

S/129/62/000/004/010/010
E193/E383

Conference on

chemical and technological properties of nitrogen-bearing alloys" by Candidate of Technical Sciences V.M. Bereziani;
"Technology of fabrication of high nitrogen-content manganese alloys" by Engineer I.B. Baratashvili (Tbilisi);
"Search for nickel-free constructional steels [suitable for fabrication] for large parts" by Doctor of Technical Sciences Professor M.P. Braun (Kiyev);
"Modified heat-resistant steel" by Engineer V.V. Vinokur (Kiyev);
"Factors determining high mechanical strength of the 3M437 (EI437) alloy" by Candidate of Technical Sciences V.G. Chernyy (Kiyev);
"The specific features of the effect of rare-earth metals on the structure and properties of industrial constructional steels" by Candidate of Technical Sciences Ya.Ye. Gol'dshteyn;
"Distribution of silicon in various phases during solidification of steels and cast irons" by Engineer F.K. Tkachenko (Zhdanov);
"Thermomechanical treatment of alloys" and "New trends in studies of structure and properties of metals and alloys" by hot-stage metallographic methods" by Doctor of Technical Sciences M.G. Lozinskiy (Moscow);
Card 2/4

Conference on

S/129/62/000/004/010/010
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"The role of structure of metals in diffusion processes" by
Doctor of Technical Sciences Professor S.Z. Bokshteyn (Moscow);
"The role of the structural factor in attaining high strength
in heat-resistant alloys" by Candidate of Technical Sciences
Ye.Ye. Levin (Leningrad);
"Study of various methods used to prevent cracking during
quenching of large parts made of constructional steels" by
Engineer L.S. Levin (Moscow);
"Operational experience relating to heat-treatment of rolled
products at the Chelyabinsk Plant" by Engineer A.I. Komissarov
(Chelyabinsk);
"The criterion of reversible temper brittleness and the size
factor" by Engineer O.S. Kostyrko (Kiyev);
"Reversible temper brittleness in cast steels of the chromium-
manganese group" by Engineer G.N. Krukovskoy (Kiyev);
"The effect of some factors on susceptibility of steels to
temper brittleness" by L.G. Sakvarelidze (Tbilisi);
"New technology of heat-treatment in a complex automated line
in the production of motor-car suspension springs" by Engineer
O.I. Yudina;
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S/129/62/000/004/010/010
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Conference on

"A new method of determining hardenability of steel during isothermal quenching (austempering)" by Engineer Ye.K.Kovshikov;
"Nitriding of tractor gears" by Candidate of Technical Sciences S.G. Lantofel' (Omsk);
"On the problem of utilization of high-strength steels" by Engineer V.S. Sysoyeva;
"Graphitization of steels" by Candidate of Technical Sciences P.Ya. Gruzlov (Moscow);
"Incorporation of nitriding for case-hardening of motor-car components in closed-cycle automated aggregates" by V.F. Nikonov;
"Heat-treatment of tools in water-vapour atmosphere" by Engineer G.G. Korolev (Moscow);

Card 4/4

L 19304-63 EWP(q)/EWT(m)/BES ASD/AFFTC JD
ACCESSION NR: AR3006905 S/0137/63/000/007/1020/1020

SOURCE: RZh. Metallurgiya, Abs. 71129

~~K~~ B

AUTHOR: Tavadze, F. N.; Kovshikov, Ye. K.

TITLE: Mechanism and structural forms of the intermediate conversions of the austenite of stamping steels

CITED SOURCE: Tr. (Iruz. politekhn. in-t, no. 4 (84), 1962, 65-74

TOPIC TAGS: austenite, stamping steel, carbide, 5KhNM, 5KhNV, 5KhNT, hardness, viscosity, tempered steel

TRANSLATION: The mechanism and structural forms of the intermediate conversion of austenite (A) of steels 5KhNM, 5KhNV, and 5KhNT were studied in the temperature range 600-200C by the method of microscopic analysis, supplemented in a number of cases by a measurement of the hardness and a_k ; the basic attention was paid to the transformations that occur in the lower (375-275C) temperature region of the intermediate conversions. In the lower temperature region of intermediate conversions, the structure represents a mixture of the tempered α -phase, dispersed carbides of the cementite type (Σ -carbides), the untempered

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ACCESSION NR: AR3006905

α -phase, and A. The Σ -carbide is coherently bonded to the initial matrix, a simple orientation bond in this carbide existing only with the lattice of the α -phase. A mechanism is proposed for the decomposition of A in this temperature region of intermediate conversion. In the upper temperature region of intermediate conversion, the structure consists of alternating plates of ferrite and enriched A, the untempered α -phase, and dispersed carbides. The use of a narrow temperature range (of the order of 50C) in the lower temperature region of intermediate conversions (300-350C) is recommended for the production of the best complex of mechanical properties of stamping steels. A. Nefedov.

DATE ACQ: 12Aug63

SUB CODE: ML

ENCL: 00

Card 2/2

37473

S/129/62/000/005/004/011

E073/E535

18.8200

AUTHORS: Tavadze, F.N., Academician AS Georgian SSR and Svanidze, Sh.G., Engineer

TITLE: Influence of thermomechanical treatment on the temper brittleness of chromansil type steel

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no.5, 1962, 23-24

TEXT: The investigated steel was produced in an acidically lined induction furnace and had the following composition: 0.31% C, 1.10% Cr, 1.14% Mn, 1.12% Si, 1.40% Ni, 0.026% P, 0.024% S. The thermomechanical treatment was carried out prior to the ordinary quenching and tempering. The blanks were heated to 1050-1100°C, forged and then the influence was investigated of the degree of deformation, the temperature of terminating the forging, the cooling and the annealing conditions. After forging, all the blanks were subjected to the same annealing conditions and then specimens were produced which were quenched from 900°C and tempered at 500°C. A sharp drop in the impact strength was observed for the range of tempering temperatures 425-625°C.

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Z

Influence of thermomechanical ... S/129/62/000/005/004/011
E073/E535

Preliminary forging improves impact strength after quenching and tempering only if the reduction exceeds 25-30%. Fig.2 shows the influence of the temperature at the end of forging, °C, on the impact strength, a_k kgm/cm². Fig.3 shows the dependence of the impact strength, a_k kgm/cm², on the time of tempering at 500°C (curve 1 - without thermomechanical treatment, curve 2 - after forging). Fig.4 shows the change in impact strength of the annealed steel as a function of the tempering temperature (curve 1 - without thermomechanical treatment, curve 2 - after forging). Fig.5 shows the influence of the tempering temperature on the impact strength (curve 1 - without thermomechanical treatment, curve 2 - after forging). There are 5 figures.

Card 2/02

ASTAP'YEV, A.A., kand.tekhn.nauk; KOVSHIKOV, Ye.K., inzh.; TAVADZE,
F.N., akademik

Rapid heating of forging dies for hardening. Metalloved. i term.
obr. met. no.10:41-44 0 '62. (MIRA 15:10)

1. AN Gruzinskoy SSR (for Tavadze).
(Tool steel—Hardening)

TAVADZE, F.N.; TSKITISHVILI, M.D.

Determining the solubility limit of aluminum, titanium, and niobium in iron-chromium-manganese-nickel-tungsten-molybdenum austenite and their effect on its heat-resistance. Trudy Inst.met. AN Gruz., SSR 12:119-128 '62. (MIRA 15:12)
(Steel, Heat-resistant—Testing) (Solubility)

TAVADZE, F.N.; S'VANIDZE, Sh.G.; MANDZHGALADZE, S.N.

Effect of copper on the corrosion-resistance of chromium-manganese-silicon steel. Trudy Inst.met. AN Gruz. SSR 12:129-136 '62.

(MIRA 15:12)

(Chromium-manganese steel--Corrosion) (Copper)

TAVADZE, F.F.; MANDZHIGALADZE, S.N.; NABICHVRISHVILI, M.A.; DASHNIANI, T.S.;
LORDKIPANIDZE, I.N.

Chemical properties of cast iron in the system iron - chromium -
nickel - silicon - carbon. Trudy Inst.met. AN Gruz. SSR 12:137-144
'62. (MIRA 15:12)
(Cast iron--Thermal properties) (Corrosion and anticorrosives)

SAKVAREKLIDZE, L.G.; TAVADZE, P.N.

Effect of thermomechanical treatment on metal susceptibility
to temper brittleness. Trudy Inst.met. AN Gruz. SSR 12:159-165
'62. (MIRA 15:12)
(Alloys—Brittleness) (Tempering)

TAVADZE, F.N.; SAKVARELIDZE, L.G.

Electron microscopy and electronography of alloys on a pure iron base. Trudy Inst.met. AN Gruz. SSR 12:167-172 '62.

(MIRA 15:12)

(Iron alloys--Metallography) (Electron microscopy)

ACCESSION NR: AR4027683

S/0276/64/000/001/G009/G009

SOURCE: RZh. Tekhnologiya mashinostroyeniya, Abs. 1G66

AUTHOR: Tavadze, F. N.; Tskitishvili, M. D.; Bagdavadze, D. I.

TITLE: The effect of additions of nitrogen, boron, and carbon on the heat resistance of chromium-nickel alloys (with 10% nickel)

CITED SOURCE: Tr. In-ta metallurgii. AN GruzSSR, v. 13, 1962(1963), 57-63

TOPIC TAGS: heat-resistant alloy, chromium-nickel alloy, alloy additive

TRANSLATION: The addition of up to 0.5% nitrogen noticeably increases heat resistance. Increasing the nitrogen content in alloys is desirably, but limited due to the complication of sample smelting technology. The addition of boron up to its solubility limit gives even better results. The addition of boron with the separation of the excess phases decreases heat resistance. The addition of up to 0.25% carbon increases heat resistance by an insignificant amount. Increasing the carbon content to 0.5% results in a sharp deterioration of heat resistance due to the separation of the unstable carbides.

Card 1/21

TAVADZE, F.N.; PITRIASHVILI, B.V.; LANCHAVA, M.D.

Pinch effect phenomenon in direct action electric resistance furnaces.
Trudy Inst. met. AN Gruz. SSR 13:65-69 '62. (MIRA 17:9)

TAVADZE, F.N.; KHUTSISHVILI, N.L.

Use of Karadag natural gas for the cementation of steel. Trudy
Inst. met. AN Gruz. SSR vol. 13:71-74 '62. (MIRA 17:9)

TAVADZE, F.N.; LEZHAVA, K.I.

Production of silicon-free, killed pipe steel. Trudy Inst. met.
AN Gruz. SSR vol. 13:75-88 '62. (MIRA 17:9)

TAVADZE, F N.; LASHKHI, T.A.

Polarizability of certain metals in grape wine. Trudy Inst. met.
AN Gruz. SSR vol. 13:89-98 '62. (MIRA 17:9)

NEBREVYEV, V.F.; GADZHIYOVA, R.G.; TAVAZIS, F.N.; MANDZHIGALADZE, S.N.

Stability of paint and varnish coatings in Borzhomi mineral waters.
Trudy Inst. met. AN Gruz. SSR vol. 13:99-103 '62. (MIRA 17:9)

TAVADZE, F.N.; NAPETVARIDZE, Z.T.

X-ray investigation of residual stresses in butt-welded joints
in petroleum-quality pipe, following various kinds of heat treat-
ment. Trudy Inst. met. AN Gruz. SSR vol. 13:247-254 '62.
(MIRA 17:9)

TAVADZE, E.N.; PETRIASHVILI, B.V.; LANCHAVA, M.D.

Superheating of cupola cast iron. Tekhnika Bulg 11 no.4:147-149 '62.

TAVADZE, F.N.; SHARADZENIDZE, S.A.; BARBAKADZE, D.F.

Core sampling from mold walls for the study of their structure
and of the mold metal properties. Stal' 22 no.4:374-375 Ap
'62. (MIRA 15:5)

(Ingot molds—Testing)

TAVADZE, F.N., akademik; TSKITISHVILI, M.D.

Effect of nitrogen on the heat resistance of multicomponent chromium-manganese alloys of a certain composition. Soob.AN Gruz.SSR
28 no.1:73-78 Ja '62. (MIRA 15:4)

1. Akademiya nauk Gruzinskoy SSR, Institut metallurgii, Tbilisi.
2. Akademiya nauk Gruzinskoy SSR (for Tavadze).
(Chromium-manganese steel—Thermal properties)
(Nitration)

S/251/62/029/006/005/005
D204/D307

AUTHORS: Tavadze, F.N., Academician and Simonishvili, T.V.

TITLE: A study of the effects of Ti, Al and W on the equilibrium and refractoriness of alloys based on the gamma solution of the system Fe-Cr-Ni-Mn-Nb-V-Si

PERIODICAL: Akademiya nauk Gruzinskoy SSR. Soobshcheniya, v. 29, no. 6, 1962, 703-708

TEXT: The present article is a continuation of earlier work (DAN AN SSSR, v. 145, no. 1, 1962, 112). The percentage composition of the basic alloy was Fe 58.5, Cr 15, Ni 15, Mn 10, Nb 0.5, V 0.5, Si 0.5, and C < 0.03. Ti, Al and W were added individually or in pairs. The limiting solubilities in the basic alloy were found to be 3% for Ti, 4% for Al, and 6% for W. When added in excess of these limits, the above elements gave rise to compounds of type Fe₂Ti, FeAl, and Fe₂W. The required phase analyses were directed by K.A. Doliashvili. Within the limits of solubility, hardness and microhardness were increased, particularly by Al, W + Al, and Ti + Al.

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A study of the effects ...

S/251/62/029/006/005/005
D204/D307

Resistivity was similarly affected, especially by W + Al. The refractoriness was lowered by combined additions of Ti and W, slightly increased by Ti and Al (added separately or together in amounts close to the solubility limits) and considerably raised by W and by W + Al (close to the solubility limits). The combination W + Al is thus to be preferred. After exceeding the solubility limits, further additions increased the hardness and lowered the refractoriness. The microhardness remained constant and the resistivity changed in a manner depending on the excess phase formed. Particularly pronounced effects were obtained by adding the alloying elements in pairs. Study of the constructed part of the equilibrium diagram [Abstracter's note: Apparently given in the earlier paper] allowed a composition to be determined which was optimal w.r.t. refractoriness and technological properties. This alloy contained relatively little Ni and no Co or Mo, but was as refractory as some austenitic steels containing the latter two metals and rich in nickel. There is 1 table. ✓

ASSOCIATION: Akademiya nauk Gruzinskoy SSR, Institut metallurgii, Tbilisi (Academy of Sciences, GSSR, Institute of Metallurgy, Tbilisi)

SUBMITTED: October 26, 1962

Card 2/2

TAVADZE, F.N., akademik; PRYAKHINA, L.I.; SIMONISHVILI, T.V.

Equilibrium of alloys based on γ -solid solution in the system
Fe - Cr - Ni - Mn - Nb - V - Si. Dokl.AN SSSR 145 no.1:112-114,
Jl '62. (MIRA 15:7)

1. Institut metallurgii imeni A.A.Baykova. 2. Akademiya nauk
Gruzinskoy SSR (for Tavadze).
(Iron alloys) (Phase rule and equilibrium)

TAVADZE, F.N., akademik; SIMONISHVILI, T.V.

Investigating the effect of Ti, Al, and W on the equilibrium and heat resistance of alloys on the basis of a gamma-solid solution in the system Fe - Cr - Ni - Mn - Nb - V - S. Soob. AN Gruz. SSR 29 no.6:703-708 D '62. (MIRA 18:3)

1. Institut metallurgii AN GruzSSR, Tbilisi. 2. Akademiya nauk Gruzinskoy SSR (for Tavadze).

KEBADZE, N. I. [deceased]; Primal uchastiye BULEISHVILI, D. A., kand. geol.-miner. nauk; TAVADZE, F. N., otv. red.; RUBINSHTEYN, M. M., kand. geol.-miner. nauk, red.; PEVZNER, G. Ye., red.; KONDRAT'YEVA, V. I., red.; BANKVITSER, A. L., red.; ASTAF'YEVA, G. A., tekhn. red.

[Natural resources of the Georgian S.S.R.] Prirodnye resursy Gruzinskoy SSR. Moskva, Vol. 5. [Fuel resources] Toplivnye resursy. 1963. 271 p. (MIRA 16:8)

1. Akademiya nauk Gruzinskoy SSR. Tiflis. Sovet po izucheniyu proizvoditel'nykh sil.
(Georgia--Coal geology) (Georgia--Peat)
(Georgia--Petroleum geology)

TAVADZE, F.N.; MANDZHGALADZE, S.N.; ROZENFEL'D, I.L., doktor
khim. nauk, otv. red.; GORSHKOV, G.B., red.izd-va;
DOROKEINA, I.N., tekhn. red.

[Corrosion and corrosion protection of metals in natural
mineral waters] Korroziia i zashchita metallov v natural'-
nykh lechebnykh vodakh. Moskva, Izd-vo AN SSSR, 1963. 246 p.
(MIRA 17:3)

ACCESSION NR: AT4030796

8/0000/63/000/000/0110/0118

AUTHOR: Tavsdze, F.N.; Bayramashvili, I.A.; Khantadze, B.V.; Grdzlishvili, V.A.

TITLE: The influence of boron on the surface tension of nickel

SOURCE: AN UkrSSR. Institut metallokeramiki i spetsial'nykh splyavov. Poverkhnostny*ye yavleniya v rasplavakh i protsessakh poroshkovoy metallurgii (surface phenomena in liquid metals and processes in powder metallurgy). Kiev, Izd-vo AN UkrSSR, 1963, 110-118

TOPIC TAGS: surface tension, boron, nickel, beryllium oxide, aluminum oxide, nickel based alloy, boron containing alloy, hydrogen, helium

ABSTRACT: The authors investigation was conducted by the lying-drop method on an instrument designed and constructed especially for this purpose. The fundamental diagram of the instrument is presented in a figure. The drop was magnified four times. The surface tension of the metal was determined on a flat support of aluminum oxide and beryllium oxide. Special experiments were performed to study the effect of the materials of the heater and the supports, as well as the medium (hydrogen, helium), on the surface tension of nickel and its alloys with boron. The

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ACCESSION NR: AT4030796

results of the investigation were presented in micro-photographs, tables, and figures. The values of the surface tension of nickel in a hydrogen and helium atmosphere were practically identical. Boron, an inactive element in relation to nickel, did not effect the value of its surface tension and the grain size. The calculation of the generalized moment and the static generalized moment of nickel and boron atoms confirmed the inactivity of boron in nickel-boron alloy systems. Orig. art. has: 10 figures and 2 tables.

ASSOCIATION: Institut metallurgii AN GruzSSR, Tiflis
AN (Georgian SSR)

(Institute of Metallurgy

SUBMITTED: 23Nov63

DATE ACQ: 16Apr64

ENCL: 00

SUB CODE: ML

NO REF SOV: 006

OTHER: 003

Card 2/2

S/225/63/000/002/012/014
ACC6/A101

AUTHORS: Ageyev, N. V., Tavadze, F. N., Kartvelishvili, Yu. M.

TITLE: Preparation of chromium chloride

PERIODICAL: Poroshkovaya metallurgiya, no. 2, 1963, 88 - 95

TEXT: A method of preparing chromium chloride is proposed which yields metal with a low content of gaseous and metallic impurities. The method consists in chlorinating ore, chrome oxide, or chrome metal with subsequent purification of the product by distillation in a chlorine current, and reduction with magnesium. Chlorination of Cr oxide was conducted at 900 - 1000°C for 1 hour, and chlorination of electrolytic Cr at 900 - 600°C for 50 min. The reactor capacitor was coated with asbestos at the spot where Cr chlorides were deposited; this made it possible to maintain a temperature in the capacitor (500 - 600°C) exceeding the melting point of volatile chlorides but not attaining the melting point of Cr chloride. In such a manner only pure Cr chloride was deposited in the capacitor. The Cr-chlorides obtained were purified at 900 - 950°C by distillation in purified chlorine current. A spectral analysis of Cr chlorides

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Preparation of chromium chloride

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A006/A101

obtained from Cr oxide and electrolytic Cr shows that high-purity chlorides can thus be obtained. The magnesium-thermal reduction of Cr chloride was performed in purified helium. Efficient reduction takes place at 650°C when magnesium is melted, and shows an explosive nature. The reactor was held at this temperature for 15 min; the temperature was then elevated to 850°C. Magnesium chloride and magnesium was eliminated from the crucible by melting and distillation in a vacuum during 60 min. Almost 100% Cr was extracted from the chloride in the form of gray powder containing not less than 99.96% Cr. The interaction between Cr chloride and magnesium during the reduction process was studied and is explained. There are 5 figures.

ASSOCIATION: Institut metallurgii AN GSSR i Institut metallurgii im. A. A. Baykov AN SSSR (Institute of Metallurgy, AS GSSR, and Institute of Metallurgy imeni A. A. Baykov, AS USSR)

SUBMITTED: April 14, 1962

Card 2/2

TAVADZE, F.N.; KOVSHIKOV, Ye.K.

Heat treatment of forging dies. Metalloved. i term. obr. met.
no.7:41-42 JI '63. (MIRA 16:7)

(Dies (Metalworking)) (Steel--Hardening)

TAVADZE, F.N.; EBANOIDZE, D.D.

Diffusion of lithium in cast iron and phenomena accompanying it.
Lit. proizv. no.10:26-28 0 '63. (MIRA 16:12)

ACCESSION NR: AT4007035

S/2598/63/000/010/0151/0153

AUTHOR: Tavadze, E. N.; Mandzhgaladze, S. N.; Lordkipanidze, I. N.; Dashniani, T. S.

TITLE: Corrosion resistance of titanium alloys to media used in the pharmaceutical industry

SOURCE: AN SSSR. Institut metallurgii. Titan i yego splavy*, no. 10, 1963. Issledovaniya titanovykh splavov, 151-153

TOPIC TAGS: titanium alloy, VT-1 titanium, OT-4 titanium alloy, OT-40 titanium alloy, AT-3 titanium alloy, AT-4 titanium alloy, AT-6 titanium alloy, AT-8 titanium alloy, titanium alloy corrosion

ABSTRACT: On the initiative of the Tbilisskiy khimiko-farmatsevticheskiy zavod Sovnarkhoza GSSR (Tiflis Chemo-Pharmaceutical Plant, Sovnarkhoza Georgian SSR), the authors studied the corrosion resistance of the Ti alloys VT-1, AT-3, AT-4, AT-6, AT-8, OT-4 and OT-40 in a number of plant extracts and infusions, tincture of iodine and aqueous solutions of tannic and gallic acid, in comparison with that of stainless steel 1Kh18N9T (E1533), Cu, tinne Cu and Ni. Of these media, tincture of iodine was found to be the most corrosive. The Ti alloys of the AT and OT class were distinguished by high corrosion resistance in all media. Thus, in tinc-

ACCESSION NR: AT4007035

ture of iodine and most plant extracts, the corrosion resistance of TI alloys other than VT-1 was 10-15 times as high as that of tinned Cu. In tannic or gallic acid, the AT alloys were 90 times as resistant as alloy VT-1, 220 times as resistant as stainless steel and 300 times as resistant as tinned Cu. Analysis of the solution after exposure of the OT alloys to tannic acid revealed leaching out of Mn and Fe. These findings were confirmed by kinetic studies in aqueous tannic acid and tincture of Convalaria malulis, which showed that the corrosion rate of stainless steel, Ni, Cu and tinned Cu increased rapidly with time, while that of the AT alloys remained quite low. Orig. art. has: 4 figures.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

SUBMITTED: 00

ENCL: 00

SUB CODE: MM, IS

NO REF SOV: 000

OTHER: 000

Card 2/2

ACCESSION NR: AT4007036

8/2598/63/000/010/0154/0158

AUTHOR: Tavadze, F. N.; Lashkhi, T. A.

TITLE: Corrosion resistance of titanium alloys in media used in the foods industry

SOURCE: AN SSSR: Institut metallurgii. Titan i yego splavy*, no. 10, 1963.
Issledovaniya titanovy*kh splavov, 154-168

TOPIC TAGS: titanium alloy, AT-3 titanium alloy, AT-4 titanium alloy, AT-6 titanium alloy, AT-8 titanium alloy, titanium alloy corrosion

ABSTRACT: The corrosion resistance of AT-3, AT-4, AT-6 and AT-8 titanium alloys, and of 1Kh18N9T stainless steel, which are used in the food industry, was investigated under laboratory conditions. Titanium alloys AT-3, AT-4, and AT-8 were subjected to boiling acids and the vapors of acetic and formic acids for 200 hours. The results of these tests are given in Table 1 of the Enclosure. All four alloys were tested under various technological conditions prevalent in the food, (coffee, wine, preserves, and tea) industries. All tested alloys showed good corrosion resistance. The corrosion resistance of AT-3 and AT-8 was especially high in coffee, acetic acid, and beer.
Orig. art. has: 7 tables.

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ACCESSION NR: AT4007036

ASSOCIATION: Institut metallurgi AN SSSR (Institute of Metallurgy AN SSSR)

SUBMITTED: 00

DATE ACQ: 27Dec63

ENCL: 01

SUB CODE: MH, MT

NO REF SOV: 000

OTHER: 000

Card

2/3

AC... NIN: AT4007036

TABLE 1

ENCLOSURE: 01

Results of corrosion test of titanium alloys AT in boiling acids

<u>Grade of the alloy</u>	<u>Testing medium</u>	<u>K₂O/m² hour</u>	<u>μ;mm/year</u>	<u>Point of stability</u>
ACETIC ACID				
AT-3	Acid	0.007	0.0133	4
AT-3	Vapor	0.003	0.0057	3
AT-4	Acid	0.01	0.019	4
AT-4	Vapor	0.003	0.0057	3
AT-8	Acid	0.007	0.00133	2
AT-8	Vapor	0.004	0.0076	3
FORMIC ACID				
AT-3	Acid	0.0008	0.00152	2
AT-3	Vapor	0.002	0.0038	2
AT-4	Acid	0.002	0.0038	2
AT-4	Vapor	0.005	0.0095	3
AT-8	Acid	0.004	0.0076	3
AT-8	Vapor	0.005	0.0095	3

Remark: all samples underwent uniform corrosion

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ACCESSION NR: AT4007038

S/2598/63/000/010/0176/0178

AUTHOR: Tavadze, F. N.; Mandzhgaladze, S. N.; Dashniani, T. S.; Lordkipanidze, I. N.; Tavadze, L. F.

TITLE: Electrochemical and corrosion behavior of alloys of the titanium aluminum system

SOURCE: AN SSSR. Institut metallurgii. Titan i yego splavyt, no. 10, 1963. Issledovaniya titanovykh splavov, 176-178

TOPIC TAGS: titanium aluminum alloy, titanium aluminum alloy corrosion, titanium alloy corrosion, titanium aluminum system, titanium alloy, Ti sub 3 Al, Ti sub 2 Al, titanium alloy electrochemical property

ABSTRACT: In order to correct certain deficiencies and contradictions in the literature, the authors studied the corrosion resistance and electrochemical potential of 19 Ti-Al alloys with Al contents of 0.5-38.5% by weight. Alloy specimens were heated to 900C for 100 hrs., then at 800C for 200 hrs. and 700C for 100 hrs. before cooling to room temperature and exposure to 40% H₂SO₄, 60% HCl, 5% HNO₃ or 0.5N NaCl. Corrosion was measured by volumetric or gravimetric methods. As shown by Fig. 1 in the Enclosure, these alloys are generally corrosion resistant, especially, in HNO₃, in which there is a single corrosion maximum at an Al concentration of 6-7%. in
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ACCESSION NR: AT4007038

H₂SO₄ and HCl, there are two corrosion maxima, one at 6-8% Al and a much broader maximum at 25-26% Al. The electrochemical potential in NaCl showed a similar behavior, with positive maxima at the same Al contents. In an alloy with 1% Al, the potential became generally more negative with time, while with 7% Al, the potential increased with time, becoming positive in about 6 minutes. These variations in the corrosion resistance of Ti-Al alloys indicate the existence of phases which act as cathodes with respect to the solid solution of Al in α -Ti. Orig. art. has: 3 figures.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

SUBMITTED: 00

DATE ACQ: 27Dec63

ENCL: 01

SUB CODE: MM

NO REF SOV: 001

OTHER: 002

Card 2/3

ACCESSION NR: AT4007038

ENCLOSURE: 01

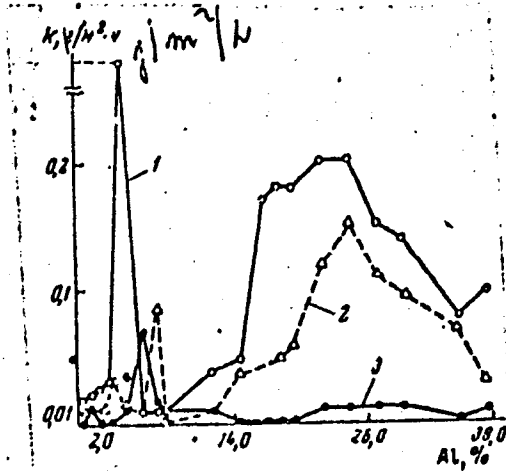


Fig. 1. Dependence of the corrosion rate of Ti-Al alloys on the Al content:
1 - in 40% sulfuric acid; 2 - in 60% hydrochloric acid; 3 - in 5% nitric acid. Ordinate = corrosion in $g/m^2/hr$.; abscissa = % Al.

Card 3/3

TAVADZE, E.N.; PRYAKHINA, L.I.; SIMONISHVILI, T.V.

Investigating the effect of tungsten and aluminum on the structure and properties of an austenitic solid solution in the system iron - chromium - nickel - manganese - niobium - vanadium - silicon. Trudy Inst. met. no.12:125-131 '63.
(MIRA 16:6)

Systems (Chemistry))
(Tungsten)
(Aluminum)

L 10629-63 EWP(q)/EWT(m)/BDS--AFFTC/ASD--JD
ACCESSION NR: AP3000/50 S/0020/63/150/003/0544/0546 57
56

AUTHOR: Tayadze, F. I. (Academician, AN GruzSSR); Bayramashvili, I. A.;
Khantadze, D. V.; Tsagareyshvili, G. V.

TITLE: Density and surface tension of molten boron

SOURCE: AN SSSR. Doklady*, v. 150, no. 3, 1963, 544-546

TOPIC TAGS: liquid-boron density, liquid-boron surface tension, localized melting, electron-beam melting, drop-volume image, contact angle

ABSTRACT: The density and surface tension of molten boron (B) have been measured for the first time by the pendant-drop and sessile-drop methods. A procedure for zone melting without a crucible, reported previously by Tsagareyshvili (Tsagareyshvili, G. V., Izvestiya nauchno-tekhnicheskoy i proizvodstvennoy opytn. gosinst., tema 37, v. 7 (1962).), was adapted with modifications for the use of an electron beam of a cathode-ray tube for localized melting. Experiments with ml drops have established that surface tension is not affected by electron beam heat. The volume of the drop was both determined from its height in a calibrated optical system for precise measurements of expansion coefficients and calculated from the function $V = \pi R^2 h$ for various contact

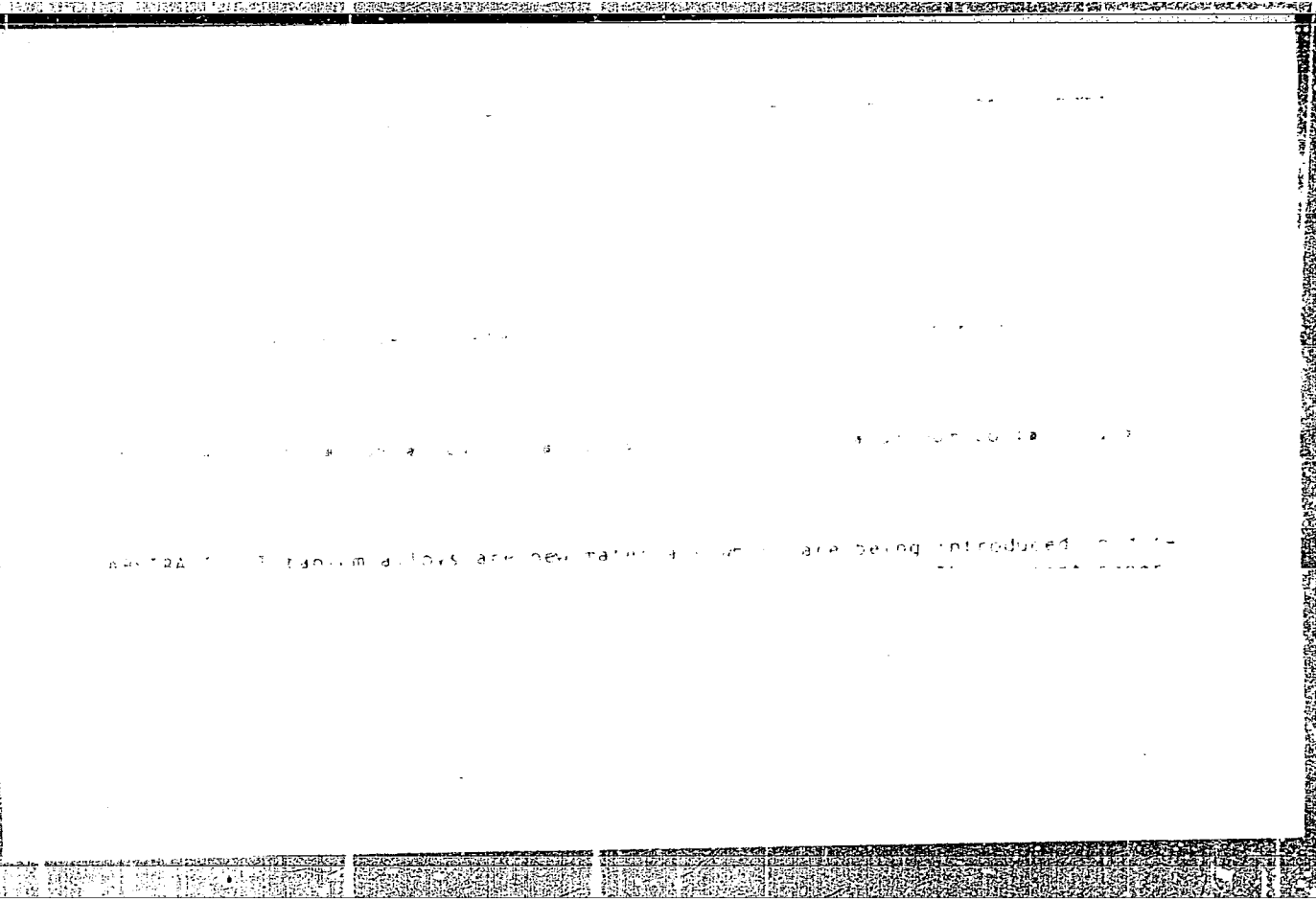
Card 1/32

L 10629-63

ACCESSION NR: AP3000'50

angles θ , with l the radius of the equatorial cross section of the drop; H , the distance between the equatorial cross section and the top; V , the volume of the drop, determined from the Bashforth and Adams tables (Bashforth, F., Adams, J. An Attempt to Test the Theories of Capillary Action by Comparing the Theoretical and Measured Form of Fluid Drop, London, 1885) and calculated on the basis of parameters l, H, θ ; and V_0 , the volume of a rotating ellipsoid with semimajor axis l , semiminor axis H , and height h . Correction to actual drop volume was accomplished by means of the above function. The accuracy of this method, since that of the Bashforth tables, is not influenced by errors in the measurement of the contact angle. The degree of heating was determined by means of an OPPR-17 pyrometer to be approximately 50C above the melting point. Surface tension was determined by melting crystalline B rods, 4, 6, and 9 μ m in diameter with an electron beam removed after formation of a drop. Results obtained were similar for rods with different diameters. Surface tension was determined to be 1080 dyn/cm by the sessile drop method and on the basis of previously reported data 1060 to 1070 dyn/cm by the pendant-weight-drop method depending on the data used and 1030 dyn/cm by the weight-drop method. At temperatures 50C above the melting point of B the density was 2.08 ± 0.03 gr/cm³, and the average surface tension was 1030 ± 10 dyn/cm. (orig. art. has 6 figures.)

cc: 12 Dept of Metallurgy



formic acids also showed high stability. It is concluded that H₂O₂ and H₂O₂ + H₂O₂ show the highest possible corrosion stability in oleic, oxalic,

Card 2/3

SUBMITTED: 15 JUL 64

EXCEL: 00

SUB CODE: MM

NO REF SOV: 005

OTHER: 000

Card 3/1

UJPC/RAEM(O)/ESD(35)/ESD(37) 2

Author: Tavazze, P. N.; Bayramashvili, A. N.

TITLE: Structure of crystalline boron
Metallografiya, v. 9, no. 6, 1964, 918-920

Keywords: boron, crystal growth, x ray structure analysis, melting

ABSTRACT: The crystalline boron was obtained by vertical crucible-
drawing with simultaneous drawing. The initial boron was
thermal decomposition. An
x-ray structural investigation showed that regardless of the source
of initial boron, the remelted boron crystallizes in the same
structure. An analysis of the x-ray

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L 16581-65
ACCESSION NR: AP5100294

bedral structure and does not experience polymorphic transformations

crystals have a tendency to maintain this plane perpendicular to the crystallization front. It is concluded that

ASSOCIATION: Gruzinskiy institut metallurgii (Georgian Institute of Metallurgy)

SUBMITTED: 11Jan64

ENCL: 00

SUB CODE: 35

NR REF SOV: 001

OTHER: 002

Card 2/2

TAVADZE, F.N., akademik; EBANOIDZE, D.D.

Effect of lithium on the graphitization of white cast iron.
Soob. AN Gruz. SSR 33 no. 2:391-395 F '64. (MIRA 17:9)

1. Gruzinskiy metallurgicheskiy institut. 2. Akademiya nauk
GruzSSR (for Tavadze).

TAVADZE, F.N.; OKLEY, L.N.; ZHAMIYERASHVILI, G.V.

Investigating temperature distribution in the mandrel during
first piercing. Stal' 23 no. 3:252-253 Mr '64. (MIRA 17:5)

1. Gruzinskiy institut metallurgii i Rustavskiy metallurgicheskiy
zavod.

TAVADZE, F.N., akademik; LANCHAVA, M.D.

Effect of overheating and inoculation on the properties of
gray cast iron. Soob. AN Gruz. SSR 33 no.3:621-626 Mr '64
(MIRA 17:8)

1. Gruzinskiy metallurgicheskiy institut, Tbilisi. 2. Akademiya
nauk Gruzinskoy SSR (for Tavadze)

TAVADZE, F.N.; BAYRAMASHVILI, I.A.; TSAGAREYSHVILI, G.V.; TSMAYA, K.P.;
ZOIDZE, N.A.

Structure of crystalline boron grown from the melt. Kristallografiia
9 no.6:918-920 N-D '64. (MIRA 18:2)

1. Gruzinskiy institut metallurgii.

L 25535-66 EWI(1)/IWI(m)/I/EWP(t) LJP(c) JD/GG

ACC NR: AM6004760

Monograph

UR/

51
A/B
B+1Tavadze, Ferdinand Nestorovich; Kilitarui, Tengiz Il'ich

Dislocation and normal growth of crystals of some nonferrous metals (Normal'nyy i dislokatsionnyy rost kristallov nekotorykh tsvetnykh metallov) Moscow, Izd-vo "Nauka", 1965. 158 p. illus., biblio., plates. 2,200 copies printed

TOPIC TAGS: crystal growth, crystallization, crystallograph, nonferrous metal, zinc, cadmium, arsenic, antimony, bismuth

PURPOSE AND COVERAGE: The book represents the results of material accumulated by the authors during the last five years in the study of methods of growing crystals from the liquid and gaseous phases of certain nonferrous metals which have hexagonal and rhombohedral structure (Zn, Cd, As, Sb, Bi), and also crystal-growth processes. A new original method is described, with the aid of which it is possible to obtain from the liquid phase crystals of metals with well developed growth faces. Spiral growth of crystals of these metals is considered, and is explained from the point of view of dislocation theory. Experimental data obtained with the aid of special motion-picture microphotography apparatus are considered. The use of this apparatus has made it possible to explain the kinetics of the growth of crystals from the gas phase. A large number of original microphotographs and single frames of motion-picture films is used to illustrate the processes. This is claimed to be the first publication of this material in the literature, and is of interest to a large group of specialists working in the field of solid-state physics, metal research, crystal chemistry, and other workers interested in crystallization processes.

Card 1/2

UDC: 542.65 : 669.2/8

2

L 25585-66

ACC NR: AM6004760

3

TABLE OF CONTENTS [abridged]:

- Ch. I. Theory of crystal growth - - 5
- Ch. II. Growth of crystals of certain nonferrous metals from the liquid phase - - 20
- Ch. III. Microrelief produced on the surface of the faces of zinc and cadmium crystals from the gas phase as a result of secondary growth - - 27 27
- Ch. IV. Features of crystal growth of certain nonferrous metals from the gas phase - - 87
- Ch. V. Kinetics of growth of terraces from the gas phase on the surface of antimony crystals - - 114 27
- Ch. VI. Analysis of growth of metal crystals from the liquid and gas phases - - 129
- Ch. VII. Tables of motion-picture frames - - 135
- Literature - - 154

SUB CODE: 11, 20/ SUBM DATE: 14 May 65/ ORIG REF: 048/ OTH REF: 036

Card 2/2 dda

L 30371-66 EWT(m)/T/EWP(t)/ETI IJP(c) JH/JD/WB/GD

ACC NR: AT6012382

SOURCE CODE: UR/0000/65/000/000/0138/0142

AUTHORS: Tavadze, F. N.; Mandzhgaladze, S. N.; Vul'f, B. K.; Yudina, S. A.;
Dashniani, T. B.62
59

ORG:

B+1

TITLE: The effect of oxygen content and heat treatment on the corrosion resistance
of AT3 and AT8 titanium alloysSOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego
splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium
alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 138-142TOPIC TAGS: OXYGEN, ALUMINUM CONTAINING ALLOY,
titanium alloy, corrosion resistance, corrosion resistant alloy,
hydrochloric acid, nitric acid, sulfuric acid / AT3 titanium alloy, AT8 titanium alloyABSTRACT: The dependence of the corrosion resistance of titanium alloys with both
small and considerable contents of aluminum upon their oxygen content is studied.
The range of oxygen content was from 0.1 to 0.43%. The alloys were studied in the
initial state and after normal heat treatment. The corrosive media were 5% HNO₃,
30% H₂SO₄, 40% HCl, solutions of tannic, gallic, and tartaric acids, 5% solutions of
NaCl and NaOH, and a humid subtropical atmosphere. In all but the HCl, H₂SO₄, and
tartaric acid, the corrosion resistance of the alloys was almost independent of the
oxygen content (see Fig. 1). An increase in the oxygen content considerably worsened

Card 1/3

I 30371-66

ACC NR: AT6012382

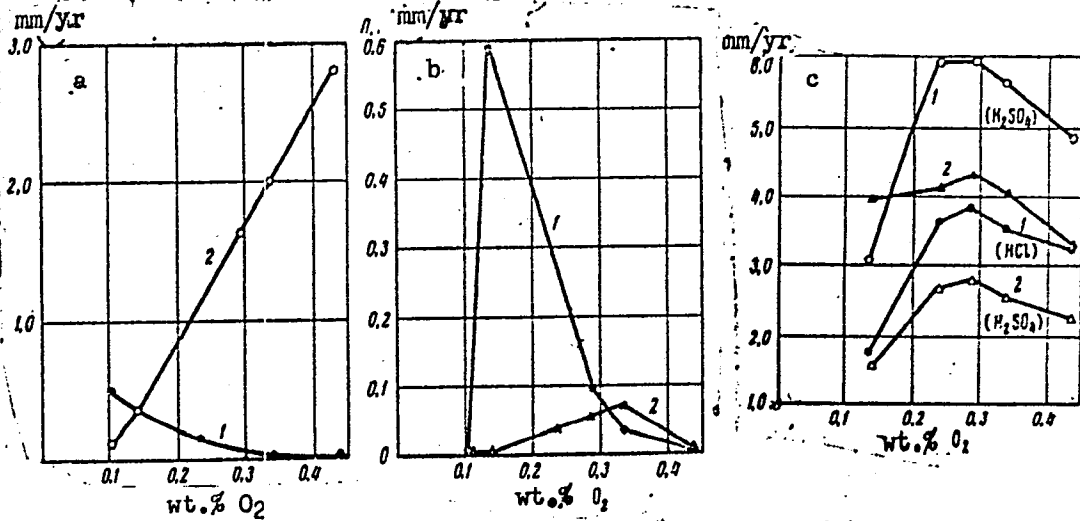


Fig. 1. Corrosion resistance of alloys AT3 (1) and AT8 (2) as a function of oxygen content: a - in 30% H₂SO₄ at room temperature; b - in 40% HCl at room temperature; c - in boiling mineral acids.

the corrosion resistance of AT8 in sulfuric acid (at room temperature) and tartaric acid. In this case, the corrosion resistance of AT3 (with less aluminum) was

Card 2/3

L 30371-66

ACC NR: AT6012302

improved. Aging of AT3 and AT8 after hardening caused a considerable decrease in corrosion resistance. Regardless of the oxygen content and the conditions of heat treatment, the nature of corrosion of the alloy is uniform. Orig. art. has: 5 figures and 1 table.

SUB CODE: 11/

SUBM DATE: 02Dec65/

ORIG REF: 007

Card 3/3 CC

BOKSHTEYN, S.Z. (Moskva); KISHKIN, S.P. (Moskva); MURKIN, I.M. (Moskva);
SAVADEE, P.N. (Moskva); ZHEBOLIN, I.I., Z.Dr. (Moskva);

Diffusive mobility and heat resistance of titanium alloys
following thermal and thermomechanical treatments. Izv. AN
SSSR. Met. no.5:139-144 5-6 1965. (MIRA 18:10)

[The text in this section is extremely faint and illegible due to the quality of the scan. It appears to be a multi-paragraph document.]

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OTHER: 004

TAVADZE, F.N., akademik; MARIYENBAKH, L.M., doktor tekhn. nauk; LANCHAVA, M.D., kand. tekhn. nauk

Design of equipment for the direct electric heating of a stream of liquid cast iron. Lit. proizv. no.9:18 S '65. (MIRA 18:10)

1. AN Gruzinskoy SSR (for Tavadze).

TAVADZE, F.N.; BARBAKADZE, D.F.

Increasing the resistance of large manganese cast iron ingot
molds without annealing. Stal' 25 no.2:126-127 F '65.

(MIRA 18:3)

TAVADZE, F.N., akademik; KHERODINASHVILI, Z.Sh.

Device for heating readily oxidizing materials in a vacuum.
Dob. AN Gruz. SSR 37 no.3:643-644 Mr '65. (MI A 18:5

1. Gruzinskiy metallurgicheskiy institut, Tbilisi. 2. Akademiya
nauk Gruzinskoy SSR (for Tavadze).

11179-66 EWP(e)/EWT(m)/EWP(w)/T/EWP(t)/EWP(b) LIP(c) JD

ACC NR: AP6004951

SOURCE CODE: RU/0027/65/010/001/0049/0052

AUTHOR: Tavadze, F. N.; Bairamasvili, I. A.; Tagareisvili, G. V.; Hantadze, D. V.

ORG: Institute of Metallurgy, Tbilisi

TITLE: Thermic expansion of boron and the volumetric effect of its melting

SOURCE: Studii si cercetari de metalurgie, v. 10, no. 1, 1965, 49-52

TOPIC TAGS: boron, heat expansion, metal melting

ABSTRACT: The authors found that as opposed to "semimetals" which have a small value of the Gruneisen constant and whose volume decreases on melting, boron's volume increases on melting which is a characteristic of true metals. The volume increase to the melting temperature also corresponds to the value of the Gruneisen constant for typical metals. Orig. art. has: 1 figure and 1 table.

JPRS

SUB CODE: 11 / SUBM DATE: none / ORIG REF: 005 / OTH REF: 002

Card 1/1

TAVADZE, F.N., akademik; BAYRAMASHVILI, I.A.; METREVELI, V.Sh.

Internal friction peak of boron in pure iron. Soob. AN Gruz. SSR
40 no.2:401-406 N '65. (MIRA 19:1)

1. Gruzinskiy institut metallurgii. 2. Akademiya nauk Gruzinskoy
SSR (for Tavadze). Submitted Jan. 12, 1965.

TAVADZE, F.N.; NAPETVARIDZE, Z.G.

Efficient conditions for the heat treatment of butt-welded
joints in petroleum pipe. Metalloved. i term.obr.met.
no.10:51-54 0 '65. (MIRA 18:11)

1. Institut metallurgii AN Gruzinskiy SSR i Azerbaydzhanskiy
nauchno-issledovatel'skiy institut neftyanogo mashinostroyeniya.

L 18727-66 EWT(m)/EWI(d)/ENP(t) IJP(c) JD/JG

ACC NR: AP6005092

SOURCE CODE: UR/ 0251/65/040/003/0685/0692

AUTHOR: Tavadze, F. N. (Academician AN GruzSSR); Pirtskhalaishvili, V. A.; Khutsishvili, N. L.

ORG: Georgian Institute of Metallurgy (Gruzinskiy institut metallurgii)

44
B

TITLE: Effect of chromium on the structure and properties of nitrogen-containing austenitic chromium-manganese and chromium-manganese-nickel steels 27

SOURCE: AN GruzSSR. Ssobshcheniya, v. 40, no. 3, 1965, 685-692

TOPIC TAGS: chromium, austenitic steel, nitrogen, plastic deformation, annealing, chromium steel, manganese steel

ABSTRACT: Specimens of specially melted alloys containing different proportions of technically pure Fe, electrolytic Cr (13.89-21.60%) and Mn (11.72-12.20%) and nitrided electrolytic Cr^{17} and Mn^{27} (with ~6% N) were hot-worked (annealing at 1200°C for 5 hr + immediate water quenching or cooling at room temperature over 24 hr) were tested for microhardness, hardness, electric resistance and deformation resistance. Microstructural examination and phase identification were based on the use of various etching agents. Findings: Cr-Mn steels containing 16% Mn, 16-18% Cr and 0.40-0.50% N display the highest deformation resistance at 700°C under a stress of 15 kg/mm². If the Cr content deviates from the 16-18% range, deformation resistance decreases

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L 18727-66

ACC NR: AP6005092

sharply owing to the decrease in the Cr concentration of the γ -solid solution, appearance of porosity in ingots, and formation of a ferritic component in the structure. Cr-Mn steels containing up to 15.50% Cr display a higher deformation resistance when in quenched state compared with annealed state, whereas for the steels containing from 15.50 to 21.50% Cr this picture is reversed. Such an effect of hot working is apparently attributable to the difference in the rates of the aging process in the steels with a Cr content below and above 15.50%. The hardness and microhardness of the investigated Cr-Mn and Cr-Mn-Ni (~3% Ni) steels in quenched state are markedly higher than in annealed state. This may be due to the special character of the aging of these steels or to the low-temperature metastable transformation. The change in the deformation resistance of Cr-Mn-Ni steel at 700°C as a function of the concentration of Cr indicates that deformation resistance sharply increases in the presence of Cr concentrations of up to 17% but does not change appreciably above that limit. The presence of N in austenitic Cr-Mn and Cr-Mn-Ni steels in an amount not below its solubility limit in the γ -solid solution and not above its solubility limit in the melts of these steels markedly enhances their deformation resistance under conditions of prolonged exposure to high temperatures and loads. Orig. art. has: 2 tables, 4 figures.

SUB CODE: 11, 13, 20/ SUBM DATE: 05Feb65/ ORIG REF: 004/ OTH REF: 005

Card 2/25/66

J. 11202-55 EWP(m)/EWP(t)/EWP(k)/EWP(b)/EWA(s) LIP(s) JD/HW
ACC NR: AP5026361 SOURCE CODE: UR/0370/65/000/005/0139/0142

AUTHOR: Bokshreyn, S. Z. (Moscow); Kishkin, S. T. (Moscow); Mirskiy, L. M. (Moscow);
Tavadze, F. N. (Moscow); Kherodinashvili, Z. Sh. (Moscow)

ORG: none

TITLE: Diffusivity and heat resistance of titanium alloys after thermal and thermo-
mechanical working

SOURCE: AN SSSR. Izvestiya. Metally, no. 5, 1965, 139-142

TOPIC TAGS: titanium alloy, carbon alloy, solid mechanical property, metal aging,
metalworking, metal diffusion, metal heat treatment, metal forming, thermal aging

ABSTRACT: The effect of standard thermal and thermomechanical working of VT2-1 ti-
tanium alloy on carbon diffusivity in alloys and alloy strength was investigated. The
standard thermal treatment consisted of heating to 870°C, followed by soaking at
870°C for 1 hour, cooling to 650°C and soaking at 650°C for one hour and air cooling
to room temperature. Thermomechanical working consisted of deformation of 30 x 30 x
x 65 mm alloy samples at 870°C (60% deformation per hammer strike) and instantaneous
quenching in water. This was followed by aging for 5 hours at 550°C. For short and
long lasting mechanical strength tests, thermally and thermomechanically worked alloy
samples were reduced to 5 mm in diameter. Carbon diffusivity tests were made on
10 x 10 x 20 mm alloy samples. Orig. art. has: 2 figures.

Card 1/3

*Probably BT3-1,4

UDC: 669.295.5-157.9

L 11202-66

ACC NR: AP3026361

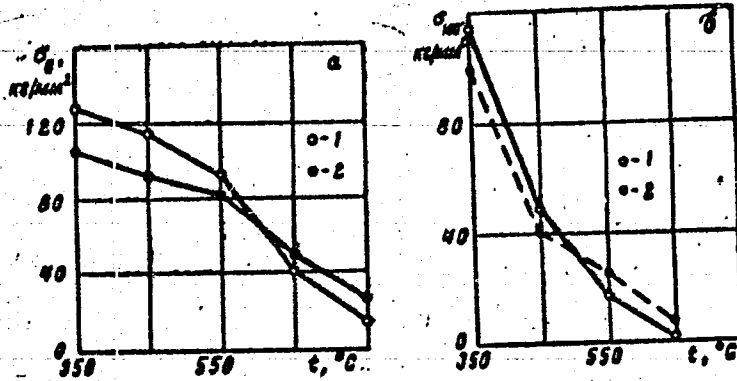


Fig. 1. Effect of temperature on short-lasting strength σ_b and 100-hour linear strength σ_{100} of VTZ-1 alloys after thermomechanical working, (1); After standard thermal working (2).

Card 2/3

L 11202-66

ACC NR: AF5026361

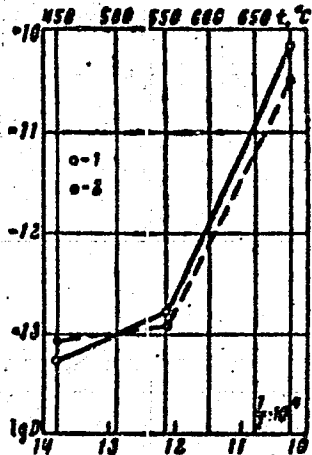


Fig. 2. Temperature dependence of the logarithm of the diffusion coefficient in *VTZ-1 alloy after thermomechanical working (1); after standard thermal working (2).

SUB CODE: 11/

SUBM DATE: 06May65/

ORIG REF: 005/

OTH REF: 000

Card 3/3

L 36463-66 EWT(m)/T/EWP(e)/EWP(t)/ETI IJP(e) JD/WB

ACC NR: AR6009968 SOURCE CODE: UR/0137/65/000/012/I058/I058

AUTHOR: Tavadze, F. N.; Tskitishvili, M. D.; Mandzhgaladze, S. N.; Lashkhi, T.

51
46
B

ORG: none

TITLE: Effect of small boron additions on the heat and corrosion resistance of multicomponent chromium-manganese alloys

SOURCE: Ref. zh. Metallurgiya, Abs. 12I437

REF SOURCE: Tr. (Gruz. in-t metallurgii, v. 14, 1965, 109-122

TOPIC TAGS: boron, austenite, chromium containing alloy, manganese containing alloy, metal hardening, heat resistance, corrosion resistance, solubility

ABSTRACT: A study was made of the relationship between heat and corrosion resistance and structure of austenitic Cr-Mn alloys in solid solution (low-alloyed with boron, nitrogen and carbon) composed (in %) of Cr, 15.0; Mn, 15.0; W, 0.5; Mo, 0.5; Nb ~ 0.5. The heat

Cord 1/2

UDC: 669.15.018.8:620.193

L 36463-66

ACC NR: AR6009968

5
resistance of alloys was analyzed by the centrifugal method. Corrosion resistance was studied in solutions of HCl, H₂SO₄, HNO₃, formic and oxalic acids. The increase of the solubility of the alloying elements (B, N₂, and C) in the solid solution causes an increase in heat and corrosion resistance; maximum improvement of properties is achieved in the saturation state. Because of its low solubility in the solid solution, B does not promote the improvement of properties of alloys. The quenching of steel with boron from 1150C improves its heat and corrosion resistance. The solubility of B is also increased by complex alloying with N₂. In the normalized state, alloys are characterized by their high properties. Cr-Mn alloys which contain N₂ and C are capable of strengthening the primary protecting films in HNO₃. In H₂SO₄ only carbon-free alloys are in the passive state. In HCl, all alloys are subjected to uniform failure at a considerable rate. In organic acids alloys simultaneously alloyed with B and N₂ have high corrosion-resistance properties, while in wine-making technological solutions, the same high properties are attributed to alloys alloyed with boron. V. Olenicheva. [Translation of abstract] [NT]

SUB CODE: 11/

Card 2/2 4/5

L 43955-66 EWP(e)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/GD
ACC NR: AT6026905 SOURCE CODE: UR/0000/66/000/000/0036/0036

AUTHOR: Tavadze, V. N. (Academician AN GruzSSR); Bayramashvili, I. A.;
Metreveli, V. Sh.; Tsagareyshvili, G. V.

59
13-1

ORG: none

TITLE: Internal friction in boron 27

SOURCE: AN SSSR. Institut metallurgii; Vnutrenneye treinye v metallakh i splavakh
(Internal friction in metals and alloys). Moscow, Izd-vo Nauka, 1966, 36

TOPIC TAGS: boron whisker, whisker internal friction, whisker shear modulus,
temperature dependence

ABSTRACT: The temperature dependence of the internal friction and shear modulus of
monocrystalline boron whiskers about 0.7 mm in diameter and up to 110 mm long has been

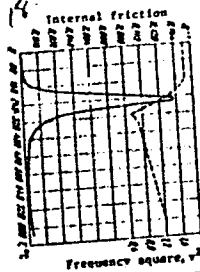


Fig. 1. Temperature dependence of the internal friction (solid line) and shear modulus (broken line) in boron.

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L 43955-66

ACC NR: AT6026905

investigated at temperatures ranging from room temperature to 850C. The obtained results showed that internal friction shows a peak at about 260C (see Fig. 1). The shear modulus (represented by frequency square ν^2 , to which it is proportional) drops as the temperature increases. Starting at 160C, it descends sharply, which coincides with a rapid rise in internal friction. The nature of the internal-friction peak in boron could not be determined at this stage of investigation and requires further study. Orig. art. has: 1 figure. [TD]

SUB CODE: 11. ~~104~~ SUBM DATE: 02Apr66/ ATD PRESS: 50 60

Card 2/2 blg

L 36083-66 EWP(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/JG
ACC NR: AP6018110 SOURCE CODE: UR/0251/66/041/001/0121/0128

AUTHORS: Tavadze, F. N. (Academician AN GruzSSR); Pirtskhalayshvili, V. A.;
Khutsishvili, H. L.

71
39
8

ORG: Georgian Institute of Metallurgy (Gruzinskiy institut metallurgii)

TITLE: Influence of molybdenum, niobium, and tungsten on the structure and properties of nitrogen-containing austenitic chromium-manganese steels

SOURCE: AN GruzSSR. Soobshcheniya, v. 41, no. 1, 1966, 121-128

TOPIC TAGS: alloy steel, austenite steel, chromium steel, manganese steel

ABSTRACT: The influence of ²⁷molybdenum, ²⁷niobium, and ²⁷tungsten on the structure and mechanical properties of nitrogen-containing austenitic chromium-manganese steels containing 15% Cr and 16% Mn was investigated. The study supplements the results of D. N. Frey (New Alloys for Automobile Turbines (SAE Journal, 64, 8, 33, 1956). The experimental procedure was described earlier by F. N. Tavadze, V. A. Pirtskhalayshvili, and H. L. Khutsishvili (Vliyaniye khroma na strukturu i svoystva azotosoderzhashchikh austenitnykh khromomargantsevykh i khromomargantsevonikelevykh staley. Soobshcheniya AN GSSR, XXIX: 3, 1965). The experimental results (presented in graphs and tables) show that the addition of 0.30 to 0.40% N and 1.00--1.50% Mo to 15% Cr + 16% Mn steel had the greatest strengthening effect. The structure of this steel

Card 1/2 ²⁷

L 36083-66

ACC NR: AP6018110

2

was fully austenitic. The strengthening of austenitic Cr-Mn steel due to the addition of Nb is associated with the formation of finely dispersed nitrides of niobium. The strengthening effect due to the addition of W is a maximum for a 1.5--2.0% addition of W and a nitrogen content of 0.45% N. Orig. art. has: 3 tables and 7 graphs.

SUB CODE: 11/

SUBM DATE: 15Feb65/

ORIG REF: 006/

OTH REF: 011

LS

Card 2/2

L 39979-66 EWT(1)/EWT(m)/T/EWP(t)/ETI IJP(c) GG/JD

ACC NR: AP6021711

SOURCE CODE: UR/0251/66/041/003/0549/0554

AUTHOR: Tavadze, F. N. (Academician AN GruzSSR); Surmava, G. G.ORG: Georgian Institute of Metallurgy (Gruzinskiy institut metallurgii)TITLE: Production of copper whisker crystals and the shapes of the crystals

SOURCE: AN GruzSSR. Soobshcheniya, v. 41, no. 3, 1966, 549-554

TOPIC TAGS: copper whisker, heat of sublimation, temperature dependence, crystal growth, crystal property, crystal impurity

ABSTRACT: A study of filamentary copper crystals (whiskers) produced by the thermochemical reaction $\text{CuI}_{(\text{liq})} + \text{H}_{2(\text{gas})} \rightarrow \text{Cu}_{(\text{whisker})} + \text{HI}_{(\text{gas})}$ was made. The crystals were grown on the bottoms and walls of combustion boats. Optimum growth parameters are tabulated for whiskers ranging in diameter from 3 to 50 mm and in length from 5 to 30 mm; these were grown 50-90 min, at temperatures from 590 to 700°C and at hydrogen inlet rates of 0.05-0.25 l/min. Microcrystals having 100-1000 μ diameters and lengths of 30-60 mm were also grown. Here, the temperatures ranged from 700 to 800°C, the growth time from 120 to 165 min and the hydrogen inlet rates from 0.24 to 0.40 l/min. Steps (terraces), cracks and other defects were observed in the single crystals at 100x. Both the quantity and quality of the whiskers depended on the growth conditions, i. e., on temperature, growth time and purity of the reducing gas and CuI. In

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L 39979-66

ACC NR: AP6021711

order to obtain crystals with smooth surfaces and regular shapes, it was necessary to use temperatures below the sublimation temperature of CuI (590-620°C). At slightly higher temperatures, short crystals formed, while polygonal crystals of Cu formed between 850-900°C. The hydrogen inlet rate could range from 0.1 to 0.4 l/min without affecting quality. The purity of CuI in the starting mixture was very important. In this experiment, CuI of grade Ch was found to be satisfactory since slight impurities did not influence the quality of the whiskers, although some impurities were carried into the whiskers. Orig. art. has: 4 figures, 2 tables, 1 formula.

SUB CODE: 11/20/

SUBM DATE: 28Jul65/

ORIG REF: 001/

OTH REF: 005

Card 2/2 H S

L 04683-57 IWE(57/EVE(W))I/WP(57/EVE(W)) IWE(57/EVE(W)) IWE(57/EVE(W))

ACC NR: AR6020944

SOURCE CODE: UR/0137/66/000/002/I016/I016

AUTHOR: Tavadze, F. N.; Sakvarelidze, L. G.; Zoidze, N. A.

46

TITLE: Tempering of deformed martensite

13

SOURCE: Ref. zh. Metallurg, Abs. 2I104

REF SOURCE: Tr. Gruz. in-t metallurgii, v. 14, 1965, 137-144

TOPIC TAGS: plastic deformation, martensite steel / U10 steel, U8 steel, 30 steel

TRANSLATION: The influence of plastic deformation on decomposition kinetics after quenching was studied in U10, U8, and 30 steels by means of measuring thermal emf and internal friction. A calculation of the degree of decomposition of deformed martensite after low temperature tempering (60-220°C) and the determination of the activation energy showed that the latter amounted to 27 Kcal/mol, just as for general cases of tempering, which implied the invariance of the nature of tempering. For the same degree of decomposition, the speed of decomposition was higher in deformed martensite while the damping of the speed proceeded faster than in the undeformed. It is expected that the increase of strength at room temperature of deformed martensite is associated with the precipitation of a large amount of small particles on dislocations, which are blocked by them, while the maintenance of strength to high temperatures is

UDC: 669.14.017.3:669.112.227.34

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ACC NR: AR6020944

associated with grain size fineness and the spheroidization of particles which become more effective barriers to dislocation motion than flat particles. I. Tulupova.

SUB CODE: 11

Card 2/2

fv

L 04182-67 EWT(m)/T/EWP(t)/ETI IJP(c) JD/JG/GD

ACC NR: AT6026906

SOURCE CODE: UR/0000/66/000/000/0037/0039

AUTHOR: Tavadze, F. N. (Academician AN GruzSSR); Bayramashvili, I. A.; Metreveli, V. Sh.

ORG: none

72
B+1

TITLE: Influence of boron on the internal friction of pure iron

SOURCE: AN SSSR. Institut metallurgii. Vnutrenneye treniye v metallakh i splavakh (Internal friction in metals and alloys). Moscow, Izd-vo Nauka, 1966, 37-39

TOPIC TAGS: internal friction, high purity metal, boron, solid solution, relaxation process, activation energy

ABSTRACT: The effect of boron on the internal friction of zone refined iron was studied. After annealing in wet hydrogen at 750-800°C, the iron was borided using both solid and liquid phase boriding methods. Internal friction was measured on a vacuum oscillator operating at a frequency of 1 cps with an alternating magnetic field. The temperature dependence of internal friction is given for iron quenched from 720°C with and without boriding. A high peak occurred at 44°C for the borided sample. The peak vanished when the borided sample was annealed in wet hydrogen for 8 hrs and then quenched. The height of the peak increased with boride content, from $30 \cdot 10^{-4}$ units at 0.004% B to $105 \cdot 10^{-4}$ units at 0.011% B. No peak occurred in pure iron melted under similar

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ACC NR: AT6026906

conditions but without boride treatment. The activation energy of the relaxation process responsible for the peak was determined by measuring the peak displacement for 0.62 and 1.57 cps. From the following formula

$$H = \frac{R \cdot T_1 \cdot T_2}{T_2 - T_1} \ln \left(\frac{\omega_2}{\omega_1} \right),$$

the activation energy was calculated to be 18.8 Kcal/mol. Thus, it was concluded that boron dissolves interstitially in iron solid solutions, just as carbon and nitrogen do. Orig. art. has: 3 figures, 2 tables, 1 formula.

SUB CODE: 11,20/

SUBM DATE: 02Apr66/

ORIG REF: 004/

OTH REF: 002

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LC

L 07806-67 ENT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AR6017483

SOURCE CODE: UR/0137/66/000/001/V021/V022

AUTHOR: Tavadze, F. N.; Bayramashvili, I. A.; Sakvarelidze, L. G.; Metreveli, V. Sh.TITLE: Zone refining of iron 27

SOURCE: Ref. zh. Metallurgiya, Abs. 1V158 B

REF SOURCE: Tr. Gruz. in-t metallurgii, v. 14, 1965, 123-127

TOPIC TAGS: zone refining, carbonyl iron, metal purification

ABSTRACT: Data are given from experiments on zone refining of two iron ingots: the first of Armco iron and the second of carbonyl iron. The first specimen was purified in an argon atmosphere on a copper hearth at a rate of 4 cm/hr. The second was purified at the same rate in a helium atmosphere on a lime hearth. It was found that zone refining may be done successfully on a hearth made from a mixture of calcium and magnesium oxides (5% MgO). Frank-Read sources at all stages of development were observed in the iron. Horizontal zone refining produces perfect crystals of iron including perfect single crystals. Purification results after nine passes on both specimens were as follows (the numerator indicates % in the initial material, the denominator -- % after zone refining in the head of the ingot): first specimen Si 0.17/0.002, P 0.007/0.003, S 0.028/0.007, C 0.017/0.009, Mn 0.13/0.025, Cu 0.16/0.09. Second specimen Si 0.0001/none, Mn 0.00005/None, Ni 0.02/0.007, C 0.011/0.006. 10 illustrations, 2 tables, bibliography of 5 titles. A. Pokhvisnev. [Translation of abstract]

SUB CODE: 11, 13

Card 1/1 mc

UDC: 660.181.4-492

ACC NR: AR6035405

SOURCE CODE: UR/0137/66/000/009/A007/A007

AUTHOR: Tavadze, F. N.; Bayramashvili, I. A.; Khantadze, D. V.

TITLE: Surface tension and density of borides of iron, cobalt, and nickel

SOURCE: Ref. zh. Metallurgiya, Abs. 9A39

REF SOURCE: Sb. Poverkhnostn. yavleniya v rasplavakh i voznikayushchikh iz nikh tverd. fazakh. Nal'chik, 1965, 376-382

TOPIC TAGS: boride, metal compound, surface tension, zone melting, metal surface

ABSTRACT: The authors investigated the surface tension σ and the density γ of Fe-B, Co-B, and Ni-B alloys. These were determined with apparatus for crucible-less zone melting by an electron beam, using the lying and hanging drop method in the 1500 - 1900° interval. The substrates were made of an alloy of boron nitride with graphite (BNC) and high-purity graphite. The value of σ of B was determined in a single experiment by two methods (by weighing the detached drop and by determining the shape of the hanging drop), while σ and γ of the alloys Me-B were determined by the "large drop" method in a helium atmosphere. The drops were produced in cups made of BeO. The following data were obtained: $\gamma_{Fe} = 8.325 - 0.862 \times 10^{-3} T^{\circ}C$, $\gamma_{Co} = 9.230 - 1.020 \times 10^{-3} T^{\circ}C$, and $\gamma_{Ni} = 9.338 - 1.036 \times 10^{-3} T^{\circ}C$. σ of B near the melting point is 1060 erg/cm². The investigated systems belong to that class of systems in which the components with low melting temperatures have a higher value of σ . The experimental isotherms of σ lie in all cases above the isotherms calculated from the equation for

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ACC NR: AR6035405

ideal solutions. This shows that the Me-B bonds are more favored from the energy point of view than the adsorption of B on the surface of the metal. That a strong interparticle interaction exists in the Me-B systems is also indicated by the appreciable negative deviation of the experimental values of the molar volumes from their additive values. The investigated alloys have apparently a quasimolecular structure with quasimolecular groupings close in composition to FeB, CoB, and Ni₃B₂. From among the investigated melts, the lowest stability to quasimolecular structure is possessed by melts of the Fe-B system. 2 illustrations. Bibliography, 24 titles. M. Krasheninikov [Translation of abstract]

SUB CODE: 11

Card 2/2

ACC NR: AP6028026

SOURCE CODE: UR/0251/66/042/001/0045/0049

AUTHORS: Tavazze, F. N. (Academician AN GruzSSR); Surmava, G. G.; Svetlov, I. L.

ORG: Georgian Metallurgical Institute (Gruzinskiy institut metallurgicheskiy)

TITLE: Investigation of diffusion in microwires of copper

SOURCE: AN GruzSSR. Soobshcheniya, v. 42, no. 1, 1966, 45-49

TOPIC TAGS: copper, zinc, wire, metal diffusion

ABSTRACT: The diffusion of zinc in microwires of copper was studied. The wire specimens were prepared after the method of A. V. Ulitovskiy (Tonkaya provoloka v sploshnoy steklyannoy izolyatsii i vozmozhnosti yeye primeniya. Pribory i tekhnika eksperimenta, 3, 1957, 11). The diffusion of zinc in the wire specimens was studied after the method of B. S. Bokahteyn, A. A. Zhukhovitskiy, and G. G. Surmava (Metodika i ustanovka dlya izucheniya diffuziy v nitevidnykh kristallakh. Zavodskaya laboratoriya, 4, 1966). The specimens had diameters of 6 and 20 microns. The diffusion was studied at 600, 650, and 700C, and the experimental results are summarized in graphs and tables (see Fig. 1). It was found that the activation energy for diffusion of zinc was approximately 22.5 kcal/mole and that the thermal dependence of the diffusion coefficient in thin and thick copper specimens was

$$D = 4.3 \cdot 10^{-4} \exp(-24000/RT)$$

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ACC NR: AP6028026

respectively.

$$D = 1.9 \cdot 10^{-6} \exp(-26000/RT),$$

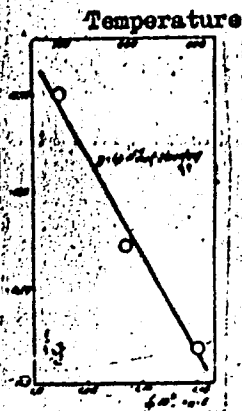


Fig. 1. Thermal dependence of the diffusion coefficient for zinc in thin microwires of copper ($d_0 \approx 6$ microns)

Orig. art. has: 1 table, 5 graphs, and 7 equations.

SUB CODE: 11/ SUBM DATE: 28Jul65/ ORIG REF: 005/ OTH REF: 003

Card 2/2

ACC NR: AP7000435

(A)

SOURCE CODE: UR/0251/66/044/002/0373/0377

AUTHOR: Tavadze, F. N. (Academician AN GruzSSR); Kartvelishvili, Yu. M.

ORG: Georgian Institute of Metallurgy (Gruzinskiy institut metallurgii)

TITLE: Obtaining compact chloride-process chromium and investigating its physico-mechanical properties

SOURCE: AN GruzSSR. Soobshcheniya, v. 44, no. 2, 1966, 373-377

TOPIC TAGS: chromium, induction melting, brittleness, hardness, powder metal

ABSTRACT: This work is a continuation of a previous investigation (N. V. Ageyev, F. N. Tabadze, Yu. M. Kartvelishvili. Polucheniye khloridnogo khroma. Poroshkovaya metallurgiya, no. 2, 1963, 88), with the difference that it deals with the physico-mechanical properties of ingots (measuring 60 mm in length and 6 mm in diameter) obtained from pressed and degassed pellets of chloride-process chromium measuring 15 mm in diameter that had been remelted by the crucibleless induction heating method. (By utilizing the forces of surface tension the molten metal can be maintained in suspended state in the electromagnetic field of the inductor. By reducing the power supplied to the inductor, the field can be weakened so that the molten metal

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ACC NR: AP7000435

descends into the molds resting on a turntable one of whose quadrants is within the melting chamber.) Since the normal impact and tensile tests are too rigorous with respect to chromium, the ingots were subjected to tests in milder stressed states, namely, tests of uniaxial static compression of cylindrical specimens: this method assures a sufficiently reliable assessment of the plastic properties of Cr and can be used to determine the effect of temperature, deformation rate and degree of purity on the plasticity of the metal, as well as to determine the temperature of the transition of Cr from brittle to plastic state (temperature of the threshold of cold brittleness). The hardness of the ingots of chloride-process averaged 105 kg/mm^2 and its corresponding cold brittleness threshold was close to 170°C , as also indicated by the findings on plasticity, considering that the lower the plasticity of Cr at room temperature, the lower its cold-brittleness threshold temperature is. A comparison of the hardness, compressive strength (plasticity) and cold brittleness thresholds of the chromium produced by the chloride-process, aluminothermic and electrolytic methods (see table) shows that the chromium produced by the chloride-process method is distinctly superior in its physico-mechanical properties to the chromium produced by the aluminothermic and electrolytic methods.

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ACC NR: AP7000435 .

Properties of metals	Aluminothermic chromium	Electrolytic chromium	Chloride-process chromium
% of gaseous impurities (O ₂ , N ₂ , H ₂)	0,281 ÷ 0,462	0,026 ÷ 0,071	0,035
% of other impurities	0,258 ÷ 2,055	0,169 ÷ 0,441	0,005
Total purity, %	98	99,6	99,96
Hardness, kg/mm ²	187	121	105
Compressive strain, %	17,0 ± 2,0	25	32 ÷ 33
Cold-brittleness threshold, °C	400	280	170

Orig. art. has: 2 figures, 1 table.

SUB CODE: 13, 11, 20/ SUBM DATE: 07Apr66/ ORIG REF: 002/ OTH REF: 002

Card 3/3

ACC NR: AT7004211

SOURCE CODE: UR/0000/66/000/000/0152/0157

AUTHOR: Tavadze, F.N.; Bayramashvili, I.A.; Tsagareyshvili, G.V.

ORG: none

TITLE: Metal refining by crucibleless electron-beam zone melting with electrotransfer of impurity ions

SOURCE: AN SSSR. Institut metallurgii. Eksperimental'naya tekhnika i metody vysoko-temperaturnykh izmereniy (Experimental techniques and methods of high temperature measurement). Moscow, Izd-vo Nauka, 1966, 152-157

TOPIC TAGS: metal zone refining, metal zone melting, electron beam melting, ~~crucibleless metal zone melting, ion electrotransfer electron beam melting unit, refractory metal zone melting.~~

ABSTRACT: A unit for crucibleless zone refining of metals using electron beam melting accompanied by the simultaneous electric transfer of impurity ions has been built and successfully used for zone melting rods of tungsten (3 mm diameter), molybdenum (4 mm), titanium (6 mm), nickel (8 mm), iron (10 mm), and boron (2.5-4 mm). The narrow portion of test specimens is the anode and is melted by the electron beam at an accelerating voltage of 1-5 kv. A selenium rectifier is the source of direct current which

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passes through the specimens and separates ions of various impurities. The power consumption in the electron beam circuit is 0.2—1.0 kw and that in the d-c circuit is up to 2 kw at 6 v. The speed of cathode movement can be varied from 0.2 to 2.0 mm/min; the melting is done in a vacuum of $1 \cdot 10^{-2}$ — $2 \cdot 10^{-5}$ mm Hg. Refined nickel single crystals, 60 mm long, were obtained in 6 passes using direct current of 600 amp/cm² density. The unit was successfully used for crucibleless zone melting, with and without passing direct current, of boron specimens 2.5—4.0 mm in diameter and 20—40 mm long by decomposition of boron triboride on an incandescent tantalum wire 0.25 mm in diameter. Boron specimens were first heated by electron bombardment, after which direct current was passed through them. The zone movement was from top to bottom. X-ray examination of the zone-melted boron showed that the tantalum core dissolved in boron and concentrated in the molten zone together with other impurities. Orig. art. has 4 figures. [MS]

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 005/ OTH REF: 002/
ATD PRESS: 5116

Card 2/2

ACCESSION NR: AT4007026

S/2598/63/000/010/0042/0047

AUTHOR: Mikheyev, V.S.; Markovich, K.P.; Tavadze, L.F.

TITLE: Study of some alloys of the system Ti-Al-Cr-Fe-Si-B containing 3% Al

SOURCE: AN SSSR. Institut metallurgii. Titan i yego splavy*, no. 10, 1963.
Issledovaniya titanovy*kh splavov, 42-47

TOPIC TAGS: titanium alloy, titanium aluminum chromium alloy, titanium aluminum chromium system, titanium complex alloy, alloy structure, phase transformation, alloy phase composition, iron containing alloy, silicon containing alloy, boron containing alloy

ABSTRACT: The authors investigated the effect of increasing concentrations (0.45-2.5%) of the alloying elements Cr, Fe and Si (1:1:1) on the ternary - solid solution of the Ti-Al-B system with 94.49-96.5% Ti and constant amounts of Al (3%) and B (0.01%). The alloys were smelted in a vacuum arc furnace with a tungsten electrode in an inert gas, cast, and the cast alloys were worked at 1000C, annealed and then quenched in air. The bars were then examined by optical methods to determine the melting diagram, by thermal analysis to determine the phase transformations in the solid state, and by metallographic analysis

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ACCESSION NR: AT4007026

to determine the microstructure (samples quenched from 1000, 800 or 600C in ice water after annealing for 2-400 hrs.). Using the N.S. Kurnakov pyrometer and samples heated for 2 hrs. at 1000, 300 hrs. at 800 and 400 hrs. at 600C, the authors constructed the polythermic cross section of the system between 400 and 1700C (see Fig. 1 in the Enclosure). This showed the presence of β , $\alpha + \beta$, α , $\alpha + \text{excess metal}$, and $\alpha + \beta + \gamma$ phases. The temperature of the onset of $\alpha \rightarrow \beta$ transformation was found to be independent of the sum of Cr, Fe and Si in the alloy. The softening temperature of the alloys decreased from 1535 to 1470C as the sum of Cr, Fe and Si increased from 0.45 to 2.5%. Finally, the solubility of these three alloying elements in the α -solid solution of Ti was found to be 1% at 600 and 1.5% at 800C. Orig. art. has: 3 tables, 2 graphs and 8 photomicrographs.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

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DATE ACQ: 27Dec63

ENCL: 01

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NO REF SOV: 008

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