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Kornilov, I. I. The conversion rate of magnesium-cadmuim alloys into solid solutions Moskva, Izd-vo Akademii nauk SSSR, 1935.

53 p. Cyr. 4 TN 26

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BC

A-1

PROCESSES AND PROPERTIES INDEX

Velocity of polymorphic transformation of the compound $MgCd$ in the system magnesium-cadmium. I. I. Kornilov (Bull. Acad. Sci. U.R.S.S., 1937, 313—321).—Hardness, conductivity, and microstructural changes indicate that the transition point of α- to β-$MgCd$ is at 218°. The hardness of the alloys increases to a max. during the transformation, owing to internal stresses involved in the rearrangement.

R. T.

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Cu

9

Solubility of copper in magnesium in the solid state.
K. I. Stepanov and I. I. Korniloy. *Ann. inst. anal phys.-chim.* (U. S. S. R.) 7, 89-98(1935); cf. S., *C. A.* 7, 11.—Study of the elec. cond., thermal coeff. of elec. resistance and hardness of Mg-Cu alloys contg. 0.01-4% Cu, either cast or tempered at 300°, 400° and 480° and then water-quenched, showed the following solubilities of Cu in Mg: 480° 0.55, 400° 0.3 and 300° 0.2%.
Chas. Blanc

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3RD AND 4TH ORDERS

M

2

***Electrolytic Production of Alloys of Zinc and Barium, and Their Constitutional Diagram.** I. I. Kornilov (*Zvetnye Metally* (*Non-Ferrous Metals*), **1955**, (10), 73-84; C. (Ex., 1937, **31**, 3792). [In Russian.] Alloys of zinc and barium were made by electrolysis of molten $BaCl_2$ with molten zinc serving as a cathode. Barium, separated electrolytically, alloys with molten zinc. The maximum barium content obtained was 11%; alloys with a greater barium content could not be obtained, because of evaporation of zinc. Microscopic and chemical examination, thermal analysis, and hardness tests of cast and heat-treated alloys indicated absence of solid solutions. The alloys were found to consist of a matrix of pure zinc and a second phase roughly corresponding to the formula $Zn_{12}Ba$. The melting point of the alloys increases from that of pure zinc to about 900° C. at 10·6% barium. The freezing point of the alloys is that of pure zinc. The microstructure is typical of anti-friction alloys. 7 *references* are given. S. G.

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PROCESSES AND PROPERTIES INDEX

Co

2

Correlation of the period of conversion and the chemical composition of an equilibrium system. I. I. Kornilov. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* 1938, 437-49(in English, 449).—A discussion of the relation of the velocity of conversion to the character of the substances participating in a reaction and of the type of the compn.-reaction velocity curve, as well as expti. data obtained in the study of the polymorphic conversion of the compd. $HgCd$ and a study of some literature data on the change of the properties of reaction products with the period of conversion. A conclusion is drawn that in a uniform system intermediate compds. are formed in the process of conversion, and the concn. of these new phases can change throughout the entire range of 0-100%. 30 references.

J. G. Tolpin

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CA

9

The fusion diagram of magnesium-cadmium alloys. N. I. Stepanov and I. I. Kornilov. *Ann. secteur anal. phys.-chim., Inst. chim. gén.* (U. S. S. R.) 10, 67-77 (1938).—In the thermal investigation of Mg-Cd alloys the danger of oxidizing the melt and overcooling during crystn. was overcome by working in a closed system in a H_2 atm. and mixing the melt in a closed Fe crucible by vertical rocking. An Fe tube, closed at the top and provided with a Pt:Pt-Rh thermocouple, was welded into the crucible bottom. Mixts., varying in at. % of Mg (sublimed) from 25 to 60%, were heated to 700° and then allowed to cool. The diagram consists of 2 branches intersecting at the point corresponding to the compd. MgCd, crystg. at a definite temp. (429°). The crystn. temp. is affected by the purity of metals used. Only the melt with 50% Mg showed a definite max.; this disproves the formation of $MgCd_2$ during crystn., which, according to Hume-Rothery and Rowell (*C. A.* 31, 3528), is formed by the peritectic reaction of the Mg-Cd melt. The absence of the $MgCd_2$ and the transition of MgCd from the α to β cryst. modification at 250° was confirmed by microscopic examn. of the annealed melts (cf. Grube, *Z. anorg. Chem.* 49, 72(1906). **The velocity of transition in magnesium-cadmium alloys in the region of the compound Mg_2Cd.** *Ibid.* 78-95; cf. *C. A.* 30, 2807°.—The velocity of chem. transition of solid solns. of Mg-Cd, varying in at. percentage of Mg from 72 to 78%, was studied by the previous method of measuring the elec. cond. at various temps. A max. in the curve at 75 at. % Mg proves that Mg_2Cd has the max. rate of transition. The change in the structure of annealed solid solns. during the transition to a chem. compd. was studied by alternate heating at 100° and rapid cooling with H_2O. A series of photomicrographs shows that in the course of gradual transition the polyhedral microstructure of the solid soln. becomes increasingly cleaved, this indicates that the formation of Mg_2Cd is accompanied by a considerable vol. contraction. Approx. 25 references. **The velocity of transition in magnesium cadmium alloys in the region of the compound $MgCd_2$.** *Ibid.* 97-112. In the similar study of Mg-Cd alloys with 20-8 at. % Mg, the curve shows a max. at 25 at. % Mg, this indicates that $MgCd_2$ has the max. rate of transition. A similar change in the crystal structure during the chem. transition to $MgCd_2$ took place.

Chas. Blanc

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*Rate of Transformation of the Alloys of Magnesium with Cadmium in the Region of the Compound Mg_2Cd. N. I. Stepanov and I. I. Korniloff (Izvest. Sekt. Fiziko-Khimich. Analiza (Ann. Sect. Anal. Phys. Chim.), 1938, 10, 79-95).- [In Russian.] See I. I. Korniloff, Met. Abs., 1936, 3, 514. N. A.

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*Rate of Formation of the Compound $MgCd_2$ on Precipitation from the Magnesium Cadmium Solid Solution. N. I. Stepanov and I. I. Korniloff (*Izvest. Sekt. Fiziko-Khimich. Analiza* (*Ann. Sect. Anal. Phys.-Chim.*), 1938, 10, 97-112). — [In Russian.] See I. I. Korniloff, *Met. Abs.*, 1936, 3, 514. — N. A.

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"Ruby" slag of recrement of aluminothermal production of metallic chromium. N. N. Kurnakov, I. I. Kornilov and G. B. Boky. *Compt. rend. acad. sci. U. R. S. S.* 18, 561-4(1938)(in English).—Large red crystals found in the slag after prepn. of Cr by reduction of Cr_2O_3 with Al have essentially the properties of corundum, but contain 4.04–7.57% Cr_2O_3 and so can be considered as a form of ruby. H. M. Leicester

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*Kinetics of the Formation of Mg_3Cd and $MgCd_3$ from Solid Solutions of Mg-Cd Alloys. I. I. Kornilov. (*Dokl. Akad. Nauk S.S.S.R.* (*Compt. rend. Acad. Sci. U.R.S.S.*), 1938, 19, (3), 157-160 (in Russian); and *Compt. rend.* (*Doklady*) *Acad. Sci. U.R.S.S.*, 1938, [N.S.], 19, (3), 157-160 (in English)).—Volume changes associated with a gradual formation of Mg_3Cd and $MgCd_3$ from solid solutions of magnesium and cadmium at 100° and 0° C., respectively, were measured. The rate of the change is proportional to the mass of the transformed substance and can be expressed by the equation for a monomolecular reaction.—N. A.

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The Aluminothermic Process for the Production of Chromium-Aluminium Alloys. I. I. Kornilov and V. S. Mikeev (*Dokl. Akad. Nauk S.S.S.R. (Compt. rend. Acad. Sci. U.R.S.S.)*, 1938, **20**, (9), 665-668 (in Russian); and *Compt. rend. (Doklady) Acad. Sci. U.R.S.S.*, 1938, [N.S.], **20**, (9), 665-668 (in English)).—A description of the well-known process of producing alloys is given.—N. A.

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PROCESSES AND PROPERTIES INDEX

Rate of Transformation of Supersaturated Magnesium Aluminium Solid Solutions. I. I. Kornilov (*Dokl. Akad. Nauk S.S.S.R.* (*Compt. rend. Acad. Sci. U.R.S.S.*), 1938, **21**, (4), 171–174 (in Russian); *Compt. rend.* (*Doklady*) *Acad. Sci. U.R.S.S.*, 1938, [N.S.], **21**, (4), 172–175 (in English)). An investigation, by micro-examination and hardness measurements of the rate of transformation under isothermal conditions, of the alloy containing 11·9% aluminium, showed that the time for the complete transformation increases on decreasing the temperature, and approaches infinity at 140°–100° C. The process of deposition originates from the boundaries of the polyhedra, the increase in hardness proceeding parallel to the separation of the excess phase.
—N. A.

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Conversion velocity of supersaturated solid solutions of magnesium-aluminum. I. I. Kornilov. *Compt. rend. acad. sci. U. R. S. S.* 21, 172-3(1938)(in English).—Investigations of excess phase pptn. with supersatd. solid soln. of Mg-Al alloys (11.9% Al) at 350, 300, 250, 150 and 100° led to the establishment of the full conversion time and its relation to temp. in the form of a curve the zero value of which corresponds to the mtn. point (425°) of a solid soln. on the soly. curve. The conversion time curve with increasing temp. goes off into infinity at about 140-100°, this being the interval of the unstable, tempered condition of alloys. The change in microstructure showed that the conversion process is heterogeneous. The hardness changes in accordance with the change in microstructure. During isothermic conversions in the interval of usual aging temps. the hardness rises parallel with the pptn. of the excess phase. A. H. Krappe

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Technology of new heat-resisting chromium-aluminium steels of high electrical resistivity. I. I. I. Korniloy. III. I. I. Korniloy and U. S. Michrev (Compt. rend. Acad. Sci. U.R.S.S., 1939, 24, 904—906, 911—914; cf. B., 1939, 1049; A., 1940, I, 156).—I. Four groups of Cr-Al-Fe alloys of high sp. electrical resistance, low temp. coeff. of resistance, and high heat-resistance are described. They are conc. homogeneous solid solutions of Cr and Al in α-Fe and their high heat-resistance is attributed to the formation of a homogeneous surface film of Al_2O_3, Fe_2O_3, and Cr_2O_3 in solid solution. Possible uses of these alloys are listed.

III. An aluminothermic method has been developed by which Al-Cr and Fe-Cr-Al alloys are prepared by combining the process of melting the Fe in a crucible with reduction of Cr oxide and Cr ore concentrates by excess of Al. By this method Al-Cr steels of any desired composition (Al >20%) have been prepared. These steels contain very much less C, Si, and Mn than those prepared by adding Al at the end of the steel-smelting process, and, in addition, less oxidation of the Al occurs and more homogeneous distribution of the Al results. Slags of CaO, MgO, and Al_2O_3 were used in smelting the new Cr-Al steels. The thermal and electrical resistance of these new steels is high. Typical specimens, e.g., Cr 10—50, Al 0—20, Fe 65—68 and 55—58% are discussed; these contain ~8—10 times less C and 3—4 times less Si than do chromal or fechral. Steels containing Cr 10—50 and Al 0—10% can be forged, but alloys with 20% Al cannot be forged, although they give uniform solid solutions.

3C

B-I-C

Steels with Cr >45 and Al >10% can be hot-rolled to 5-mm. wire, ribbon, etc. Steels with an Al content > that of chromal can also be cold-rolled. Although rather brittle at room temp., the steels become plastic at 200—400°. The use of these steels as substitutes for nichrome and Pt as electric heating elements and as substitutes for high-resistivity steels is indicated.

W. R. A.

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Equilibrium diagram of the ternary system iron-chromium-aluminium. II. I. I. Kornilov, V. S. Michaev, and G. K. Konenko-Gratschova (Compt. rend. Acad. Sci. U.R.S.S., 1939, 24, 907—910).—Thermal properties, micro-structure, hardness and conductivity of the ternary system Fe-Cr-Al have been investigated over the range 0—40% Al and 0—100% Cr. A region of ternary solid solutions has been found, existing in alloys quenched from 1150° and annealed at this temp. with subsequent slow cooling. The solid solubility of Al in α-Fe is decreased by the addition of Cr for quenched steels and for annealed alloys there are, in addition, transformations in the solid state. It is confirmed that the electrical resistivity increases with the concn. of the solid solutions. W. R. A.

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CA

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New heat-resistant iron-chromium-aluminum alloys of high electric resistance. J. J. Kornilov. *Bull. acad. sci. U. R. S. S., Classe sci. chim.* **1940**, 751-61; cf. *C. A.* **34**, 4040[8].—Carbon-free Cr-Al, manufd. according to Mikheev's process, were used for producing Cr-Al steels of high quality with a min. contents of C, Si, Mn, etc. An inexpensive alloy suitable for rheostats was produced; it can be substituted for constantan, nickeline and nichrome. Alloy No. 1 is a substitute for nichrome and fechral; alloy No. 2 is a substitute for nichrome, chromal and platinum; alloy No. 3 is a substitute for the silit and platinum in elec. heating units. The new alloys are very stable at high temp. The high heat resistance of the homogeneous ternary solid soln. Fe-Cr-Al and the oxidation of these alloys are discussed theoretically. Alloys No. 1 and 2 were found satisfactory for elec. heating by practical tests. 15 references.

S. Machelson

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Equilibrium Diagram of the Ternary Iron-Chromium-Aluminium System (Preliminary Communication). I. Korniloy, V. Mikheev and O. Konenko-Grachova. (Stal, 1940, No. 5–6, pp. 57–59). (In Russian). Alloys containing up to 40% of aluminium and up to 100% of chromium (impurities: carbon 0·02–0·4%, sulphur 0·06–0·1%, phosphorus <0·005–0·006%) were studied along sections parallel to the Fe-Cr and Fe-Al systems, using thermal analysis, microscopic examination and measurements of hardness and electrical conductivity. A melting-point diagram has been constructed. The ternary solid solubility decreased with temperature. The electrical resistance of the ternary solid solution increased with the concentration of chromium and aluminium. Like the electrical resistance of the ternary solid solution, preliminary experiments showed that the resistance to scaling increased with increasing aluminium content for a constant chromium content. The resistance to scaling was affected by the homogeneity of the alloys, being greater in the homogeneous alloys. Thus alloys with 15–25% of chromium and 5–6% of aluminium were more resistant to scaling than alloys with 28–30% of chromium and 5–6% of aluminium.

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New Heat-Resistant Alloys of the Fe-Cr-Al Type with High Electrical Resistance. I. Kornilov. (Stal, 1940, No. 5-6, pp. 59-60). (In Russian). On the basis of the determination of the equilibrium diagram and the use of low-carbon chromium-aluminium hardeners, new heat-resistant alloys of the iron-chromium-aluminium type have been developed which are claimed to be superior to existing alloys of this kind. Unfortunately no compositions are given, but the following properties are claimed: Alloy (1) containing 78-90% of iron, tensile strength 50-60 kg. per sq. mm.;

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elongation 18–25%; working temperature 1000–1100° C.; specific electrical resistance 1·40–1·60 ohms per sq. mm. section per m. length; temperature coefficient of resistance 0·00005. Alloy (2) containing 68–69% of iron, tensile strength 60–65 kg. per sq. mm.; elongation 18–20%; working temperature 1200–1250° C.; specific electrical resistance 1·45–1·70 ohms per sq. mm. per m.; temperature coefficient 0·00004. Alloy (3), containing 50–55% of iron, working temperature 1350–1400° C.; specific electrical resistance 1·70–1·90 ohms per sq. mm. per m.; temperature coefficient 0·00003. A rheostat alloy was also developed; this contains 85–90% of iron, has a working temperature of 600–800° C. and a specific electrical resistance of 1·20–1·40 ohms per sq. mm. per m. Alloys (1) and (2) and the rheostat alloy can be cold- and hot-worked. Alloy (3) can only be hot-worked. The hot-drawing of alloy (3) into wire is now being developed. All these alloys can be gas and arc welded. A 1/1 mixture by weight of CaF_2 and KCl is recommended as a flux for welding.

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KORNILOV, I. I.

B.T. B.M.I. 1254

I. I. Kornilov and V. Nikheev, Commercial Production of New Chrome-Aluminum Steels with the Use of Key Alloys. STAL, vol. 10, 1940, pp. 14-18; 4900 words.

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3RD AND 4TH ORDERS

6

M

*Diagram "Composition-Thermostability" of the Ternary Solid Solution of Iron-Chromium-Aluminium Alloys. I. Korniloy and R. Minte (*Compt. rend. (Doklady) Acad. Sci. U.R.S.S.*, 1942, 36, (3), 78-82).—[In English.] The "thermostability," *i.e.* resistance to oxidation, at high temperatures was investigated for a series of iron-rich alloys containing chromium up to 30% and aluminium up to 17%. Specimens were heated in air at 1100°, 1200°, 1300°, and 1400° C. for periods up to 240 hrs., with similar results. Data for 1200° C. are tabulated in full, the thermostability being expressed as loss of weight in grm./m.²/hr. The thermostability for any chromium content was found to be considerably higher in the presence of aluminium. The results are clearly expressed in the form of contours of constant loss of weight plotted on a triangular composition diagram, and show that an increase in the chromium and aluminium content of the ternary solid solution gives increased resistance to oxidation. The analogy between these curves and other property-composition diagrams is pointed out.—G. V. R.

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ca

Nature of the oxide film of Fe-Cr-Al solid solutions. I. I. Kornilov and I. I. Sidorishin. *Doklady Akad. Nauk S. S. S. R.* **42**, 21-4(1944); *Compt. rend. acad. sci. U. R. S. S. S. R.* **42**, 20-3(1944)(in English); cf. *C. A.* **37**, 2701[9]. A study was made of oxide film formation on an alloy I consisting of 70% Fe, 25% Cr and 5% Al which heated to 400°, 500°, 600°, 700°, 800°, 1000° and 1200° for 12 hrs. Electronographs, supported by x-ray and chem. analyses, showed that the surface oxidation of I proceeds, at moderate temps., with formation of an isomorphous mixt. of oxides of Fe, Cr and Al. At higher temps. of oxidation, the lattice const. of the surface oxide layer decreased and at the limit approached that of pure γ-Al_2O_3. Selective oxidation of Al occurs at higher temps., the O being furnished by the atm. or by the oxides of Fe and Cr in the oxide film. A superficial film of substantially pure Al_2O_3 possesses no protective properties, crumbles off easily and constitutes the portion that is detd. when thermal stability is studied by the loss in wt. method. Thermostability of I is brought about by formation of a film of solid soln. of oxides of Fe, Cr and Al, but is impaired by aluminothermic reduction of Fe and Cr oxides in the protective film.

I. W. Perry

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Theory of Oxidation of Iron-Chromium-Aluminium Solid Solutions. I. I. Korniloy (*Compt. rend. (Doklady) Acad. Sci., U.R.S.S.*, 1944, **42**, (4), 181-184).—[In English.] See preceding abstract. The mechanism of oxidation of iron-chromium-aluminium alloys in air at high temperatures consists of two stages: (*a*) oxidation of all three metals on the surface; (*b*) aluminothermic reduction of the oxides of chromium and iron where the surface film is in contact with aluminium atoms. The net result is enrichment of the film in aluminium oxide and a decrease in the aluminium content of the outer layers of the alloy. This leads to an outward diffusion of the aluminium in the alloy from the central portions. Experiments with a series of alloys containing 15–18% chromium and 3–15% aluminium show that the higher the initial concentration of aluminium in the solid solution, the smaller is the relative rate of its loss by oxidation.—G. V. R.

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CD

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Aluminothermal production of low-carbon intermediary alloys and ferrochrome. I. I. Kornilov and V. S. Mikheev. *Doklady Akad. Nauk S.S.S.R.* 43, 16–18; *Compt. rend. acad. sci. U.R.S.S.* 43, 16-28(1944)(in English); cf. *C.A.* 38, 2613[9].—Because of unfavorable heat balance, 10-30% of O-furnishing materials, e.g., KNO_3, $KClO_3$, $K_2Cr_2O_7$, $NaNO_3$, were used in conjunction with reduction of roasted chromite by Al to produce Fe-Cr and Fe-Cr-Al alloys contg. less than 0.1% C and less than 1.5% Si. The Si content of the chromite was reduced to less than 0.5% prior to reduction with Al. In some expts., CaO was used in the reduction process to produce low-melting slag.

J. W. Perry

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A cyclic process of aluminothermal production of C-free ferro-alloys. I. I. Kornilov. *Doklady Akad. Nauk S.S.S.R.* **44**, 112-15; *Compt. rend. acad. sci. U.R.S.S.* **44**, 104-7(1944)(in English).—The slags obtained on reducing roasted chromite with Al were treated with various alkalies and then leached to recover Al_2O_3. The latter was electrolytically reduced to Al which was reused in the reduction step (cf. preceding abstr.). The cyclic process resulted in an improved degree of recovery (80-85%) of the Cr from the ore concentrate. J. W. Perry

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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KORNILOV, I. I.

Iron-Chromium-Alluminum Alloys, Published by Academy of Science, Moscow 1945.

Institute of General and Inorganic Chemistry, Laboratory of the Iron Alloys.

B-68125, 1 Sep 53

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

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CA

2

Melting diagram of the chromium-manganese system. I. I. Kornilov and A. I. Tat'yanchikova. *Akad. Nauk S.S.S.R., Referaty, Otdel. Khim. Nauk* 1948, 19.—The system has a broad range of solid soly., Mn being sol. in Cr almost to 60% where a gap occurs due to the lattice difference of Cr and γ-Mn.

N. Thon

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2

Relation between the velocity of reaction in solid solutions and the chemical composition of the equilibrium system. I. Velocity of reduction of chromites and of oxides of iron and chromium. I. L. Korniloy and E. A. Kremlaeva. *Akad. Nauk S.S.S.R., Referaty Otdel. Khim. Nauk* 1945, 21-8.—Pure oxides of Fe and Cr, including their mech. mixts., are reduced by Al instantaneously (3-5 sec.) at 750-800°, by Si at 1150-1200°; the same applies to chromite ignited with CaO, whereas natural chromite, ignited or not without CaO, requires 10-15 min. N. Thon

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PROCESSES AND PROPERTIES INDEX

Classification of the Solubility of Elements in Iron. I. I. Kornilov. (*Izvest. Akad. Nauk S.S.S.R.*, **1945**, [Khim.], (2), 104–112).—[In Russian.] A consideration of the solubility of elements in iron shows that the atomic diameters of elements which are completely soluble in iron do not differ by more than 8% from the atomic diameter of iron, while the atomic diameters of partially soluble elements differ by 8–15%, and the elements for which the difference is still higher (>20%) are insoluble in iron. It is therefore possible to predict the likely degree of solubility of a metal in iron from its atomic diameter.—V. K.

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621.315.551 : 621.365.4 – 82

The application of alloy No. 2 for heating elements of high-temperature furnaces. KORNILOV, I., AND NIKOLSKY, N. *Bull. Acad. Sci., USSR* (No. 9) 825 30 (1945) *In Russian.*—A new Fe Cr Al alloy containing 23·8% Cr and 4·7% Al displays very favourable heat-resisting and anti-oxidation characteristics, resistivity being 1·28 Ω/mm²/m. A furnace heating element made up from ribbon of the alloy has run successfully at 1 250 1 270°c for 12 000 hrs. The alloy is recommended for use in industrial furnaces operating in this range. L. B. A.

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CA

9

Melting diagram of the chromium-manganese system. I. I. Kornilov and A. I. Tat'yanchikova. *Doklady Akad. Nauk S.S.S.R.* 90, 223-5(1945); cf. *C.A.* 42, 6219i.—In a study of the melting region of the Cr-Mn system use was made of electrolytic Cr with 0.01 C, 0.02 Fe, and 0.02% Si, and electrolytic Mn with 0.01 C, 0.002 Fe, 0.04% S, and no Si. The alloys were melted in fused Al_2O_3 crucibles in an induction furnace. Cooling curves were obtained for 14 compos. from 39.9 to 100% Mn, and the thermal arrests and microscopic appearances are tabulated. Only microscopic studies were made of three higher-melting compos., 27.2, 14.4, and 8.7% Mn. Addnl. data were obtained by heating alloys to 1100° in vacuum for 24 hrs. and then quenching in H_2O or furnace cooling in vacuum during the course of 48 hrs. The liquid-solid reaction consists of a peritectic horizontal at 1350° extending from about 70 to 80% Mn, and joined by solid soln. reactions to the m.p. of Cr and of Mn. The Cr solid soln. is interrupted by transformation into the CrMn intermetallic compd. at about 50% Mn. Two solid reactions are shown, a peritectoid horizontal at about 1000° extending from about 85 to 95% Mn, and a eutectoid horizontal at about 950° extending from about 70 to 85% Mn. The limit of soly. of Cr in Mn after annealing is 5%. The eutectoid structure is like that of pearlite.

A. G. Gay

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Korniloy, I. I.

Mechanical Properties of Iron-Chromium-Aluminum Ter-
nary Alloys

up to 25% and aluminum

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4

Laboratory resistor furnaces with resistors of "alloy No. 2." I. I. Kornilov and A. V. Kuz'min. *Zavodskaya Lab.* 12, 87-8(1946); cf. C.A. 41, 2616h. The alloy is used as substitute for nichrome in resistor furnaces. At 900-1000°, coils made of alloy No. 2 last as long as, and in some cases longer than, nichrome coils. The max. temp tolerated is 1250°. The No. 2 alloy coil contains Al more than 4.5%, C less than 0.08%. Resistivity of the wire is 1.3-1.4 ohms/sq. mm./m. At 1000° the alloy reacts noticeably with Si and Fe. The coating on the coil should contain not over 10% Si and not over 3% of Fe_2O_3. The coating consists of Al_2O_3 50, grog (ground to 3 mm.) 30, and grog clay 20%. The mass is dried before use at 150-200° until hardened. W. R. Henn

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CA

Equilibrium diagram of the ternary system iron-chromium-aluminum. A. I. Kornilov, V. S. Mikheev, O. K. Kotenko-Grachova, and R. S. Mints. *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* **16**, No. 2, 100-15(1946); cf. *C.A.* **34**, 4041[1]; **42**, 5300h.—The object of this study were alloys with up to 100% Cr and up to 60% Al. The most significant of these were ternary alloys forming a solid soln. of the 3 components and designated as α_3. The boundary of α_3 was traced on a phase diagram. The electroresistance of α_3 increased more with an increased Al content than with a rise in the Cr content. As the Al and Cr increased, the temp. coeff. of the electroresistance decreased. At a const. Cr content, Al increased the dilation of the alloys, whereas Cr decreased thermal dilation. M. Hosch

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M

4-27. **Solid Solutions.** I. I. Kornilov. *Iron and Steel*, v. 19, Feb. '48, p. 52-56.

Solubilities of elements in iron in the solid state from the point of view of Hume-Rothery's size factor theory. The size factor alone is adequate to account for the experimental results except in the case of cerium and certain elements of the B sub-groups of the fourth and fifth periods of the periodic system. (Translated from Izvest. Akad. Nauk, U.S.S.R. (Khim), v. 2, 1945, p. 104, by G. Stanley Smith.)

B-71187, 28 Dec 53

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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2

The Rate of Oxidation of High-Chromium Fe-Cr-Al Alloys. I. I. Kornilov and A. I. Shpikelman (*Compt. rend.* (*Doklady*) *Acad. Sci. U.R.S.S.*, 1946, 53, (9), 805-808).—[In English]. The rate of oxidation of alloys containing chromium 40, aluminium 2, 4, 7, 8, 10, and 13% and iron remainder, was measured at 1200° C. by determining the weight loss. The results of oxidation lasting 1000 hr. show that the rate of oxidation decreases with an increasing aluminium content in the alloy, attaining a minimum with an aluminium content of 10-12%. The process of oxidation is followed by a loss in aluminium content of the alloy and an increase in its chromium content.
—V. K.

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B

Rate of Oxidation of High-Chromium Iron-Chromium-Aluminum Alloys. I. I. Kornilov and A. I. Spikelmann. *Reports of the Academy of Sciences of U.S.S.R.*, v. 53, Sept. 21, 1946, p. 813-816. (In Russian.)

The oxidation process at high temperatures is assumed to consist of: first, oxidation of the three components; and second, diffusion of aluminum on the surface of the alloy. To aid in development of high temperature alloys, a series of high-chromium alloys were investigated for chemical constitution, weight loss, and changes in electrical properties, after 1000 hrs. at 1200°C. Results are presented in chart form. The most heat-resistant combinations found were: 25% Cr, 7-10% Al; and 40% Cr, 10-13% Al.

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M

2

*The Rate of Oxidation of Austenitic Iron-Chromium-Nickel Alloy. I. I. Kornilov and A. I. Shpikelman (*Compt. rend.* (*Doklady*) *Acad. Sci. U.R.S.S.*, 1946, 54, (6), 511–517).—[In French]. An alloy containing carbon 0·62, silicon 1·74, chromium 23·19, nickel 20·81, manganese 0·35%, and iron remainder, was oxidised at 1100° and 1200° C. for times up to 750 hr., and subsequently analysed for losses in the alloying elements. The results show that at 1100° C., carbon, silicon, and chromium losses amount to 61·3, 56·9, and 5·5% of their initial values, while at 1200° C., carbon and silicon are reduced by 70·1 and 67·8%, and chromium increased by 6·1%. Nickel contents are increased in both cases by 5·5 and 6·8%, respectively. The change in the oxidation of chromium at higher temp. is explained by the reduction of chromium oxide with silicon.—V. K.

A58-51A METALLURGICAL LITERATURE CLASSIFICATION

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KORNILOV, I. I.

1ST AND 2ND ORDERS | 3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

Speed of oxidation of the austenite-type iron-chromium-nickel alloy. I. I. Kornilov and A. I. Shpitel'man. *Compt. rend. acad. sci. U.R.S.S.* 54, 511-14(1946)(in French); cf. *C.A.* 41, 3730h.—The preferential speeds of the various elements in an alloy of the B X H type contg. C 0.62, Si 1.74, Cr 28.19, Ni 26.81, Mn 0.35, Fe 42.29%, which possesses a high thermal stability, were investigated at temps. of 1100° and 1200° over a period of 750 hrs. with round bars 60 mm. long and 5 mm. in diam. The loss of wt. and variations in the percentage compn. were detd. for each temp. after 120, 240, 500, and 750 hrs., to investigate the role of each element in the oxidation. A table gives the speed of oxidation, expressed as percentages of the original content of the alloy. As was the case with the ferrites previously reported, the austenite-type thermostable iron alloys are oxidized at high temps. principally at the expense of the elements easily oxidized. In the former alloys, it is at the expense of the Al, while in the austenite type, the C, Si, and Cr play the important role up to temps. of 1100° to 1150°. If the temp. is increased above 1200°, the C and Si alone undergo oxidation.

Helen F. Pool

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KORNILOV, I. I.

M

*The Rate of Oxidation of High-Chromium Fe Cr Al Alloys. I. I. Kornilov and A. I. Shpikelman (Compt. rend. (Doklady) Acad. Sci. U.R.S.S., 1946, 53, (9), 805-808) (In English). The rate of oxidation of alloys containing chromium 40, aluminium 2, 4, 7, 8, 10, and 12%, and iron remainder, was measured at 1200° C. by determining the weight loss. The results of oxidation lasting 1000 hr. show that the rate of oxidation decreases with an increasing aluminium content in the alloy, attaining a minimum with an aluminium content of 10-13%. The process of oxidation is followed by a loss in aluminium content of the alloy and an increase in its chromium content.

V. K.

KARNILOV, I. I.

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3RD AND 4TH ORDERS

A

P

3A-89. (Book) **Zharoupornyy Splav.** (Heat Resisting Alloys.) Vol. 3. I. I. Korniloy. 120 pages. 1947. Academy of Sciences of the USSR, Moscow, U.S.S.R.

Results of theoretical and experimental investigation of the most important factors in developing heat-resisting alloys. Solid solutions of iron with a series of alloying elements were studied thoroughly, particularly regions of the constitution diagram which include heat resistant materials. It is shown that the ternary system Fe-Cr-Al represents the most important combination of elements for use between 800 and 1500° C. Two alloys have been developed and introduced industrially in the USSR, replacing the Ni-Cr alloys and platinum. 48 ref.

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9

The classification of the solubilities of elements in iron. II. Continuous solid solutions of iron. I. I. Kornilov. *Bull. acad. sci. U.R.S.S., Classe sci. chim.* 1947, 337-343(in Russian); cf. *C.A.* 39:5144[1].—Chem. elements having the same cryst. lattice as Fe and differing in at. diam. by not more than 8% can form a continuous series of binary solid solns. with Fe. Since Fe can form solid solns. based on the α-Fe lattice (ferrite) or on the γ-Fe lattice (austenite), the 8 elements that can form continuous binary solid solns. with Fe are divided in this manner.—Cr and V are the only elements that form continuous binary solid solns. of the ferrite type. Since it has been reported that there is complete solid soly. in the Cr-V system, it is supposed that the ternary system Fe-Cr-V shows continuous solid soly. A hypothetical diagram is shown with the solid-soln. region broken by the γ loop and by the compds. FeV and FeCr. The elements Co, Ni, Rh, Pd, Ir, and Pt form continuous binary solid solns. of the austenite type. A total of 15 ternary continuous solid-soln. systems of this type are possible. The solid-soln. region in each of these ternaries is interrupted by the $\alpha \rightleftarrows \gamma$ transformation, and in all except possibly the Fe-Ni-Co system chem. compds. form in the solid state. The mode of occurrence of both of these discontinuities in the solid soln. is shown schematically for the Fe-Ni-Pt system. A total of 20 quaternary austenitic continuous solid-soln. systems involving Fe is possible, and a tetrahedral representation of the $\alpha \rightleftarrows \gamma$ transformation in a typical system is given. Eleven quinary systems are possible. 20 references. Discussion. G. V. Akimov. *Ibid.* 344-5(in Russian).—The conclusions stated by K. are criticized. It is pointed out that differences in at. diam. are not always sufficient to det. solid soly., as in the case of Fe-Cu, where the diams. are almost identical but the solid soly. is slight. Although these geometrical factors are significant in substitutional solid-soln. formation, they cannot be applied to interstitial solid solns. It is suggested that there is some solid soly. of Fe for S. A. G. Guy

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Ca

Answer to the discussion of corresponding member of the U.S.S.R. Academy of Science, G. V. Akimov. I. I. Kornilov. *Bull. acad. sci. U.R.S.S., Classe sci. chim.* **1947**, 345-6(in Russian); cf. preceding abstr. The value of a general rule for soly. is pointed out. However Cu and other subgroup B elements of the IV and V periods are recognized exceptions. The type of solid soln. is not important; the soly. of H in Pd is greater than in Fe because of the presence of α Pd-H compd.; C soly. in α Fe rather than in γ Fe was considered because it is the material existing at room temp. The soly. of S at room temp. is negligible. A. G. Guy

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CA

Composition and properties of refractory alloy No. 3 of high ohmic resistance. I. I. Kornilov and A. A. Azovskaya. *Vestnik Mashinostroenia* 27, No. 5, 71-2(1947); *Chem. Zentr.* 1948, II, 912-13.—The ternary alloys No. 1 and 2 (Fe-Cr-Al) were tested as materials for resistances of elec. furnaces. These are satisfactory up to 1200°. The refractory alloy No. 3 (Fe-Cr-Al) has been developed which withstands temps. of 1300-50° without essential oxidation or other damage. Sp. resistance, tensile strength, and elongation were measured on alloys contg. 40% Cr and 0-12% Al (series I) and those contg. 25% Cr and 0-12% Al (series II) to det. the effect of the Al content on these properties. The tensile strength of alloys of series I was considerably higher than that of those of series II. It increased progressively with the Al content. In tensile tests on series I the elongation was 10% at 0 Al content, 3-4% at 2-3% Al, and only 1-2% at 0-8% Al. In series II the elongation was 20-25% at 5.5-6% Al. Above 6% Al the elongation dropped sharply and the alloys became brittle at room temp. Impact tests showed these heat-resistant alloys having a high sp. elec. resistance to be brittle at room temp. Alloys contg. 40.5% Cu and 7.3% Al remained brittle even when heated to 900-1000°. The impact resistance of the alloy contg. Cr 27.2 and Al 7.6% increased considerably between 300 and 800°. This alloy could be worked at 300-400°. Alloy No. 3 is recommended as a resistance material for temps. of 1300-1350°. It contains C ≤ 0.05, Cr 23-7, Al 6-8, Si ≤ 1, Ti 0.2-0.4, S 0.02, and P 0.002%. Its elec. resistance is 1.45-1.60 ohm-sq. mm. per m. Heating this alloy to 750° for 30-40 min. and quenching in water reduced the tensile strength from 90-100 to 75-85 kg./sq. mm. and at the same time increased the elongation from 3-8 to 10-15%. Hot-rolled ribbons 2 × 20 mm. and wires 6 mm. in diam. could be produced from alloy No. 3. These products could be used for the resistances of elec. furnaces without the need of a transformer.

M. G. Mouwe

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KORNILOV, I. I.

5
(3)

Rate of oxidation of quaternary alloys of iron-chromium-nickel and manganese. I. I. Kornilov, A. T. Durnov, and [redacted]. *Do[redacted] Nauk S.S.S.R.* 58, 1005-8(1947).—Oxidation rates of alloys contg. 17.3-20.5% Cr, 7.8-9.2% Ni, 16.7-2.85% Mn, and 58.2-68.5% Fe were detd. The results, given graphically, indicate that at 1000° alloys contg. Mn and Fe oxidize more rapidly than those contg. Cr or Ni. In order of rate of oxidation the series is Mn, Fe, Cr, and Ni. Most of the oxidation falls to Mn and it detns. the general rate of reaction. Apparently MnO, Fe_3O_4, Cr_2O_3, and NiO are the products. MnO and Fe_3O_4 are unstable oxides under conditions of alternate heating and cooling and they do not form a protective film.

G. M. Kosolapoff

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KOMMILOV, I. I.

"Experiments in the Application of the New Iron-Chrome-Aluminum Alloys for Heating Elements," Elektrichestvo 67, No 2, 1947

Prof., Inst. Gen. and Inorganic Chemistry, AS USSR

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9

Classification of the solubility of elements in iron. III. Limited solid solutions of iron. I. I. Kornilov. *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1948, 269-76.—Ternary, quaternary, and quinary limited solid solns. based on α-Fe are classified in a general manner on the basis of difference in at. diam. between Fe and the various elements. In binary constitution diagrams with Fe, the region of solid soly. is interrupted by the formation of intermetallic compds. The temp. stability of these compds. increases with increase in the difference of at. diam., and above a difference of 8% they tend to be stable, to the m.p. The 11 elements having a difference of at. diam. of 8% to 15% (cf. *C.A.* 42, 3209g) and C and B form limited binary solid solns. with Fe. The no. of ternary and more complex limited ferritic solid solns. is increased by the possibility of having Cr and (or) V present, elements completely sol. in α-Fe. Ternary limited ferritic solid solns. are divided into 3 classes: (1) concn. triangle has a closed apex of solid solns. at the Fe corner (78 possible alloy systems); (2) concn. triangle has an open side of solid solns. (2); (3) concn. triangle has solid solns. encompassing the 3 apexes (6). Quaternary limited ferritic solid solns. are divided into 3 classes: (1) concn. tetrahedron has a closed space apex of solid solutions (286); (2) concn. tetrahedron has an open edge of solid solns. (150); (3) concn. tetrahedron has an open face of solid solns. (13). Typical diagrams illustrating these classes of diagrams are shown. A. G. Guy

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KORNILOV, I. I.

[redacted]

8/49T10

USSR/Chemistry - Iron, Solid Solution Jul/Aug 48
Chemistry - Solubility

"Classification of the Solubility of Elements in Iron," I. I. Kornilov, Inst Gen and Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR, 6 3/4 pp

"Iz Ak Nauk SSSR, Otdel Khim Nauk" No 4

Defines group of elements with a difference of 8 - 15% in atomic diameters, forming double limited solid solutions with iron beginning with ratio of atomic diameters to iron. Gives systematism of triple, quaternary and more complex limited solid solutions of ferrite on basis of these elements. Calculates the number of possible systems.

[redacted] 8/49T10

USSR/Chemistry - Iron, Solid Solution Jul/Aug 48
(Contd)

Submitted 15 Nov 1947.

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

C.A.

Rate of isothermal transformation of austenite as affected by composition in the system iron-carbon. I. I. Kornilov and A. A. Asovskaya. *Inst. Sektora Fiz.-Khim. Anal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* 16, No. 4, 85-95(1948).—It was observed that the rate of transformation of a system is closely connected with its compn., namely the max. rate of transformation coincides with stoichiometric compn. and the farther away from such compn., the longer it takes to attain equil. upon transformation. This investigation dealt with the transformation austenite → ferrite + cementite, as affected by the C content. The Fe-C alloys studied contained only negligible admixts. of Mn, Si, S, and P. The C content varied from 0.18 to 0.94%. The alloys were heated for 30 min. at temps. 100° above the complete change to austenite, quenched in a Pb bath and the time for complete transformation was studied at 715 and 700°, and at 50° intervals down to 200°. The fastest transformation was at a C content of 0.18%. The time required for complete transformation increased with the C content up to 0.81% which is a eutectic and at 0.94% of C decreased again. The factors which detd. the rate of transformation were the concn. of the solid soln. and the nature of the new phase. As the concn. of the solid soln. increased, the rate of transformation decreased while the appearance of a new phase, cementite, hastened transformation. The min. rate coincided with the eutectic. Deviation from this was observed only when intermediate products such as martensite, troostite, etc., were formed.

M. Hosch

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

C. 4.

Oxidation of solid solutions of chromium and aluminum in iron. I. I. Kornilov. *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* **16**, No. 4, 122-9(1948).—In high temp. Al-Cr-Fe alloys the element most susceptible to oxidation is Al. At the surface of the ternary alloy Al oxidizes and the oxide gradually flakes off. The surface becomes impoverished in Al and therefore the alloy becomes thermodynamically unstable. This causes diffusion of Al atoms from the core toward the periphery. This process was studied on cylindrical specimens contg. Cr 27 and Al 5.8% at 1200° for 100 and 500 hrs. In both cases, there was a migration of Al from the center toward the periphery. The depth of the layer (from the periphery toward the center) where a diminution in the concn. of Al was observed after 100 hrs. was 2-2.5 mm. and after 500 hrs. 3-4 mm. The rate at which the concn. of Al decreased as affected by its original concn. in the Al alloy was studied on specimens contg. 1.5-9.5% Al, at 1200°, for up to 1000 hrs. The loss of Al was detd. by changes in resistivity, loss of wt., and chem. detn. of total Al. The relatively greatest changes, i.e. the highest rate of oxidation of Al was observed in alloys with the lowest Al content. Thus, an alloy contg. 1.5% Al lost during 1000 hrs. at 1200° 60% of it, while an alloy contg. 7.5 and 9.5% Al lost only 5-6%.

M. Hosch

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

MA

Properties of Alloys - 2

1934, 111, 319; see *M.A.*, 1, 302; and Saldau and Schamray, *Z. anorg. Chem.*, 1935, 224, 308; *M.A.*, 2, 577).—R. S. B.

***Magnesium-Rich Alloys of the System Magnesium-Aluminium-Manganese.** N. V. Agcev, I. I. Kosnilov, and A. N. Khlapova (*Izvest. Sekt. Fiz.-Khim. Anal.*, 1948, 16, (4), 130-143; *C. Abs.*, 1951, 45, 521).—[In Russian]. The purpose of the investigation was to determine the limit of solubility of Al and Mn when present together in solid Mg, to determine the boundaries of phases adjacent to the ternary solid soln., and to study the ageing properties and corrosion-resistance of the alloys. The work was carried out on Mg alloys with up to 40% Al and up to 10% Mn. At the beginning of crystn. in the Mg region there separated first the α-phase, which is a ternary solid soln. having the crystal lattice of Mg. A Mn-rich phase separated next, and is referred to as *X*, the compn. of which was not determined. Next came γ, which is a solid soln. having a crystal lattice corresponding to Al_3Mg_4, and a phase having the crystal lattice of Mn. In the presence of Al, the solubility of Mn in Mg at 450° C. rose from 0·3% to 1·25-1·5% and in slowly cooled alloy from 0 to 0·5-0·8%. The hardness of the alloys increased considerably with the Al content; lowering the Mn content did not appreciably affect the hardness. Alloys within the field of ternary solid soln. contg. Al 10-14 and Mn 0·2-0·5% could be aged artificially at 150°, 175°, and 200° C., and attained a max. hardness of 90-100 Brinell. At 100° C. the alloys aged very slowly and the hardness changed insignificantly. The preferred compn. for these alloys are: Al 10-13 and Mn 0·2-0·5%; the most corrosion-resistant alloys contained Al 2-7 and Mn 0·05-1·5%.

[illegible] *Chimique*, 1938 (*C.A.* 32, 4725[3])) is proposed for its detn., because the method gives the most satisfactory results.

Emanuel Merdinger

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

Properties of Alloys

Isothermal Transformation of Supersaturated Solid Solutions of Aluminium and Manganese in Magnesium. I. I. Korniloy and A. N. Khlapova (*Izvest. Sekt. Fiz.-Khim. Anal.*, 1948, 16, (4), 144-150; *C. Abs.*, 1951, 65, 521). [In Russian]. The process of transformation was studied in alloys contg. Al 2-14·50 and Mn 0·10-1·15% at 100°-350° C. The alloys fall within the field of supersaturated ternary solid soln. Specimens were kept for 3 days sealed in evacuated tubes at 430° C. and were then transferred to a furnace maintained at the requisite temp. where they were kept for a definite time, after which they were water-quenched. At 350° and 300° C. the precipitated phase appeared in the form of large shiny particles throughout the entire field of the solid soln. There was no change in hardness. At 250°-150° C. the precipitated phase was pearlitic; the pptn. started along grain boundaries. Decompn. of the solid soln. at this temp. was accompanied by a considerable increase in hardness. At 100° C. no noticeable change was observed in the microstructure or hardness. The rate of transformation increased with the Al and Mn content. In consequence of the isothermal transformation the same hardness was attained as upon ordinary ageing, though in less time.

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

B

11

Classification of Solubility of Elements in Iron. IV. Restricted Austenite Solid Solutions of Iron. (In Russian.) I. I. Korniloov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Chemical Sciences, Sept.-Oct. 1949, p. 449-459.

On the basis of the relationship of atomic diameters of various elements and iron, the group of elements forming the modification of a restricted austenite solid solution with Fe is isolated. A system of ternary, quaternary, and more complex solid solutions is presented on this basis. The maximum number of possible systems is calculated. Data are tabulated and charted. 10 ref.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

M

11

Centrifugal Method for Determining the Strength of Metals and Alloys at High Temperatures. I. I. Kornilov (*Zavod. Lab.*, 1949, **15**, (1), 76-82).--[In Russian]. Small round test-bars, with or without additional weights, are clamped to a rotor spinning at a const. regulatable speed in a furnace at a const. controlled temp. in the range room temp. to 1200° C. The relative strength of samples is proportional to the time necessary to attain the same or the max. state of deformation. Bending deformation continues indefinitely. The method can be used to choose quickly alloys with most suitable properties for a particular purpose and also to determine resistance to oxidation at high temp.; the test conditions correspond closely to the working conditions of alloys. The binary aluminium-magnesium alloys show greatest bending strength at 5% magnesium at 300° C.; the ternary iron-nickel-chromium system, tested for ratios of Fe : Ni = 3 : 1, shows greatest bending strength at 770° C. at ~25% chromium.—T. O. L.

Dec. 1950

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I.I.

New method for testing bending strength of metallic systems at high temperatures. Izv. Sekt. fiz. khim. anal. 18:72-82 '49. (MIRA 11:4)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR.

(Metals—Testing) (Metals at high temperatures)

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I.I.; AZOVSKAYA, A.A.

Bending strength of aluminum - magnesium alloys at 300°C. Izv. Sekt. fiz. khim. anal. 18:83-85 '49. (MIRA 11:4)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR.

(Aluminum-magnesium alloys--Testing)

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

PA 66/49T40

USSR/Metals - Strength Aug 49
Alloys, High Temperature

"Application of Centrifugal Forces to the Study of the Strength of Metallic Systems," I. I. Kornilov, Inst of Gen and Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR, 3 pp

"Dok Ak Nauk SSSR" Vol LXVII, No 5

In 1945, revealed possibility and method of applying centrifugal forces to simplify method of testing the strength of metals, as existing methods proved unsatisfactory in handling test specimens at various temperature ranges. The newer method must permit the comparative testing [redacted]

66/49T40

USSR/Metals - Strength (Contd) Aug 49

of many small samples at various temperatures at the same time, if high-temperature alloys are to be exploited. Presents a study of the necessary qualifications of an ultracentrifuge for testing alloys and metals, such as compactness, resistance to high temperatures (900°, 1,000°), high speeds (100,000 rev/min), etc. Diagram shows the arrangement of electric heating "oven" and centrifuge in the "oven," with motor and panel wiring scheme.

[redacted]

66/49T40

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

M

2

"Theory of the High-Temperature Strength of Metallic Solid Solutions. I. I. Kornilov (*Doklady Akad. Nauk S.S.S.R.*, 1949, 67, (6), 1037-1040; *C. Abs.*, 1950, 44, 4844).—[In Russian]. A suggested measure of high-temp. strength is the time required for a specimen to creep or bend a predetermined amount in a centrifugal testing machine. By this means data were obtained for alloys of the binary systems: aluminium-magnesium at 200°, 250°, and 300° C.; copper-nickel at 900° C.; nickel-chromium at 800° C.; iron-chromium at 850° C.; on the 5% aluminium section of the iron-chromium-aluminium system at 800° and 1000° C.; on the 25% nickel, 75% iron section of the iron-chromium-nickel system; also on the 50% nickel, 50% iron section, and on the 75% nickel, 25% iron section, all at 800° C.; on the quinary systems made up of 20% chromium, 30% iron, 40% nickel, and 10% manganese and 0-9% titanium, or 0-4% tungsten, or 0-15% niobium, all at 800° C. The high-temp. strength of a solid solution is higher than that of a pure metal and increases with increasing solute content. The high-temp. strength decreases when a second phase is produced by further addition of the solute. The concept "chemical hardening" by a solute atom is suggested in analogy with work-hardening.

May 1947

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

CA

7

Study of the transformation of the α-solid solution in the iron-chromium system by the method of transformation velocity. I. I. Kornilov and V. S. Mikheev (N. S. Kurnakov Inst., Acad. Sci., U.S.S.R.). *Doklady Akad. Nauk S.S.S.R.* **69**, 527-30(1949).—An exptl. study was made of Fe alloys contg. from 40.58 to 54.80 at. % Cr. The time for 50% transformation of the solid soln. at 650° was detd. by a *magnetometer* and was found to have minima of 21 hrs. at 42.44 Cr, 33 hrs. at 46.44 Cr, and 62 hrs. at 49.57 at. % Cr. Between and beyond these compns. the half-time rose to about 1500 hrs. These data show the existence of three one-phase regions, β, θ, and σ, resp., with intervening eutectoid reactions involving β + θ and θ + σ. The eutectoid decompns. did not go to completion in the 1925 hrs. of the expts. The curve of Curie temp. vs. compn. was continuous in the compn. ranges beyond and between the 3 one-phase regions.

A. G. Guy

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

CA

2

Solubilities of elements of the periodic system in nickel. I. I. Kornilov (N. S. Kurnakov Inst. Gen. and Inorg. Chem., Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1950, 475-84.—Analysis of literature data shows that the rule of formation of solid solns. based on the comparability of the at. radii of the solvent and the solute is applicable to solid solns. in Ni. However, Ni has a somewhat greater tendency to form solid solns. than Fe, namely, it forms uninterrupted series of solid solns. up to an 11% difference in the at. radii (as against up to 9-9% in the case of Fe), and partial (limited) solid solns. up to 17-18% difference (as against up to 15-16% in the case of Fe). Plots of the solubilities in Ni by groups and periods of the periodic system permit predictions about the formation or the absence of solid solns. in Ni. Thus, uninterrupted solid solns. in Ni can be expected for Rh and Ir, and the existence of an uninterrupted solid soly. in the system Ni-γ-Mn is confirmed. Limited soly. in Ni can be expected for Ru, Os, and Re, on account of the differences of the crystal lattices of these elements and of Ni, and for P and U, on account of the differences of the at. radii (10 and 12.8%, resp.). Absence, or only insignificant solid soly. in Ni can be predicted, on account of the large difference of the at. radii (over 20%), for Be, Hf, Th, Sc, all elements of the 1st main group and of the 2nd main group, with the exception of Be. Deviations from the soly. rule are found in the subgroups, e.g. Ag forms no solid solns. with Ni despite the favorable size factor, whereas Sn and Sb do form solid solns. despite an 18-20% difference in at. radii. Solubilities in other elements of the VIIIth group, Co, Pt, and the Pt-group metals, can be inferred by analogy with Ni.

N. Thon

1951

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

B

10

2480* Solid Solutions of Nickel. (In Russian.) I. I. Korniloy. *Izvestiya Akademii Nauk* SSSR (Bulletin of the Academy of Sciences of the USSR), Section of Chemical Sciences, Nov.-Dec. 1950, p. 582-589.

Classifies types and determines number of possible ternary and quaternary solid solutions of nickel. Cases of formation of complex saturated and unsaturated solid solutions of nickel with elements of the 4th periodic group were investigated. Data are tabulated and charted.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

PA 160T75

USSR/Metals - Alloy Systems
Bismuth Compounds

May 50

"New Method for Studying Alloys by Samples of Variable Composition," I. I. Kornilov, N. V. V'yal', Inst of Gen and Inorg Chem, Acad Sci USSR, 3 pp

"Zavod Lab" Vol XVI, No 5

Offers method based on separating compounds of metal systems under action of centrifugal force in process of crystallization. Describes equipment and procedure for obtaining specimen of variable composition using alloy of bismuth with 10% cadmium. Method may be applied only for separating metals of different specific weights.

160T75

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

Time factor in physicochemical analysis. I. I. Kornilov. *Izvest. Sektora Fiz.-Khim. Anal., Akad. Nauk S.S.S.R.* 20, 294-304 (1950).—Chem. reactions often take place in 3×10^{-7} sec., the half period of ThC', but some transformations in the solid state, e.g., silicates, take place within geologic ages. The extremes are irrelevant in phys.-chem. analysis; measurable rates of reaction are the important factor. In phys.-chem. analysis the time factor is considered from the point of view: (1) time required for a system to attain equil. and the various stages of this system during this interval; (2) effect of compn. on the time of transformation within the system; (3) changes in compn. and properties of a nonequil. system with time. M. Hosch

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

PROCESSES AND PROPERTIES INDEX

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

a

p

284-F. **Rule of Temperature Dependence of Metal Solubility in Iron.** (In Russian.) I. I. Kornilov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 21, 1950, p. 1067-1070.

On the basis of theoretical considerations, verified by experimental data, the following rule was formulated: "Change of solubility of elements in the solid phase in a given solvent with temperature is determined by the relative change of the difference in atomic diameters of the elements with temperature". Using this rule, the temperature dependence may be established, not only for iron, but for other metals. (P13, Fe)

COMMON ELEMENTS

COMMON VARIABLES INDEX

MATERIALS INDEX

OPEN

METALLURGICAL LITERATURE CLASSIFICATION

AUTHOR INDEX

1ST AND 2ND LETTER

3RD LETTER

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

CA

Continuous solid solutions of transition elements. I. I. Korniev. Doklady Akad. Nauk S.S.S.R. 73, 486-7 (1950).—The rules for continuous-solid-soln. formation that were found to hold for Fe-base alloys were assumed to hold also for all transition elements. Data from the literature were available on 15 out of the 21 possible binary systems of face-centered cubic metals, and all of these showed complete solid soln. when the difference in lattice-const. values was less than 10%. Data on 5 out of 15 body-centered cubic systems gave the same result. No data were found for systems involving two hexagonal metals. A. G. Guy

Review - B-77406, 21 Jul 54

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

Method of Representation of Quinary and the More Complex Metallic Systems. I. I. Kornilov (*Doklady Akad. Nauk S.S.S.R.*, 1951, 81, (2), 191-194).—[In Russian]. A definite chem. compn. of a binary (or more complex) solid soln. is taken as origin, and addn. of the remaining three components are represented on the x, y, and z co-ordinate axes, to give a tetrahedral figure denoting an isolated region of the quinary (or more complex) system. Parts of hypothetical Fe-Cr-Ni-A-B and Fe-Cr-Ni-A-B-C systems are considered as examples.—G. Y. E. T.

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

USSR/Chemistry - Metals

Dec 51

"Solid Solutions of Metal Compounds," I. I. Kornilov

"Dok Ak Nauk SSSR" Vol LXXXI, No 4, pp 597-600

Shows on the basis of exptl material that solid solns of metal compds can be formed under the following conditions: (1) from metal compds of an ordered structure, (2) from metal compds of a const compn of Dalton's type, (3) from metal compds of a variable compn of Bertolet's type, and (4) from metal compds of both Dalton and Bertolet's type.

202T22

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

USSR/Academy of Sciences Chemistry - Electrochemistry Jun 52

"Meeting of the Department of Chemical Sciences"

Vest Ak Nauk SSSR, No 6, p 112-115

At a session of the Dept Chem Sci concerned with the problem of electrochemistry, 4 reports were read, namely: "Reactions of Electrical Reduction and the Zero Points of Metals" by Acad A. N. Frumkin; "Diffusion Kinetics" by V. G. Levich; "Crystallochemistry of Complex Thiocyanates" by G. S. Zhdanov; and "Metallic Compounds" by I. I. Kornilov.

PA 251T72

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

BTR

1384 Solid Solutions: Classification of the Solubilities of Elements in Iron. Part II and III. I. I. Kornilov. *Iron & Steel*, v. 25, Jan. 1952, p. 25-30. (Translated from *Izvestiia Akademii Nauk SSSR*)

In Part II a classification of solid solutions higher than binary involving iron is presented, based on the atomic diameters of the elements which form continuous (binary) solid solutions with iron and among themselves. Corresponding to the two modifications of iron (α and γ), two classes of continuous solid solutions are considered: ferritic and austenitic. In Part III, from the relation of the atomic diameters of the elements and of iron, a group of elements with a difference of atomic diameters of 8-15% which form binary limited solid solutions with iron is isolated. A systemization of ternary, quaternary, and higher limited solid solutions of ferrite is given on the basis of these elements, and the number of possible systems is calculated. 27 ref.

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

"Scientific Sessions, Conferences, and Meetings - Meeting on the Theory of Metal Alloys," N. Sh. Abrikosov, Dr. Chem Sci., Vest Ak Nauk, No 8, p. 112, Aug 52.

At a meeting at the Inst of General and Inorg Chemistry imeni N. S. Kurnakov, Acad. Sci USSR, concerning metal alloys, N. V. Ageyev, Corr. Mbr. Acad. Sci USSR, presented a report "Periodic Law of D. I. Mendeleyev - Basis of the Science of Metal Alloys." Also read were reports S. T. Konobeyevskiy, Corr. Mbr. Acad. Sci. USSR, on the "Nature of Combinations in Metals," and by Prof. I. I. Kornilov, on "Metal Chemistry and Some of its Problems." Plans were discussed for publication of a monograph and reference book on metal alloys.

252T47

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

Alloys

Development of N. S. Kurnakov's theories on the chemistry of metallic alloys. Usp.khim. 21, No. 9, 1952.

9. Monthly List of Russian Accessions, Library of Congress, December 1952 /1953. Unclassified.

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USSR

Investigation of the diagram "composition-temperature-strength" of the quaternary system iron-chromium-nickel-manganese. I. I. Kornilov and K. A. Usipov. *Bull. Acad. Sci. U.S.S.R.*, Div. Chem. Sci. 1953, 387-9(Engl. translation).—See *C.A.* 48, 133924. H. L. H.

M

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

USSR/Metallurgy - Alloys, Heat Resistance

1 Oct 52

"Basic Types of Composition-Heat Resistance Diagrams of Metal Systems," I. I. Kornilov

DAN SSSR, Vol 86, No 4, pp 721-724

States that numerous exptl data have been accumulated in past 6-7 years by using centrifugal method for investigating heat resistance of alloys; suggests 3 types of compn vs heat resistance diagrams of metal systems consisting of: (1) continuous solid solns with or without formation of compds from them; (2) limited solid solns with considerable concn range and soly varying with temp.; and (3) very limited solid solns or no solns at all. Presented by Acad G.G. Urazov 7 Aug 52.

(CA 48 no. 2:527 '54)

Source #264T49

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

USSR/Metallurgy - Aluminum-Magnesium Heat Resistance Dec 52

"Effect of Temperature on the Heat Resistance of the Alloys of the Aluminum-Magnesium System," I. I. Kornilov and L. I. Pryakhina, Inst of General and Inorganic Chem imeni N. S. Kurnakov, Acad Sci USSR

Pa 240T77

"DAN SSSR" Vol 87, No 6, pp 971-974

Constructs for the first time compn vs heat resistance diagrams for alloys of Al-Mg system and, analyzing them, explains discrepancy in exptl data of various investigators. Some data show

240T77

max heat resistance in region of unsaturated solid solns, while data of other investigators place this max in region of complete satn. Submitted by Acad G. G. Urazov 20 Oct 52.

240T77

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

USSR.

Solubility of chemical elements in chromium. I. I. Kornilov. *Bull. Acad. Sci. U.S.S.R., Div. Chem. Sci.* 1953, 671-7(Engl. translation).—See *C.A.* 48, 7977*h*.

H. L. H.

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

Journal of Applied Chemistry
June 1954
Industrial Inorganic Chemistry

(2)

Composition-hot strength diagram for alloys in the quaternary system, iron-chromium-nickel-manganese. I. I. Kornilov and K. A. Osipov (*Izvestia*, 1953, No. 3, 429—433).—The electrical conductivity and hardness when quenched from 800° to room temp., and the resistance to plastic deformation (measured as the deflection on short rods after centrifugal loading for a definite time) at 800° ("hot strength"), are measured for various alloys in the system. The hot strength increases with the Cr content in the γ solid solution region, but sharply decreases with it above saturation or in the $\gamma+\alpha$ region, where the hardness at room temp. increases with the Cr content. Changes in Mn content exert little effect on the mechanical properties, and Mn can be largely replaced by Ni.

R. C. MURRAY.

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr 1954)

Name	Title of Work	Nominated by
Kornilov, I. I.	"Solid Solutions and Compounds of Metals"	Institute of Metallurgy imeni A.A. Baykov, Academy of Sciences USSR

SO: W-30604, 7 July 1954

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILLOV, I.I.

USSR/ Chemistry - Physical chemistry

Card 1/1 : Pub. 40 - 5/22

Authors : Kornillov, I. I.

Title : Metallic compounds

Periodical : Izv. AN SSSR. Otd. khim. nauk 5, 795-804, Sep-Oct 1953

Abstract : The differences in the properties of metallic and ion compounds are explained. The atoms of opposite sign in metallic compounds are bound with each other in the crystalline lattice, preferably by a metallic bond, which in contrast to metallic solid solutions fixes the constant stoichiometric ratio of the atoms in the compound. The laws governing the formation of metallic solutions and metallic compounds are especially important for the determination of the nature of reaction of metals and prognosis of structural diagrams in non-investigated systems. Eighteen references: 17-USSR and 1-USA (1911-1952). Table; graphs.

Institution : Acad. of Sc. USSR, The N. S. Kurnakov Institute of Gen. and Inorg. Chemistry

Submitted : January 1, 1953

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

USSR/Metallurgy - Alloys Nov/Dec 53

"The Solubility of Chemical Elements in Chromium," I.I. Kornilov, Inst Gen and Inorg Chem im N.S. Kurnakov, Acad Sci USSR

Iz Ak Mauk SSSR, OKhN, No 6, pp 980-987

Established relationships pertaining to the solubility of elements in the form of solid solns in Cr. Concludes that the regularities established will aid in investigating solid solns based on Mb and W. Points out the significance of this work for the technology of heat-resistant alloys.

273T68

Translation B-77406, 21 Jul 54

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I. and MIKHEYEV, V. A.

"Constitution Diagrams of Metallic Systems Based on Chromium," Uspekhi Khimii 22 (1953) pp 87/98.

B-77406, 21 Jul 54

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I.I.; MINTS, R.S.

Structural diagram of the system Cr -- NiAl. Izv.Sekt.fiz.-khim.anal. 22:111-116 '53. (MLRA 7:5)

1. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova Akademii nauk SSSR. (Chromium- nickel- aluminum alloys)

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

Solid State Physics, Thermodynamics (4898)
Izv. Sektora Fiz.-Khim. Analiza (Inst. Obshch. i Neorgan. Khimii A. N. SSSR), No 22, 1953, pp 117-121
Kornilov, I. I., and Nikolayenko, G. N.
Phase Diagram of the System Nickel-Chromium-Manganese

Microstructural method using 12 aross sections was used to investigate phase diagram at room temperature of Ni-Cr-Mn. Solubility of Cr in Ni was found 35%, Mn in Ni about 36%, and maximum of joint Cr and Mn solubility was 24% Cr + 24% Mn.

So: Moscow, Referativnyy, Zhurnal -- Fizika, No 5, 1954 W-31059

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

Diagram of state of the system nickel-tantalum. I. I. Kornilov and E. N. Pylaeva. *Izvest. Sektora Fiz.-Khim. Anal., Akademiya Nauk S.S.S.R.* 23, 110-17(1953).—The studied alloys contained up to 59.04% Ta. At a Ta content up to 36% crystd. solid solns. of Ta in Ni were present. At 30-50% Ta crystd. as Ni_4Ta and its solid solns. The max. m.p., 1504°, was observed for an alloy contg. 49.07% Ta, which is close to Ni_4Ta contg. 50.7% Ta and for which Therkelsen (*C.A.* 27, 4513) gives the m.p. as 1545°. On either side of Ni_4Ta there is a eutectic. The 1st coincides with 37.50% Ta and m. 1360°. The other eutectic was not detd. Data in literature place it at 61% Ta and m. 1400°. The soly. of Ta in Ni as function of temp. was detd. to be 37.5% at 1360°, 33% at 1300°, 30% at 1200°, 24% at 1100°, 14% at 1000°, and 7.5% at 800°. Hardness and electroresistance increased with the Ta content. Analysis of the extraneous phase showed it to be a solid soln. of Ni in Ni_4Ta contg. 40.44% Ta.

M. Hosch

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

USSR/Metallurgy - Nonferrous Alloys
Heat Resistance 1 Feb 53

"Composition Versus Heat Resistance Diagram of the Ni-Al System," I. I. Kornilov, R. S. Mints, S. D. Onopriyenko, Inst of General and Inorg Chem, Acad Sci USSR

DAN SSSR, Vol 88, No 4, pp 683-685

Studies dependence of heat resistance on compn of Ni-Al alloys up to 30% Al by wt. Establishes that heat resistance of solid solns of Al in Ni increases with increase in Al concn and reaches its max in region of complete satn of solid solns. Alloy

249T60

corresponding to Ni_3Al is characterized by lowest heat resistance; solid solns based on Ni_3Al, rich with Ni or Al, have heat resistance higher than that of Ni_3Al. States that diagram of compn vs heat resistance permits detn of physicochem nature and boundaries of phase areas on Ni-Al constitution diagram. Presented by Acad G. G. Urazov 29 Nov 52.

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249T60

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I.I.

met 2

J. of the Inst. of Metals
Feb. 1954
Properties of Alloys

Separation of Nickel Tantalide, Ni_2Ta, from Alloys of the Binary System Nickel-Tantalum. I. I. Kornilov and E. N. Pylaeva (*Doklady Akad. Nauk S.S.S.R.*, 1953, 91, (4), 841–843).—[In Russian]. By heating *in vacuo* at 1300° C. for 4 hr., at 1200° C. for 2 hr., at 1000° C. for 2 hr., and then slowly cooling to room temp., K. and P. produced a considerable coarsening of the Ni_2Ta phase (present as elongated crystals) in the two-phase alloy of Ni with 39·15% Ta. They found that 5% HCl contg. 2–3 drops HNO_3 was best for dissolving the Ni solid soln. without attacking the Ni_2Ta. With 0·2–0·5 g. alloy in a 100-ml. beaker, dissoln. began only on warming, but then continued very slowly in the cold for 2–3 days, with occasional agitation. The residue was dried with alcohol and ether and observed microscopically. Greater amounts were prepared by electrolytic dissoln., using as anode a polished rod of the alloy 50 × 3 mm. dia. in a colloid bag, centred with relation to the tinplate beaker, 9 cm. high × 8 cm. wide, acting as cathode. The electrolyte was 0·75% alcoholic HCl + 20 g. citric acid + 5 g. NH_4Cl, and the c.d. 0·01 amp./cm.^{2} (at greater c.d. there was anodic oxidation, so that the product contained oxide and salts). 0·5 g. powder was obtained in 1 hr. On analysis by dissolving in $HF + HNO_3$, removing HF by heating with H_2SO_4, precipitating Ta with NH_4OH in the presence of NH_4Cl, and weighing as Ta_2O_5, the powder was found to contain 49·44% Ta (cf. 50·79% for Ni_2Ta theoretically).—G. V. E. T.

Inst. Gen-le Inorganic Chem. im. N.S. Kurnakov, AS USSR.

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

Kornilov, I. I.

1/ The compound Ni_3Al. I. I. Kornilov and R. S. Mints. *Doklady Akad. Nauk S.S.S.R.* 88, 529-32(1953); cf. *C.A.* 49, 3600e.—The metallic compds. Ni_3Al (I) and NiAl (II) show min. resistivity and a max. temp. coeff. of resistivity on corresponding compn.-property diagrams. I shows a singular min. on the coeff. of linear expansion isotherm whereas II gives only a negligible effect. The coeff. of linear expansion of I is considerably lower than for pure Ni and a solid soln. of Al in Ni. I gives an identical singular point on all known property-compn. diagrams including heat resistance. Discrepancy in direction of the isotherm of coeff. of linear expansion for annealed and quenched alloys leads to the possibility of transformation of I in the solid state at temps. near 600°. V. N. Bednarski

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I.I.

B. T. R.
V. 3 No. 3
Mar. 1954
Metals- Metallography, Transformations, and Structures

3937 Basic Types of Constitution Diagrams of Titanium Base Binary Systems. (Russian.) I. I. Kornilov. *Doklady Akademii Nauk SSSR*, v. 91, no. 3, July 21, 1953, p. 549-552.

Position in the periodic system of Ti and its alloying elements and similarity or differences of their chemical properties determine characteristics of their interactions and consequently the types of phase diagrams. Graphs. 16 ref.

Inst. Metallurgy. AS USSR

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KOCHILOV, I. I.

"Creep of Solid Solutions and Compounds in Metallic Systems," a study presented at the Symposium and International Conference on Creep and Fracture of Metals at High Temperature, Teddington, England, 31 May to 2 Jun 1954.

S-81466, 30 Dec 54

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

USSR/Chemistry Solubility

Card : 1/1

Authors : Kornilov, I. I.

Title : Solubility of chemical elements in titanium

Periodical : Izv. AN SSSR, Otd. Khim. Nauk., 3, 392 - 399, May - June 1954

Abstract : The analogous sequence existing between the solubility of chemical elements of the periodical system in titanium and the solubility of elements in other metals (iron, nickel, chromium, etc.) is discussed. The difference in chemical properties of elements and their effect on the formation of solid solutions or their absence in binary titanium systems, are explained. Metals of the V and VI groups analogous to titanium, which have small differences in atom diameters and isomorphic structure, but when combined with titanium are capable of yielding continuous solid solutions, are described. Thirty-eight references: 8 USSR, 3 German, 27 USA. Tables, graphs.

Institution : Acad. of Sc. USSR, The N. S. Kurnakov Inst. of Gen. and Inorg. Chem.

Submitted : July 9, 1953

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

"Titanium, Its Properties, Application and Methods of Preparation," Usp. Khim., No 5, pp 529-546, 1954

Translation M-422, 6 May 55

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

6

USSR

*The Relation Between the Composition, Temperature, and Strength of Aluminium-Magnesium Alloys. I. I. Kornilov and L. V. Pryakhina (Izvest. Akad. Nauk S.S.S.R., 1954, [Tekhn.], (9), 85-89).—[In Russian]. The influence of temp. upon the strength of Al-Mg alloys was studied between 20° and 400° C. in relation to the compn. in the range 0-12 wt.-% Mg. The specimens were subjected to bending tests, and for each temp. a different value of stress was chosen in order to produce slow deformation in the course of several tens or hundreds of hr. At 400° C. the max. strength was shown by pure Al; at lower temp. the region of alloys of high strength shifted gradually towards the alloys contg. more Mg, the max. becoming wider as the temp. was lowered. Thus, at 300° C., the alloys contg. 5-6 wt.-% Mg possessed the greatest strength; at 25° C. those contg. 4-12 wt.-% Mg. Above 300° C., the alloys which retained most strength were homogeneous solid soln. of Mg in Al. The max. strength at 300° C. corresponded to the max. solubility of Mg in Al, and below 200° C. to the alloys composed of two phases. This behaviour was explained by the fact that the solidus temp. of the homogeneous solid soln. is higher than the initial m.p. of the two-phase alloys.—S. K. L.

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APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I.I.

USSR/Scientific Organization - Conferences

Card 1/1 Pub. 124 - 9/26

Authors : Kornilov, I. I., Dr. of Chem. Sc.

Title : Conference of creep and destruction of metals at high temperatures

Periodical : Vest. AN SSSR 12, 57-59, Dec 1954

Abstract : Minutes are presented of the conference held in London, England during May 31 - June 2, 1954, at which problems of creep and destruction of metals at high temperatures were discussed. The conference was called by the largest English Scientific Organization - National Physics Laboratory and was attended by metallurgical scientists from all Western Nations including the USA and Japan. The USSR was the only representative of East European Nations invited to the conference.

Institution : ...

Submitted : ...

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

AID P - 1111

Subject : USSR/Chemistry

Card 1/1 Pub. 119 - 1/7

Author : Kornilov, I. I. (Moscow)

Title : Titanium: properties, use and methods of production

Periodical : Usp. khim., 23, no. 5, 529-546, 1954

Abstract : Production and properties of metallic titanium are reviewed, based in the main on non-Russian literature. Ten diagrams, 4 tables, 37 references (8 Russian: 1941-1954).

Institution : None

Submitted : No date

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

*Melting Diagram of the System Nickel-Chromium-NiAl. I. I. Kornilov and R. S. Minin (Doklady Akad. Nauk S.S.S.R., 1954, 94, (5), 1035-1038).—(In Russian). The melting diagram of the ternary system Ni-Cr-NiAl was prepared, starting with an investigation of the binary systems Ni-Cr, Ni-NiAl, and Cr-NiAl by the method of thermal analysis and microhardness detn. The liquidus surface of the system Ni-Cr-NiAl was then constructed with the aid of orthogonal projections of the liquidus lines of sections of const. contents of 20, 30, 40, 50, and 55 wt.-% Cr; 20, 30, 40, 50, and 60 wt.-% Ni; 10, and 20 wt.-% NiAl upon the compn. triangle. It consisted of four fields of primary crystn., corresponding to the sepn. of the following phases: (i) α solid soln. of Ni and Al in Cr, (ii) β solid soln. of Ni and Cr in NiAl, (iii) γ solid soln. of Cr and Al in Ni, and (iv) γ′ solid soln. of Cr, Ni, and Al in Ni_3Al. The lines of secondary crystn. and of phase structure and the behaviour under heat-treatment of several Ni-Cr-NiAl alloys of intermediate compn. were also determined. It was concluded that the peritectic reaction giving rise to Ni_3Al takes place between the liquid and the β phase of NiAl (cf. Taylor and Floyd, *J. Inst. Metals*, 1952-53, 81, 481; *M.A.*, 20, 691) and not between the liquid and the Ni γ solid soln. (cf. Alexander and Vaughan, *ibid.*, 1937, 61, 247; *M.A.*, 4, 614).—S. K. I.

Evaluation B-80678

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

3

*The Compound Ni_4Cr. I. I. Kornilov and R. S. Mints (*Doklady Akad. Nauk S.S.S.R.*, 1954, 96, (3), 543-545).—[In Russian]. Alloys of Ni contg. 0-35 at.-% Cr were examined, before and after annealing at different temp., by metallographic and X-ray analysis, and by dilatometric and elect.-resistance detn. (cf. Taylor and Hinton, *J. Inst. Metals*, 1952-53, 81, 169; *M.A.*, 20, 337). The sp. elect. resistance of the specimens annealed at 460° C. was lower than the resistance of the quenched specimens, the difference increasing with the time of annealing. A sharp min. on the sp. elect. resistance/at.-% Cr curve corresponding to 24 at.-% Cr indicated the formation of the Ni_4Cr compound. A similar sharply defined min. was discovered on the linear expansion coeff./at.-% Cr diagram. X-ray analysis showed a decrease of the cell const. a after annealing; for the alloy contg. 24 at.-% Cr, a = 3·533 and 3·524 kX for the quenched and annealed specimens, resp.—S. K. L.

Evaluation B-80678

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

USSR/ Chemistry - Metallurgy

Card : 1/1

Authors : Kornilov, I. I. and Pylaeva, E. N.

Title : Study of the structural diagram of a system formed by metallic Ni_3Nb-Ni_3Ta compounds.

Periodical : Dokl. AN SSSR, 97, Ed. 3, 455 - 457, July 21, 1954

Abstract : The study and formation of a structural diagram, for a binary system formed by metallic Ni_3Nb and Ni_3Ta compounds, are discussed. The study of this system was carried out by methods of thermal analysis, microstructure, specific electrohardness resistance and specific weight. Many fusions of this binary system were also subjected to x-ray analysis and the total results are described. Eight references: 6-USSR and 2-USA. Graph, illustrations.

Institution : Acad. of Sc. USSR, The A. A. Baykov Institute of Metallurgy

Presented by : Academician I. P. Bardin, March 26, 1954

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I. I.

USSR/Chemistry - Metallic compounds

Card 1/2 Pub. 22 - 24/47

Authors : Kornilov, I. I., and Matveyeva, N. M.

Title : Constant solid solutions of metallic FeCr and FeV compounds

Periodical : Dok. AN SSSR 98/5, 787-790, Oct 11, 1954

Abstract : The existence of a continuous series of solid alpha solutions in the ternary Fe - Cr - V system at high temperatures and the formation of a continuous series of solid sigma solutions between FeCr and FeV compounds was confirmed by thermal analysis, hardness and micro-structural methods. The process and rate of formation of such solid sigma compounds, from solid alpha solutions, are explained. The temperatures leading to conversion of solid solutions of the sigma FeCr and FeV compounds into ternary solid solutions of alpha compounds, which constitute the ternary system of metals, were found to be of continuous nature and correspond to conversions of solid sigma solutions into

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"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

Dok. AN SSSR 98/5, 787-790, Oct 11, 1954 (Additional card)

Card 2/2

Abstract : solid solutions of alpha metals. Nine references: 8-USSR and 1-USA (1936-1954). Graphs.

Institution: Acad. of Sc. USSR, The A. A. Baykov Metallurgical Institute

Presented by: Academician G. G. Urazov, May 22, 1954

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

FD-2240

USSR/Engineering - Metallography

Card 1/1 Pub 41-8/17

Author : Kornilov, I. I. and Kosmodem'yanskiy, V. V., Moscow

Title : Relationship between composition, temperature, and heat resistance. II. Ternary system Nickel-Chromium-Titanium alloys

Periodical : Izv. AN SSSR, Otd. Tekh. Nauk 2, 90-97, Feb 1955

Abstract : Studies the relationship between composition, structure, and heat resistance of Ni-Cr-Ti ternary system alloys over a wide temperature range (500-1200°). Twenty different alloys were tested. The chromium content was constant at 20% while titanium content was varied from 0% to 10%. Ritanium solubility was investigated at the following temperatures: 700°, 800°, 900°, 1000°, 1100°, and 1200°. Diagrams. Eight references, 7 USSR.

Institution:

Submitted : January 21, 1955

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"

"APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2

KORNILOV, I.I.

FD-3227

USSR/Engineering - Physical Metallurgy

Card 1/1 Pub. 41-8/22

Author : Kornilov, I. I. and Snetkov, A. Ya., Moscow

Title : Study of the Limited Solid Solutions of Nickel by the X-ray Structural Method

Periodical : Izv. AN SSSR, Otd. Tekh. Nauk 7, 84-88, Jul 55

Abstract : Investigates the variation of value a (lattice spacing) in relation to the content and relative atomic diameters of alloying elements in binary and ternary nickel alloys. Concludes that chromium, which differs little from nickel in its atomic diameter, effects only a small distortion of the crystal lattice of nickel. Three tables; two diagrams. Twelve references, nine USSR.

Institution :

Submitted : 26 January 1955

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720006-2"