made of iron, copper, tungsten, aluminum, zinc, cadmium, magnesium, and carbon were photographed using capacitances of 280, 140, 80, 20, 8, and 0.25 microfarad It was established that for the same capacitance the sparks obtained by different electrode pairs were in agreement, with the exception of the Fe-C pair (in this case it was 600, 1,000° lower). If the capacitance is kept constant, but different voltages and currents are used, the spark temperature between Fe electrodes remains practically constant over the range 70-220 volts and 1-3 amperes. Reducing the gap in the Fe-Fe pair increases the temperature; the same occurs when the electrode diameter is decreased The following empirical dependence on the capacitance was established $T = 7200 + 450\sqrt[3]{C}$ deg. C. It is concluded that the electric-spark processing of production objects is carried out not

Card : 2/3

K 6

Category USSR/Optics - Spectroscopy

Abs Jour Ref Zhur - Fizika, No 2, 1957, No 5005

in the spark region, which is the optimum for controlled erosion, but in the spark-arc region. Bibliography, 21 titles.

Card : 3/3

PALATNIK, L S

USSR/Optics - Optical Methods of Analysis. Instruments, K-7

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35873

Author: Palatnik, L. S., Lyulichev, A. N.

Institution: University imeni Gor'kiy, Khar'kov, USSR

Title: Application of Spectral Analysis to the Investigation of Vapor Phase Occurring During Electric-Spark Working of Metals

Original Periodical: Zh. tekh. fiziki, 1956, 26, No 4, 839-849

Abstract: An investigation was made of the spectra of sparks, obtained directly from the setup for electric working of metals for 377 combinations of electrode-elements Be, C, Mg, Al, Si, Ti, Pb, Bi, Cr, Fe, Co, Ni, Cu, Zn, Mo, Ag, Cd, Sn, Sb, and W. The composition of the vapor-like phase was estimated with an accuracy to within an order of magnitude with the aid of the approximate expression $c_a/c_c \simeq I_a/I_c$, where c_a and c_c are the concentrations of the anode and cathode in the vapor-like phase and I_a and I_c are the intensities of the brightest lines of the

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USSR/Optics - Optical Methods of Analysis. Instruments, K-7

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35873

Abstract: spectra of the anode and the cathode. The interaction and transfer criteria, suggested by L. S. Palatnik (Izv. AN SSSR, ser. fiz., 1951, 15, 80, 469), were used. In accordance with this criterion, it turned out that the composition of the vapor-like phase depends principally on the physical and chemical properties of the electrodes, with a decisive role being played by the thermal effect and by the processes of the electric spark working. The mode of the metal working has practically no influence on the composition of the vapor-like phase. The increase in the porosity of the electrodes and the reduction in their diameter leads to poorer heat transfer conditions and to a more intense evaporation of the material of the electrodes. The effect of polarity, as a rule, leads to an increase in the relative contents of the vapors of the element serving as the anode. For lightly-oxidizing elements one observed a contrary effect of the polarity. To strengthen by means of graphite it is advantageous to employ the following polarities: graphite-cathode, part-anode. Investigation of selective evaporation on the binary system Cu-Sn has shown that the composition of the vapor-like phase depends on the shape of the electrodes, on the material of the upper electrode, and on the polarity.

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B-8

USSR/Physical Chemistry, Thermodynamics, Thermochemistry,
Equilibriums, Phys-Chem. Anal. Phase-Transitions.

Abs Jour : Ref Zhur - Khimiy., No 7, 1957, 22293.

sence of initial, secondary, or in general of I or II or any other series of crystallization (in any sequence). The analysis carried out permitted to foretell the possibility of observation of phenomena unknown before: pseudo-congruent and pseudo-incongruent reversible processes, during which initial crystals in eutectics, and lower eutectics in higher ones, originate and disappear at the crystallization and melting of multi-component eutectic alloys.

Card 2/2

PALATNIK, L.S.; KOPELIOVICH, I.M.

Topoanalytical investigation of equilibrium diagrams for multicomponent eutectic systems. Part 1. [with English summary in insert] Zhur.fiz.khim. 30 no.9:1948-1958 S '56. (MIRA 9:12)

1. Politekhnicheskiy institut imeni V.I. Lenina, Gosudarstvennyy universitet imeni A.M. Gor'kogo, Khar'kov.
(Phase rule and equilibrium) (Eutectics)

PALATNIK, L.S.; LANDAU, A.I.

Topological investigations of equilibrium diagrams of multicomponent heterogeneous systems and their sections with the aid of the phase separation rule for contiguous regions. Zhur. fiz. khim. 30 no.11: 2399-2411 N '56. (MLRA 10:4)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo.
(Phase rule and equilibrium)

PAL.TNIK, [illegible], [illegible]

Theory of equilibrium diagrams of heterogeneous multicomponent systems. Uch.zap. LHGU 71 [illegible] '56. (MIRA 10:8)

(Phase rule and equilibrium)

(Systems (Chemistry))

PALATNIK, L.S.; LANDAU, A.I.

Differential correlations of the generalized rule of the "center of gravity" and their application to variant physicochemical processes. Uch.zap., KhGU 71:47-54 '56. (MIRA 10:8)
(Chemistry, Physical and theoretical)

PALATNIK, L.S.; LANDAU, A.I.

The rule of contiguous regions of phase separation in multicomponent heterogeneous systems. Uch.zap. KHGU 71:55-58 '56. (MIRA 10:[illegible])
(Phase rule and equilibrium) (Systems (Chemistry))

Palatnik

USSR/Solid State Physics - Morphology of Crystals, Crystallization. E-8

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 11803

Author : Palatnik, L.S., Skalyar, M.G , Vaynshteyn, I.A.

Inst : —

Title : On Quasi-Equilibrium External Forms of Crystals.

Orig Pub : Uch. zap. Khar'kovsk. un-ta, 1956, 71, 59-64

Abstract : Description of a microscopic investigation of intermediate stages of the variation in the external geometrical form of crystals, occurring after crystallization of KI and KBr from aqueous and alcohol solutions. The substrate employed was a fresh surface of single crystals of mica and glass. To measure the magnitude of the crystals, the authors employed a microphotometer, which makes it possible to determine not only the length and the width, but also the thickness of the small crystal (proportional to the blackening) Several stages of crystallization and recrystallization were observed, and these can be considered as intermediate

Card 1/2

Palatnik

USSR/Thermodynamics, Thermochemistry. Equilibria. Physico-Chemical Analysis. Phase Transition. B-8

Abs Jour : Ref Zhur - Khimiya, No 3, 1957, 2[illegible]127

Author : L.S. Palatnik

Title : Determination of Type of Alloy Equilibrium Graphs in Region of High Temperatures by Spectral Analysis Method.

Orig Pub : Dokl. AN SSSR, 1956, 109, No 1, 127-130

Abstract : A spectral method of determination of the type of equilibrium graphs in the temperature region of coexistence of the liquid and the vapor phases of binary and multicomponent alloys is proposed. The method is based on the use of the effect of selective evaporation of the components of the alloy-electrode at electric discharges, which effect is determined by various kinetic factors, as well as by the form of the above mentioned equilibrium graph. Having evaluated the kinetic factors, the author arrives at the conclusion that, in case of an electric discharge in a microscopic volume, melting takes place without diffusion, and boiling takes place by diffusion in accordance with the graph vapor - liquid. The computation formula allowing to determine any of the three possible graph types of vapor-liquid equilibrium is given;

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Kharkov State Univ im A.M. Gorkiy

USSR/Thermodynamics. Thermochemistry. Equilibria. Physico-Chemical Analysis. Phase Transition. B-8

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26127

The possible types are a) a cigar, b) a cigar with a minimum and c) a cigar with a maximum. The problem is solved graphically. The described method also allows to determine the situation of points of equal concentrations in the vapor and the liquid in cases b and c.

Card : 2/2

Palatnik, L.S

3

The structure of equilibrium diagrams of multicomponent heterogeneous systems. L. S. Palatnik and A. I. Landau. *Proc. Acad. Sci. U.S.S.R., Sect. Chem.* 109, 499-501(1956) (English translation).—See *C.A.* 51, 14400g. B. M. R.

PALATNIK, L.S.

4

4E4j-1

The structure of equilibrium diagrams of multicomponent heterogeneous systems. L. S. Palatnik and A. I. Landau (A. M. Gorkii State Univ., [illegible]). *Doklady Akad. Nauk S.S.S.R.* 109, 954-7(1956).—An extension of topologic concepts of equil. surface structure to all systems with any no. of components (cf. *C.A.* 50, 9129*b*).

W. M. Sternberg

PALATNIK, L. S. and SPITSYN, V. I.

"Concerning the Structure of Heteropoly Compounds, especially of Phosp;horous Wolframates, and the great Mobility of oxygen- and hydrogen atoms in them."

report presented at the UNESCO Conference on the Utilization of Radioactive Isotopes in Scientific Research, Paris, 9-20 Sept 1957.
Vestnik AN SSSR, 1958, v. 28, no. 1, pp. 71-78. (author Vinogradov, A. P.)

PALATNIK, P.S., inzhener.

A wider selection of cloth is being put on the market. Tekst. prom. 17 no.3:10-14 Mr'57. (MLRA 10:4)

(Woolen and worsted manufacture)

PALATNIK, L. S., LYUBARSKIY, I. M. and LYUBCHENKO, A. I.

"On the structure and wear resistance of case hardened steel," a paper submitted at the International Conference on Radioisotopes in Scientific Research, Paris, 9-20 Sep 57.

UNESCO/NS/RIC/32
London Pergamon Press Ltd. [illegible] p

PALATNIK, L.S.

3

✓Obobshchennaia Formulirovka Neravenstva Gibbsa. L. S. Palatnik and A. I. Landau. *AN SSSR Dokl.*, June 1, 1957, pp. 837-840. In Russian. Presentation of a generalized formulation of Gibbs inequality.

126-2-15/35

PALATNIK, L S.

AUTHORS: Leont'yev, B. A., Palatnik, L. S., and Spektor, Ya. I.

TITLE: Investigation of the kinetics of step-wise transformation of super-cooled austenite. (Issledovaniye kinetiki stupenchatogo prevrashcheniya pereokhlazhdennogo austenita).

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol.5, No.2, pp. 304-317 (USSR)

ABSTRACT: At present no systematic data are available on the interaction of the products of austenite transformation obtained at various temperatures, on the influence of decomposition in one temperature range on the kinetics of transformation at another temperature. Detailed information is available only on the interaction of the products of intermediate and martensite transformation. Numerous authors (Refs.5-8) have pointed out that there is a lowering of the martensitic point after partial transformation of the austenite in the intermediate range. It was also pointed out (Refs.7-12) that there is an acceleration of the decomposition in the intermediate range after partial martensitic transformation. Information on other points is incomplete and sometimes contradictory. Hehemann, R.F., and Troiano, A.R. (Ref.13) detected a stabilization of the intermediate transformation

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range after preliminary annealing at higher temperatures. Stregulin, A. I., and Kotsin, F.S. (Ref.14) found that the partial decomposition of the austenite in the pearlitic range in below-eutectoidal carbon steels, which is accompanied by ferrite separation, slows down the intermediate transformation and that such a decomposition in the eutectoidal steels does not affect the speed of intermediate decomposition. Jolivet, H., and Portevin, A. (Ref.15) also found that partial transformation at 600°C in CrNi steel containing 0.65% C does not influence the process of transformation at 250°C; they observed a marked slowing down of the pearlitic transformation under the influence of partial decomposition at 400°C. In contrast to this A. A. Popov (Ref.16) indicates that formation of ferrite-carbide mixture in structural alloy steels slows down appreciably intermediate transformation and the latter accelerates the formation of ferrite-carbide mixtures. The problem of interaction of transformation products obtained in various temperature ranges is of great theoretical and practical importance and study of this problem is likely to yield useful information on the

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Investigation of the kinetics of step-wise transformation of super-cooled austenite.

mechanism and the kinetics of decomposition and serve as a basis for developing more effective methods of heat treatment of steel. In this paper, thermomagnetic, metallographic and X-ray investigations are described relating to step-wise decomposition of austenite in the steels 55C2 and ШХ15; main attention was paid to the intermediate transformation range. The chemical compositions of the two steels are as follows:

Steel 55C2: 0.53% C, 0.75% Mn, 1.71% Si, 0.019% S, 0.019% P,
0.23% Cr, 0.10% Ni;
" ШХ15: 1.04% C, 0.29% Mn, 0.23% Si, 0.010% S, 0.020% P,
1.39% Cr, 0.16% Ni.

The graphs, Figs.1 and 2, p.305, give the diagrams of isothermal transformation for the two steels. The results of investigation of the kinetics of the step-wise transformation of austenite in the two steels are graphed in Figs.3-6. The values of the relative acceleration of the transformation, brought about by the preliminary decomposition in the other temperature range, defined by the formula:

$$100(v - v_0)/v_0, \%,$$

Card 3/7 where v_0 is the maximum speed of the isothermal trans-

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Investigation of the kinetics of step-wise transformation of super-cooled austenite.

formation at the given temperature, are entered in Table 2, p.307. The results of metallographic investigations are given and some of the obtained micro-photos are reproduced in the Figs.7-11, pp.310,311. Some of the results of the X-ray investigations are entered in Table 3, p.312. After giving some of the obtained results, the author discusses the following: the influence of pearlite on the kinetics of transformation in the intermediate range; the influence of partial transformation in the upper interval of the intermediate range on the kinetics of the intermediate transformation at low temperatures; the influence of partial transformation in the martensitic and the intermediate ranges on the kinetics of intermediate transformation at higher temperatures; the influence of partial transformation in the martensitic and the intermediate ranges on the kinetics of pearlitic transformation. It was established that preliminary transformation of austenite in the martensitic and the intermediate ranges brings about in both steels an acceleration of the intermediate transformation at higher temperatures which,in the given case,begins without

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Investigation of the kinetics of step-wise transformation of super-cooled austenite.

an incubation period. The effect of acceleration increases with decreasing temperature of the intermediate decomposition and also with increasing temperature at which final transformation takes place. Decomposition of the austenite in the upper range of the intermediate interval in the Steel 55C2 brings about an appreciable slowing down of the intermediate transformation at low temperatures. If there is a considerable quantity of preliminarily decomposed austenite, the remaining part of the austenite stabilizes on lowering the temperature. The influence of such treatment is less pronounced in the case of the steel ШX15 and may lead to an acceleration or deceleration of the intermediate transformation at low temperatures, depending on the quantity of the preliminarily deformed decomposition products. A partial decomposition of the austenite in the intermediate and the martensitic ranges in both steels leads to a decrease in the speed of pearlitic transformation and this decrease will be the more pronounced the higher the percentage of the preliminary decomposition. The greatest slowing down is

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Investigation of the kinetics of step-wise transformation of super-cooled austenite.

observed in the case of preliminary decomposition in the lower region of the intermediate range. Increase of the temperature of pearlitic transformation leads to a decrease of the slowing down effect (Steel Ш X15). Depending on the grade of the steel and the temperature of further transformation, the presence of pearlite may accelerate or decelerate the transformation in the intermediate range. The features of the kinetics of step-wise transformation cannot be satisfactorily explained by taking into consideration solely the changes in the concentration of the austenite and the germination effect of the preliminarily deformed transformation products. The basic cause of the influence of preliminary transformations in the intermediate and the martensitic ranges on the kinetics of transformation at other temperatures are the changes in the fine structure of the austenite accompanying the formation of a structure of the martensitic type. A convincing confirmation of this conclusion is the qualitative identity of the kinetics of step-wise transformation of austenite for the investigated steels, which differed in chemical

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126-2-15/35

Investigation of the kinetics of step-wise transformation of super-cooled austenite.

composition, structure and character of the carbon redistribution during the process of transformation. There are 11 figures, 3 tables and 24 references, 13 of which are Slavic.

SUBMITTED: June 11, 1956.

ASSOCIATION: Khar'kov Polytechnical Institute imeni V. I. Lenin.
(Khar'kovskiy Politekhnicheskiy Institut imeni V.I.Lenina).

AVAILABLE: Library of Congress.

Card 7/7

USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria,
Physical-Chemical Analysis, Phase Transitions. B-8

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3787.

should be given for the topological plotting of isothermal and polythermal plane sections of equilibrium graphs of eutectic multicomponent systems. The computation of section comes to a calculation of simple determinants. The proposed denotation system permits to write all the necessary equations automatically.

Card : 2/2

PALATNIK, L S

AUTHORS: Palatnik, L. S. and Fedorov, G.V. (Khar'kov). 24-9-18/[illegible]

TITLE: Graphical calculation of the local composition in three-component alloys of variable concentration. (Graficneskiy raschet lokal'nogo sostava v trekhkomponentnykh splavakh peremennoy kontsentratsii).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1957, No.9, pp. 119-120 (USSR)

ABSTRACT: A description is given of a graphical method of calculation of the local composition in three-component alloys of variable concentration using experimental distribution curves for each of the components. The method is applied for calculating the concentrations of systems produced by means of a method developed by S. A. Vekshinskiy (Ref.1). An alloy of variable composition obtained by evaporating various metals from two evaporators represents a binary field of concentrations and in such a field it is possible to calculate a family of circles along which the composition of the alloy remains constant. A three-component system forms a ternary field of concentration and the calculation is correspondingly more complex; families of curves of equal composition no longer exist but families of curves of another type do exist, one representing the lines along

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24-9-18/33

Graphical calculation of the local composition in three-component alloys of various concentration.

which the concentration ratio of two components remains constant and the other lines along which the concentration of one component remains constant. In a real collector these families of curves correspond to a family of analogous straight lines on the concentration triangle of Gibbs. By photometering of a semi-transparent layer of metal deposited on a glass collector which is perpendicular to the crucible axis, the distribution was studied of the density as a function of various parameters (speed of evaporation of the metal etc.) and, following that, the most suitable conditions of evaporation were chosen. The distribution of the condensate represents a mound with a circular symmetry whereby the symmetry axis of the mound coincides with the crucible axis; Fig.1 shows the distribution of a condensate on the collector for Sb, Bi and Ag. From these distribution curves, curves of equal thicknesses for each metal are plotted, finally, a coordinate network is obtained which permits solving the following two basic problems: to determine the composition of the condensate at a given point of the collector and to determine on the collector a point having

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24-3-18/33

Graphical calculation of the local composition in three-component alloys of various concentration.

a given composition. For illustrating the method, the results are included of the calculation of a collector of a real system of Ag-Bi-Sb, Fig.2. The here described method is applicable for any evaporator with a known distribution.
There are 2 figures and 2 Slavic references.

SUBMITTED: April 19, 1957.

AVAILABLE: Library of Congress.

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PALATNIK, L.S.

24-11-29/31

AUTHORS: Komnik, Yu. F., Palatnik, L.S. and Fedorov, G. V. (Khar'kov)

TITLE: Distribution of the condensate on a plane in the case of evaporation of metal from a cylindrical crucible. (Raspredeleniye kondensata na ploskosti pri isparenii metalla iz tsilindricheskogo tiglya).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1957, No.11, pp. 193-196 (USSR)

ABSTRACT: The authors assume that when using a cylindrical crucible as an evaporator, distribution of the condensate of the molecular flow does not necessarily depend on the level of the metal in the crucible, provided this level is sufficiently distant from the opening of the crucible. They studied the dependence on the metal level in the cylindrical crucible of the condensate distribution on a plane collector for the purpose of verifying their assumptions. They also studied the influence of the temperature on the distribution of the condensate and the influence of the location of the metal level in the crucible on the speed of evaporation of the metal. The condensate distribution on a plane transparent base was studied by photometering of semi-transparent metallic layers. The experiments were effected by means of a

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24-11-29/31

Distribution of the condensate on a plane in the case of evaporation metal from a cylindrical crucible.

vacuum set-up containing apparatus as shown in Fig.1, p.194. Cylindrical porcelain crucibles 4.5 and 8 mm dia. and about 30 mm deep were used as evaporators; these were heated by 1 mm dia. nichrome wire. The metal was fed into the system in the form of balls, whereby the charging apparatus was inside the vacuum system. Fig.2 shows the obtained curves of condensate distribution for various levels of metal (tin) in the crucible. The dependence was studied of the distribution of the condensed metal on the evaporation temperature as well as on the metal level in the crucible. The existence was detected of a range of depths of the metal in the crucible within which the distribution of the condensate on the collector and the speed of evaporation of the metal remained constant. This indicates that cylindrical crucibles can be applied as evaporators for making preparations of three component systems of thicknesses up to 0.1 mm according to the method of S. A. Vekshinskiy. There are 4 figures and 7 references, all of which are Slavic.

Card 2/2

SUBMITTED: April 19, 1957.

ASSOCIATION: Khar'kov Polytechnical Institute. (Khar'kovskiy Politekhnicheskiy Institut)

AVAILABLE: Library of Congress.

Palatnik, L. S.

3

Topoanalytical investigation of the equilibrium diagrams of multicomponent eutectic systems. II. L. S. Palatnik and I. M. Kopeliovich (A. M. Gor'kii State Univ., Khar'kov). Zhur. Fiz. Khim. 31, 552-8(1957); cf. C.A. 51, [illegible]. —A topoanalytic method is discussed for construction of plane sections of the equil. diagram of *n*-component systems that form simple eutectics. A general equation of all hypersurfaces was derived, which sepd. the equil. diagrams into *n*-dimensional crystn. vols. The construction of polythermal and isothermal intersection planes requires a knowledge only of the concns. and temps. of the eutectic points. The computation of the sections became reduced to the computation of simple determinants. W. M. Sternberg

PALATNIK, L.S.

AUTHORS: Palatnik, L.S., Landau, A.I. 76-12-21/27

TITLE: Heterogeneous Systems With Many Components and a Non-Maximal Order of the Concentration-Matrix (Mnogokomponentnyye geterogennyye sistemy s nemaksimal'nym rangom matritsy kontsentratsiy).

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 12, pp.2739-2747 (USSR)

ABSTRACT:

First the distribution of the thermodynamic degrees of freedom in systems with a non-maximal order of the concentration matrix is dealt with. Referring to ref. 2, it is shown that a whole series of heterogeneous systems with many components with a defect of the matrix $\sigma > 0$ can exist. It was shown that the case $\sigma = 1$ at $r \leqslant n$, dealt with by Gibbs [Ref.1] and Storonkin [Ref.3], is only a special case, whereas the number of possible thermodynamic systems with $\sigma > 0$ is essentially greater. Certain heterogeneous systems with many components and with both a pressure- and temperature extreme, such with equal composition of concentration of various phases (e.g. of phases in points of equal concentration, of allotropic phases), as well as some systems with many components where not all components participate in the individual phases of the system, belong to these systems.

In the concentration-matrix $\| x_{ij} \|$ ($i=1,2,\ldots, n$; $j=1,2,\ldots,r$), in which case each x_{ij} is a concentration of the i. component in the j.

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phase (n and r is the number of components, or of the phases of the system respectively) it is assumed that the defect σ of the concentration-matrix is equal to zero [Ref.1]. The inequality $r \leqslant n + 2$, set up by Gibbs, can be generalized for all these enumerated systems. For this purpose the value χ (kappa) is introduced. This is the greatest of the numbers r - n and 0. $\chi = \max \{r - n, 0\}$ and the inequality of Gibbs reads then $0 \leqslant \chi \leqslant 2$, and the generalized form of it is $0 \leqslant \chi + \sigma \leq 2$. Equations (7) are derived here. These equations form the conditions which are imposed to the concentration x_{ij} of the thermodynamic system and which are correlated with the value σ by means of the equality of the concentration-matrix-defect, where $\sigma \geqslant 0$, and each μ_{ij} in the equation (5) represents the chemical potential of the i.component in the j.phase. It is shown that the sense of the equation (4) ... $0 \leqslant \chi + \sigma \leq 2$ consists in that, that with $\sigma + \chi > 2$, in the basic equations (5)-(7), which express the investigated open thermodynamic system, an indetermination arises in any arbitrary case and that also when the pressure and temperature of the system are not previously fixed. A redundance in determination arises in the set of equations (5) to (7) at $\sigma = 0$ and $\chi > 2$. It is shown that the nonvariant-determination of the variables at

Heterogeneous Systems With Many Components and a Non-Maximal Order of the Concentration-Matrix

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$\sigma + \chi = 2$, or the monovariant-determination of the variables at $\sigma + \chi = 1$, in the general case does not belong to the whole equation-system (5) to (7), but to an individual group of this system of equations. The generalizing terms of the nonvariant and monovariant state of a thermodynamical system are given in the second part of the work. It is shown that at $\sigma + \lambda = 2$ in the thermodynamical system a certain group of phases which is in nonvariant equilibrium ($y_1=0$) with each other, must be contained, whereas all other phases of the same system in the general case can have a degree of freedom $y_2 = y \geqslant 0$, different from zero. Thereby, the total amount of degree of freedom of the thermodynamical system is equally equal to y, and can be greater than 0: $y \geqslant 0$. Such a state of the thermodynamical system, in which case a part of the phases is in nonvariant equilibrium, whereas the total-amount of thermodynamical degrees of freedom of the system y in the general case can be different from 0, is called by the authors the nonvariant state of the thermodynamical system. consequently, the conception of the nonvariant state of the thermodynamical system is a more general term than that of the nonvariant equilibrium, provided that the total amount

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of the degrees of freedom of the system is equal to zero. In the special case $y = 0$, all phases of the given system are in nonvariant equilibrium. In such a case the terms of nonvariant state and nonvariant equilibrium coincide. Analogously it is shown that a thermodynamical system at $\sigma + \chi = 1$ is in monovariant state, i.e. it contains a certain group of phases which are in monovariant equilibrium ($y_1 = 1$) with each other, whereas the other phases of the system in the general case have a greater number of degrees of freedom. Concluding, examples are given. There are 3 Slavic references.

ASSOCIATION: Khar'kov State University imeni A.M. Gor'kiy (Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo).

SUBMITTED: October 17, 1956

AVAILABLE: Library of Congress

Card 4/4

SOV/137-58-8-17811

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 231 (USSR)

AUTHORS: Palatnik, L.S., Lyubarskiy, I.M., Lyubchenko, A.P.

TITLE: On the Formation of the Carburized Layer Structure of Steel (O formirovanii struktury tsementirovannogo sloya stali)

PERIODICAL: Uch. zap. Khar'kovsk. un-t, 1957, Nr 95, Tr. Khim. fak. i N.-i. in-ta khimii KhGU, Vol 18, pp 75-91

ABSTRACT: Investigations were performed in order to determine how the wear-resistant properties of steel 18KhNVA are affected by the structure of steel obtained as a result of various heat-treatment procedures applied to the steel after carburization. The wear resistance (WR) was determined with the aid of radioactive isotopes on roller-shaped specimens 50 mm in diameter and 7 mm wide. The steel was rendered active by introduction of radioactive Co^{60} into molten metal. The active rollers operated in contact with three inactive rollers, 50 mm in diameter and 10 mm wide, mounted in a special stand which simulated the operation of a gear transmission. The extent of wear was determined by measurement of the radioactivity of the lubricant by means of a counter. In one revolution the velocity of

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SOV 137-58-8-17811

On the Formation of the Carburized Layer Structure of Steel

sliding on the surface of a roller changed from 1 to [illegible] m/sec. It was established that quenching the metal in water or oil immediately after carburization greatly increases WR and resistance to pitting as compared with the procedure in which the part is quenched and tempered at [illegible]°C after the cementation pot had been cooled in air. The improvement in WR properties can not be explained by transformation of the retained austenite into martensite during the process of friction because metallographic and X-ray analyses indicate that the amount of austenite present in the specimen is the same before and after the tests for wear. The WR is impaired as the content of retained austenite in the carburized layer is increased under slow cooling after carburization. Rapid cooling after carburization results in a considerable increase in WR. X-ray analysis of the substructure of austenite crystal lattice after slow and rapid cooling indicates that the lattice suffers a slight microdeformation if cooled abruptly from the carburization temperature; the solid solution exhibits a maximum of Cr and C saturation which determines the high WR of the carburized layer. A significant microdeformation of the crystal lattice occurs upon slow cooling. Slowly cooled austenite loses a good deal of its ability for deformation and hardening when resisting external forces. The results of the present work were verified on 6 and 10-mm thick gears with a module (reciprocal of pitch diameter) of 5 and a root circle diameter

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SOV/137-58-8-17811

On the Formation of the Carburized-layer Structure in Steel

of 100 mm. Quenching of the gears in water immediately after carburization increased their WR by a factor of 2.5. An explanation is given for the nature of the "white zone" which appears in a thin surface layer during friction, as well as under impact and in the course of hardening by shot peening.

N. K.

1. Steel--Mechanical properties 2. Steel--Carbonization
3. Steel--Structural analysis 4. Cobalt isotopes
(Radioactive)--Applications

Card 3/3

PA - 2658

AUTHOR PALATNIK L.S., FEDOROV G.V.

TITLE A photometric determination of the thickness of semitransparent
metal layers.
(Fotometricheskoye opredeleniye tolshchiny poluposrachnykh metalliches-
kikh sloyev, -Russian)

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 1, pp 100-103, (U.S.S.R.)
Received 5/1957 Reviewed 6/1957

ABSTRACT

The present work discusses a microphotometric method for the measuring
of the absolute density of semitransparent metal layers obtained by eva-
poation in the vacuum and the density distribution of the condensate of
the transparent vitreous base on the occasion of the employing of vapori-
zers of any type.
The method of photometrizing semitransparent layers:
The symmetry axis of the evaporator must be placed vertical to the col-
lector plane. The density distribution o the condensed layers then forms
a circular mound with the maximum of density and thickness on the symmet-
ry axis. Apparently the height of the maximum is proportionalto the dura-
tion of precipitation. If the metal layers are precipitated on several
collectors, the dependence of the blackening S of the collector can be ob-
tained from the duration τ of precipitation. Thus, also the dependence
$S = S(h)$ is obtained, because for the thickness of the layer $h = k\tau$,
applies, where k denotes a proportionality factor. If now one of the col-
lectors is photometrized along a straight line passing through the ma-
ximum, the dependence of the blacking S on the distance up to a given

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A Photometric Determination of the Thickness of Semitransparent Metal Layers. PA - 2658

point of the collector can be determined. The corresponding dependences S ($\mathcal{J}$) and S (ρ) are shown in form of a diagram. From these two dependences the dependence $\mathcal{J}(\rho)$ is then determined, which is equivalent to the dependence $h_{rel}(\rho)$ in relative unities on the ordinate axis. Experimental Part: Experiments were carried out in a vacuum chamber. A sylindrical ferfort crucible served as evaporator and heating took place by means of a nichromium spiral. At a distance of about 40mm from the crucible an immobile metal screen with a long narrow gap was fitted vertical to the crucible axis. Then a glass collector was fitted on to this metal screen. The here discussed photometric method was tested on bismuth films. Bismuth was vaporized on at 600° and 680°, and vaporizing-on velocity was changed 6 to 7 times. On this occasion the authors noticed no influence exercised by condensation velocity on the dependence of the blackening of the thickness of the film. From data obtained from some experiments a diagram was determined for the dependence of S on the thickness h of the bismuth layer; this method is well suited for the determination of the thickness of semitransparent metal layers. (2ill.)

ASSOCIATION Polytechnical Institute KHAR'KOV
PRESENTED BY Member of the Academy S.A.VEKSHINSKIY
SUBMITTED 24.11.1956
AVAILABLE Library of Congress
Card 2/2

AUTHORS: Palatnik, L. S., Landau, A. I. 20-114-4-43/63

TITLE: A Generalized Formulation of Gibbs Inequality (Obobshchennaya formulirovka neravenstva Gibbsa)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 4, pp. 837-840 (USSR)

ABSTRACT: The terms V, S, P, T mean: volume, entropy, pressure and temperature of the total heterogeneous system. M_1 and $\mathcal{M}_1$, on the other hand, mean the quantity and the chemical potential of the i-th-component in the whole system; further v_j, s_j, m_j denote the specific volume, specific entropy and the mass of the mass of the j-th-phase of the system; x_{ij} and μ_{ij} are the concentration and the chemical potential i-th-component in the j-th-phase; n and r denote the number of components and the number of phases in the system. In the case of an analytical study of the thermodynamic systems it is usually considered a foregone conclusion that the rank of this matrix is a maximum, i.e. that its defect is $\sigma = 0$. Thus the phase rules and the inequality deduced by Gibbs $r \leqslant n + 2$ concern only such thermodynamic systems with $\sigma = 0$. One can, however, imagine really existing thermodynamic systems with a $\sigma > 0$.

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A Generalized Formulation of Gibbs Inequality 20-114-4-43/63

They were mentioned by Gibbs and discussed more in detail by Storonkin. As may be seen from the following, the case of a system with $\sigma = 1$ at $r \leqslant n$ is only a special one, and the number of possible systems with $\sigma > 0$ is considerably higher. To this belong certain thermodynamic systems with a pressure- and temperature maximum, with equal concentration composition of various phases, some systems in whose individual phases not all components participate. It is the purpose of the present paper to determine the rules to which the systems with $\sigma > 0$ are subjected. If any additional conditions are added to a thermodynamic system, these conditions have to be added apparently to the equations of Gibbs-Duham or to the equality of the chemical potentials before computing the number of the thermodynamic degrees of freedom of a system. In the present case the additional conditions are those connected with the equality of the defect of the concentration matrix by the value σ, where $\sigma \geqslant 0$. Furthermore the equations of the chemical potentials are discussed together with the above-mentioned conditions. Then follow in an analogous manner the equations of Gibbs-Duham together with the conditions of the non-maximum of the matrix rank. From the results obtained the meaning of the conditions $0 \leqslant \sigma + \varkappa < 2$ (7) becomes clear.

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It must evidently be ascribed to the fact that at $\sigma + \kappa > 2$ in a thermodynamic system a "pereopredelennost" originates also if P and T of the system have not been fixed previously. By means of the generalized rule of the "center of masses" it is not difficult to realize, that $\sigma + \kappa = z$, where z is the figure of the phase quantities m_i which may alter arbitrarily at fixed values P, T, and M_i. From this follows a criterium of the non-variant and mono-variant properties of a thermodynamic system: at z = 1 the system possesses mono-variant and at z = 2 non-variant properties. By analogy one should assume negative values for the "variability", if z = 3,4.... In reality a thermodynamic system cannot be realized at $z > 2$. To a negative "variability" corresponds in the mathematical sense "pereopredelennost". Thus at $\sigma + \kappa = z > 2$ a thermodynamic system is either not unequivocally solvable (this should not be principally admitted), or the fundamental equation is incomplete and reflects, in the here discussed case, the thermodynamic system and thereby loses the name of a fundamental equation. As could be seen the matrix condition of the phase equilibrium solves all difficulties, since it forbids the existence of equilibrium systems with

A Generalized Formulation of Gibbs Inequality 20-114-4-43/63

$\sigma + \varkappa > 2$.
There are 9 references, 9 of which are Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

PRESENTED: December 26, 1956, by N. V. Belov, Member, Academy of Sciences, USSR

SUBMITTED: February 17, 1956

Card 4/4

20-3-14/52

AUTHORS: Palatnik, L. S., Lyubchenko, A. P.

TITLE: Diffusion in Solid Solutions of Variable Concentration (O diffuzii v tverdykh rastvorakh s peremennoy kontsentratsiyey)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 3, pp. 407 - 410 (USSR)

ABSTRACT: In the present paper an equation is suggested which describes the diffusion in alloys (solid solutions) with variable concentration of the components and in systems with tension- or temperature gradients. In deriving the equations the non-constancy of the values of α_i (the significance of α_i is not mentioned) and of M_i (number of atoms impinging on a surface of $1 cm^2$) is taken into account. No new parameters are introduced and no special assumptions are made. The authors verified this equation experimentally, on which occasion they discovered the effect of counter-diffusion in the cementation of the steel. This counter-diffusion manifests itself by a current of iron atoms and of the atoms of the alloying metals towards the surface of the sample to be cemented. On this occasion a gradient of the activation energy Q of the self-diffusion of the iron is produced. For the computation of the current of the counter-diffusion the authors use the solution of the diffusion equation. The computation is described in detail. A formula for the

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computation of the excess concentration of the Fe-vacancies in the cemented layer is then given. For the determination of the diffusion curve during cementation a thin layer or radioactive iron was applied electrolytically on to the samples to be investigated. The following cementation took 15 hours at a temperature of 910° in a carburizer. The radioactivity of the sample was measured by registering the γ-quanta. The dependence of the specific activity of the layers upon depth thus obtained is illustrated by a diagram. The curve has a maximum with a considerable decrease of the specific activity near the surface, which confirms the existence of a counter-diffusion of the iron. The existence of a counter-diffusion can be confirmed by an additional series of experiments. The relaxation times necessary for the coalescence of the vacancies in the macroscopic pores have the same order of magnitude as the duration of the diffusion annealing. Therefore, the concentration of vacancies can be somewhat lower than the computed value. There are 2 figures, and 6 non-Slavic references.

20-3-14/52

Diffustion in Solid Solutions of Variable Concentration

ASSOCIATION: Khar'kov State University imeni A. M. Gor'kiy (Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo)

PRESENTED: June 17, 1957, by S. A. Vekshinskiy, Academician

SUBMITTED: June 15, 1957

AVAILABLE: Library of Congress

Card 3/3

PALATNIK, L.S.; LANDAU, A.I.

A generalized formulation of Gibbs inequality. Dokl. AN SSSR 114 no.4:837-840 Je '57. (MIRA 10:9)

1. Khar'kovskiy gosudarstvennyy universitet imeni A.M. Gor'kogo. Predstavleno akademikom N.V. Belovym.
(Systems (Chemistry)) (Thermodynamics)

PALATNIK, L S.

3(8) PHASE I BOOK EXPLOITATION SOV/1310

Soveshchaniye po eksperimental'noy i tekhnicheskoy mineralogii i petrografii, 5th Leningrad, 1956.

Trudy... (Transactions of the Fifth Conference on Experimental and Applied Mineralogy and Petrography) Moscow, Izd-vo AN SSSR, 1958. 516 p. 1,800 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut geologii rudnykh mestorozhdeniy, petrografii, mineralogii i geokhimii, and Akademiya nauk SSSR. Institut khimii silikatov.

Resp. Ed.: Tsvetkov, A.I.; Ed. of Publishing House: Ivanov, B.V., Tech. Ed.: Kiseleva, A.A.

PURPOSE: This book is intended for scientists and students of mineralogy and petrography.

COVERAGE: The present collection of articles are reprints of reports presented at the Fifth Conference on Experimental and Applied Mineralogy and Petrography, held in Leningrad on March 26-31, 1956. The

Card 1/[illegible]

Transactions of the Fifth Conference (Cont.) SOV/1310

purpose of the Conference was to exchange information and coordinate the activities in the fields of experimental and applied mineralogy and petrography, and to stress the increasing complexity of practical problems. The Conference was sponsored by the Academy of Sciences of the USSR and organized by its Institute of Ore Deposits, Geology, Petrography, Mineralogy and Geochemistry of the Division of Geological-Geographical Sciences, and the Institute of Silicate Chemistry of the Division of Chemical Sciences. During the Conference special tribute was paid to Academician D.S. Belyankin, (died 1952), founder of applied petrography in the USSR and organizer of the first four conferences and Academician A.N. Zavaritskiy, (died 1953), outstanding petrographer and mineralogist. Of the 76 reports presented, 53 are reprinted in the present volume. Each article is accompanied by diagrams, tables, and bibliographic references.

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[illegible]

21(8) PHASE I BOOK EXPLOITATION SOV/1764

Vsesoyuznaya nauchno-teknicheskaya konferentsiya po primeneniyu radioaktivnykh i stabil'nykh izotopov i izlucheniy v narodnom khozyaystve i nauke Moscow, 1957.

Trudy... Mashinostroyeniye i priborostroyeniye (Transactions of the All-Union Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and Science; Machine and Instrument Manufacturing) Moscow, Izd-vo AN SSSR, 1958. 358 p. 4,500 copies printed.

Sponsoring Agencies: USSR. Glavnoye upravleniye po ispol'zovaniyu atomnoy energii, and Akademiya nauk SSSR.

Editorial Board of Set: V.I. Dikushin, Academicain (Resp. Ed.), N.N. Shumilovskiy (Deputy Resp. Ed.), Yu. S. Zaslavskiy (Deputy Resp. Ed.), L.K. Tatochenko, B.I. Verkhovskiy, S.T. Nazarov, L.I. Petrenko, and N.G. Zelevinskaya (Secretary).

Ed. of Publishing House: P.N. Belyanin; Tech. Ed.: T.P. Polenova.

Card 1/~~20~~

Transactions of the All-Union Conference (Cont.) SOV/1764

PURPOSE: This book is intended for specialists in the field of machine and instrument manufacture who use radioactive isotopes in the study of materials and processes.

COVERAGE: This collection of papers covers a very wide field of the utilization of tracer methods in industrial research and control techniques. The topic of this volume is the use of radioisotopes in the machine- and instrument-manufacturing industry. The individual papers discuss the applications of radioisotope techniques in the study of metals and alloys, problems of friction and lubrication, metal cutting, engine performance, and defects in metals. Several papers are devoted to the use of radioisotopes in the automation of industrial processes, recording and measuring devices, quality control, flowmeters, level gauges, safety devices, radiation counters, etc. These papers represent contributions of various Soviet institutes and laboratories. They were published as Transactions of the All-Union Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and Science, April 4-12, 1957. No personalities are mentioned. References are given at the end of most of the papers.

Card 2/20

PALATNIK, L. S., KOSEVICH, V. M.

"The Investigations of Diffusive and Undiffusive Transformations in Amorphous Antimony Films."

report presented at the Conf. on Mechanical Properties of Non-Metallic Solids, Leningrad, USSR, 19-26 May 1958.

University, Polytechnical Inst., Khar'kov.

PALATNIK, L.S.; BOYKO, B.T.

Aging of Al-Cu alloys of variable composition [1] in thin films. Izv. vys. ucheb. zav.; fiz. no.3:112-116 '58. (MIRA 11:9)

1. Khar'kovskiy gosuniversitet imeni A.M. Gor'kogo i Khar'kovskiy politekhnicheskiy institut imeni V.I. Lenina.
(Aluminum-copper alloys--Metallography)

78-3-3-16/47

AUTHORS: Palatnik, L. S., Landau, A.I.

TITLE: Problems on the General Theory of the Equilibrium Diagrams of Polycomponent Heterogeneous Alloys (Voprosy obshchey teorii diagramm ravnovesiya mnogokomponentnykh geterogennykh splavov)

PERIODICAL: Zhurnal Neorganicheskoy Khimii 1958 Vol. 3 Nr 3 pp. 637-649 (USSR)

ABSTRACT: The problem of the general topological and analytical theory of polycomponent heterogeneous alloys, their equilibrium diagrams and the sections of the equilibrium diagrams were treated. The peculiarities of the topological method of N. S. Kurnakov, as well as the analytical method of Gibbs were discussed. The results of the application of the topoanalytical theory to the thermodynamic problem of polycomponent heterogeneous alloys were used. The suggested method for the determination of the chemical composition of phases by their mass is also employed in the heterogeneous phases with any number of phases and components. Different therm

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78-3-3-16/47

Problems on the General Theory of the Equilibrium Diagrams of Polycomponent Heterogeneous Alloys

dynamic degrees of freedom were introduced: an extensive and an intensive degree of freedom. The formula for the calculation of the extensive thermodynamic degree of freedom is as follows:

$$y_{ext} = q_{ext} + q_{int} + \nu$$

The polycomponent heterogeneous alloys with pseudoextreme pressure and temperature are considered alloys with a small number of components, whereby the investigation and construction of the polycomponent heterogeneous alloys is facilitated. Special potentional functions can also be introduced in these calculations. The employment of the topoanalytical theory for investigations of the geometric construction of the equilibrium diagrams of polycomponent heterogeneous alloys was studied. There are 8 figures and 21 references, 21 of which are Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

SUBMITTED: June 25, 1957

Card 2/2

SOV/70-3-4-10/26

AUTHORS: Palatnik, L.S. and Finkel', V.A.

TITLE: On Certain Regularities in the Structures of Triple Metallic Compounds (O nekotorykh zakonomernostyakh v strukturakh troynykh metallicheskikh soyedineniy)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 4, pp 467-472 (USSR)

ABSTRACT: Analysis of the data published on triple intermetallic compounds shows that the basic regularities established for two-component phases continue to apply to three-component phases. As a rule, two metals have similar values of atomic radii in a three-component system (Cu and Au or Fe and Ni, etc.). For interstitial phases this need not be so and a third metal can be interstitial in an alloy of two others. Numerous regularities (standard types of structures) are observed but there are some alloys which cannot be fitted in. These are characterised by a high Al content and extremely various structure. They are, for example, $Mg_3Cr_2Al_{18}$, $Cr_4Si_4Al_{13}$, β-Cu_2FeAl_7, $Ni_4Mn_{11}Al_{60}$. The main regular classes are:

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SOV/70-3-4-10/26

On Certain Regularities in the Structures of Triple Metallic Compounds

1) Triple electron compounds with electron concentrations of 3/2.
2) Triple interstitial phases. (23 examples quoted).
3) Laves phases, NiAs structures and Sigma phases.

There are 4 tables and 50 references, 17 of which are Soviet, 15 English, 6 German and 12 Scandinavian.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo (Khar'kov State University imeni A.M. Gor'kiy)

SUBMITTED: January 22, 1958

Card 2/2

SOV/70-3-5-13/24

AUTHORS: Palatnik, L.S. and Levchenko, A.A.

TITLE: On the Nature of Electric Erosion in Single Crystals (O kharaktere elektricheskoy erozii na monokristallakh)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 5, pp 612-616 (USSR)

ABSTRACT: The traces left on the surfaces of single crystals of 15 elementary metals after single sparks (as used in the electro-erosion process) were passed to them have been examined microscopically. The holes melted in the anodes had the form of circles and were accompanied by plastic deformation; holes in the cathode surface reflected the characteristic symmetry of the particular crystal planes concerned. The anodic plastic deformation may be of any of the known types.
Previous workers have examined the traces left after multiple discharges (or oscillatory discharges) and not single strokes as here. In general, they confirmed the hypothesis of thermal attack on the surface. Here, the metals Ag, Al, Bi, Cd, Cr, Cu, Fe, Mg, Mo, Ni, Pb, Sb, Sn, W and Zn have been studied. The plastic deformation occurring is classified in each case as gliding, twinning or cleavage and is compared with the kinds of deformation

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SOV/70-3-5-13/24

On the Nature of Electric Erosion in Single Crystals

occurring in the same metals under static loading. Under the same conditions, the holes produced in any one metal were of very constant size. In order of increasing diameter, different metals fell into the series, Bi, Sb, Pb, Sn, Cd, Zn, Mg, Cr, Al, Fe, Ni, Cu, Mo and W. Discharges were made in air and under alcohol. The zones of melted metal were not found to be oxidised. The cathode erosion would be expected to be due to the sudden melting and vaporisation causing a pressure impulse and consequently similar to a "micro-explosion". On an anode surface, the diameter of the damaged area is significantly larger and the pressure wave seems to decay more slowly with time. The thermal conductivity is here an important factor and as the faces examined all had a symmetry axis of order greater than 2, the conductivity surface has here a circular section. There are 3 figures, 1 table and 13 references, 11 of which are Soviet and 1 Scandinavian, 1 German.

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SOV/70-3-5-13/24

On the Nature of Electric Erosion in Single Crystals

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut imeni V.I. Lenina (Khar'kov Polytechnical Institute imeni V.I. Lenin)

SUBMITTED: September 4, 1957

Card 3/3

SOV/70-3-6-9/25

AUTHORS: Palatnik, L.S. and Kosevich, V.M.

TITLE: An Investigation of the Crystallisation of Antimony in Thin Films (Issledovaniye kristallizatsii sur'my v tonkikn plenkakh) Part I. The α- and β-transformations (I. α- i β-prevrashcheniya)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 6, pp 709-715 (USSR)

ABSTRACT: It has been earlier established that an amorphous phase occurs in thin films of antimony. Two transformations α- and β- were distinguished when these layers crystallised. Here the crystallisation of amorphous layers of antimony, evaporated onto amorphous substrata (quartz or collodion) is examined. Observations were made of the electrical resistance and also metallographically and electronographically. Films were condensed at 8×10^{-7} g/cm^{2}sec. Initially, the Sb appears chestnut and then develops blue spots, the latter (as shown electronographically) being a crystalline phase. This is the α-transition. A graph of the dependence of the time for full transition to the crystalline state on the thickness of the layer is given. h_α is the thickness

Card1/4 less than which crystallisation does not occur and h_1

An Investigation of the Crystallisation of Antimony in Thin Films Part I. The α- and β-transformations

is the thickness for which crystallisation is complete in one minute. The time of condensation of the film t is given by $t = dh/w = 0.074\ h$ secs (d is the density of Sb and $w = 8 \times 10^{-7}$ g/cm^{2}sec the rate of condensation). The rate of growth of crystalline spherulites in an amorphous layer as a function of its thickness was measured microscopically. The stability of the Sb as an amorphous thin film can be explained if it is regarded as a super-cooled liquid with a co-ordination number of 3. On the sudden cooling, a compression of the film arises but at a temperature below that of crystallisation, bonds with the substrate are established and the substrate is compressed. The resulting tension stabilises the amorphous phase. This tension decreases in the Sb as the thickness increases. Amorphous phases are known in other metals for layers of 30-50 Å (Co, V, Cr, Be) but here the thickness of a stable layer can be 270 Å. Using diffraction methods, a diagram of the α- and β-transformations has been established. There are three

SOV/70-3-6-9/25

An Investigation of the Crystallisation of Antimony in Thin Films
Part I. The α- and β-transformations

regions, amorphous Sb up to about 250 Å thickness, then a region of amorphous + crystalline and then a region of crystalline Sb divided off by the lines "end of α-transformation" and "β-transformation". The latter run from a thickness of 500 Å at a deposition rate ω of 10^{-7} g/cm^{2}sec to 1 500 Å at a rate of 10^{-4} g/cm^{2}sec. For low rates of deposition a phenomenon of "super-thickening" can occur where the α-transformation stops and the β- has not yet begun; this can amount to 100-300 Å. The β-transformation takes place almost instantaneously. X-ray diffraction shows that the structures formed by the β- and α-transformations are identical. The α-transformation can be regarded as a diffusion separation of amorphous Sb into "holes" and crystalline Sb. The β-transformation is a definite step like the known diffusion-less martensitic transformation. Although diffusionless, in amorphous Sb the co-ordination number is 4 whereas in the crystalline material it is 3. Other resemblances and differences to the martensitic transformation are discussed.

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SOV/70-3-6-9/25

An Investigation of the Crystallisation of Antimony in Thin Films. Part I. The α- and β-transformations

There are 5 figures and 13 references, 11 of which are Soviet and 2 English.

ASSOCIATIONS: Khar'kovskiy gosudarstvennyy universitet im A.M. Gor'kogo (Khar'kov State Universtiy im. A.M. Gor'kiy) Politekhnicheskiy institut im. V.I. Lenina (Polytechnic Institute imeni V. I. Lenin)

SUBMITTED: January 14, 1958

Card 4/4

SOV/126-6-3-22/32

AUTHORS: Palatnik, L. S., Lev[illegible], A. [illegible], [illegible], A.F. and
Terletskiy, V. Ye.

TITLE: Determination of the Type of Equilibrium Phase Diagram
for Cu-Ni at High Temperatures by Spectral Analysis.
II. (Opredeleniye tipa diagrammy ravnovesiya Cu-Ni v
oblasti vysokikh temperatur metodom spektral'nogo
analiza. II)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 3,
pp 540-544 (USSR)

ABSTRACT: Palatnik's spectral method (Ref 1) is applied to systems consisting of liquid plus vapour; the method utilises the fact that the selective evaporation (or retention) of a component is dependent on the type of interaction (i.e. ultimately the type of euilibrium diagram). Spark discharges are passed through the vapour, using as solid electrode a sample of the alloy; the surface of the electrode becomes depleted by selective evaporation (solid-state diffusion negligible). The main application is to binary systems, in which only three types of diagram exist, and where the type of diagram can therefore be readily established (from the deviations from Raoult's

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SOV/126-6-3-22/32

Determination of the Type of Equilibrium Phase Diagram for Cu-[illegible] at High Temperatures by Spectral Analysis. II.

law on varying the composition). The Cu-Ni alloys used were prepared by sintering the pressed powders in [illegible] at 950°C for one hour. The Cu was electrolytic; the Ni was prepared from nickel oxalate by hydrogen reduction. Fifteen alloys were used. Spark lines of Cu II and Ni II were used as reference lines; the wavelengths are given in Table 2. Fig. 2 shows how the experimental curve (top) compares with the liquid-vapour (middle) and solid-liquid (bottom) equilibrium curves. It is pointed out that the middle curves are really only deduced from the experimental spark curves, and are only very approximately correct. The tendency to selective evaporation, although slight, indicates that a narrow two-phase region may exist in the liquid. There are 2 tables, 3 figures and 2 references, one of which is a Soviet original [illegible] translation of [illegible] by [illegible].

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SOV/126-6-3-22/32

Determination of the Type of Equilibrium Phase Diagram for Cu-Ni at High Temperatures by Spectral Analysis. II.

ASSOCIATIONS: Khar'kovskiy gosudarstvennyy universitet imeni
A. M. Gor'kogo (Khar'kov State University imeni
A. M. Gor'kiy) and
Khar'kovskiy politekhnicheskiy institut imeni V.I.Lenina
(Khar'kov Polytechnical Institute imeni V. I. Lenin)

SUBMITTED: September 15, 1956

1. Copper-nickel alloys--Analysis 2 Copper-nickel alloys--Sintering
3. Copper-nickel alloys--Phase studies 4. Hydrogen--Applications

Card 3/3

AUTHOR: Palatnik, L. S. SOV/126-6-3-26/32

TITLE: Use of Spectral Analysis with Multicomponent Alloys at High Temperatures (O primenenii spektral'nogo analiza k issledovaniyu mnogokomponentnykh splavov v oblasti vysokikh temperatur)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 3, pp 565-567 (USSR)

ABSTRACT: Palatnik attempts to dispose of the objections made in the previous paper by saying that the processes occurring at electrodes in spark discharges have not been studied at very high temperatures; he tries to support his diffusion theory by saying that the period of lattice vibration is much shorter than 10^{-6} sec, though this has no real bearing on the issue. Some other theoretical arguments regarding the general application to determining types of phase diagram he advanced are considered (in a note from the editors) to indicate that further discussion on the topic is useless until more experimental and theoretical work has been done. There are 7 references, all Soviet.

SUBMITTED: March 16, 1957

Card 1/1 1. Metals--Spectrographic analysis 2. Spectrographic analysis--Theory 3. Spectrographic analysis--Temperature factors 4. Electric discharge --Properties 5. Diffusion--Theory