ACCESSION NR: AP4024995

A sharp maximum at Yb corresponds to a large atomic radius and indicates a bivalent state in this element. "The authors express their thanks to P. I. Kripyakevich for his discussions of the work." Orig. art. has: 1 figure and 2 tables.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet (Lvov State University)

SUBMITTED: 04Jul63 DATE ACQ: 16Apr64 ENCL: 00

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

Card 2/2

ACCESSION NR: AP4019490 S/0078/64/009/003/0665/0670

AUTHORS: Glady*shevskiy, Ye. I.; Kuz'ma, Yu.B.; Kovalik, D.A.

TITLE: Phase equilibria and crystal structure of the compounds in the Re-Fe(Co, Ni)-Si systems

SOURCE: Zhurnal neorg. khimii, v. 9, no. 3, 1964,665-670

TOPIC TAGS: rhenium iron silicon system, rhenium cobalt silicon system, rhenium nickel silicon system, phase equilibrium, crystal structure, ternary intermetallic compound, x ray analysis, microstructure, Re_3Fe_2, W_6Fe_7, gamma phase, μ phase, Re_6Fe_6Si, $Re_6Co_{5.7}Si_{1.3}$

ABSTRACT: Preliminary phase analyses of the alloys of the ternary systems Re-Fe-Si, Re-Co-Si and Re-Ni-Si were undertaken to verify that Fe, Co and Ni form ternary intermetallic compounds in ternary systems with Re and Si. The phase equilibria at 800C were studied in these systems; isothermal sections were constructed from x-ray and microstructure data (figs. 1, 2 and 3). A new intermetallic compound of the beta-manganese structure type (gamma' phase a = 6.43 ± 0.01A) is formed in the Re-Fe system near Re_3Fe_2. The existence of ternary

Card 1/5

ACCESSION NR: AP4019490

Intermediate compounds of the W_6Fe_7 type structure (μ-phase) was established in Re-Fe-Si and Re-Co-Si. Re_6Fe_6Si (a = 4.67 ± 0.01A; c = 25.69 ± 0.05A; c/a = 5.50) exists in equilibrium with Fe_3Si, FeSi and Re_5Si_3. $Re_6Co_{5.7}Si_{1.3}$ (a = 4.633 ± 0.002A; c = 25.514 ± 0.005A; c/a = 5.507) is in equilibrium with Co_2Si, CoSi and Re_5Si_3. Compounds of the W_6Fe_7 type structure are absent in the Re-Ni-Si system. Orig. art. has: 1 table and 3 figures.

ASSOCIATION: L'vovskiy ordena Lenina gosudarstvenny*y universitet im. I. Franko (Lvov State University)

SUBMITTED: 08Jan63 DATE ACQ: 31Mar64 ENCL: 03

SUB CODE: CH, ML NR REF SOV: 013 OTHER: 007

Card 2/5

ACC NR: AP4019490

ENCL: 01

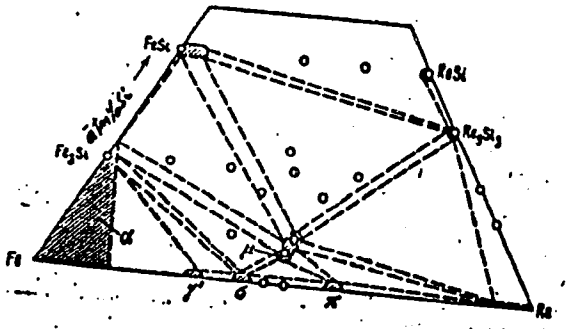


Figure 1

Isothermal section of part of the ternary system Re-Fe-Si at 8000

Card: 3/5

ACC NR: AP4019490 ENCL: 03

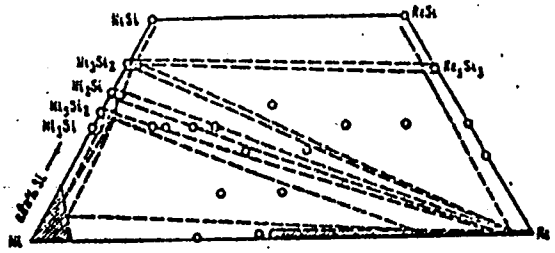


Figure 3
Isothermal section of part of the ternary system Re-Ni-Si at 8000

Card: 5/5

ACC NR: AP4019490

ENCL: 02

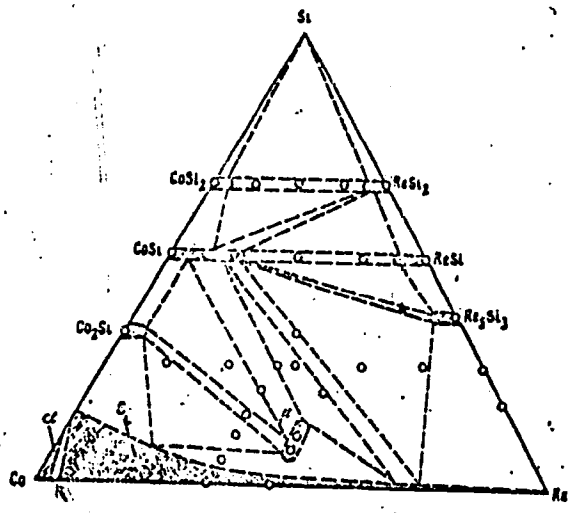


Figure 2

Isothermal section of the Re-Co-Si system at 8000

Card: 4/5

ACCESSION NR: AP4019492 S/0078/64/009/003/0674/0681

AUTHORS: Kuz'ma, Yu. B.; Glady*shevskiy, Ye. I.

TITLE: The Mn-Co-Si system

SOURCE: Zhurnal neorg. khimii, v. 9, no. 3, 1964, 674-681

TOPIC TAGS: manganese cobalt silicon system, manganese silicon system, cobalt silicon system, manganese cobalt system, Mn sub 3 Si, Mn sub 5 Si sub 3, MnSi, Mn sub 3 Si sub 5, Mn sub 6 Si, alpha beta manganese transition, MnCo sub 3, Co sub 2 Si, Co sub 3 Si, solid solution, ternary compound, MnCoSi, Mn sub 2 CoSi, Mn sub 3 Co sub 3 Si, MnCo sub 2 Si, crystal structure

ABSTRACT: The object of the work was to determine the phase equilibria in the Mn-Co-Si ternary system and in the Mn-Si, Mn-Co, and Co-Si binary systems. The 800C isothermal cross section of the system was constructed from x-ray and microstructure data for 185 melts (fig. 1). The following compounds exist in the Mn-Si system: Mn_3Si, Mn_5Si_3, MnSi, Mn_3Si_5, a compound containing 18 at.% Si (phase N), and Mn_6Si which is identical with a compound previously identified

Card 1/3

ACCESSION NR: AP4019492

as having 14 at.% Si. Silicon lowers the transition temperature from alpha- to beta-manganese. In Mn-Co melts annealed from 400C, there are two intermediate compounds approximating $MnCo_3$ in composition. The Co-Si system has two phases consisting of Co_2Si and a solid solution based on Co; Co_3Si does not exist. In the ternary system the boundaries of the solid solutions were established based on components and double compounds. Seven ternary intermediate compounds were found and their areas of homogeneity determined; (MnCoSi), R', U, λ_1 ($MnCo_{1.34-1.25}Si_{0.66-0.75}$), S ($Mn_2CoSi$), X ($Mn_3Co_3Si$) and H($MnCo_2Si$). The crystal structure of Mn_4Si and the R'-phase were found to be of the same structure type as the R-phase (space group C_{3i}^2 -$R\bar{3}$). For Mn_6Si a = 10.874 ± 0.005A, c = 19.177± 0.010A, c/a = 1.764; for the R' phase a = 10.755 ± 0.005A, c = 19.126 ± 0.010A, c/a = 1.778. Orig. art. has: 5 tables and 3 figures.

ASSOCIATION: L'vovskiy ordena Lenina gosudarstvenny*y universitet im. I. Franko (Lvov State University)

SUBMITTED: 21Feb63 DATE ACQ: 31Mar64 ENCL: 01

SUB CODE: CH NR REF SOV: 014 OTHER: 013

Card 2/3

ACCESSION NR: AP4019492

ENCLOSURE: 01

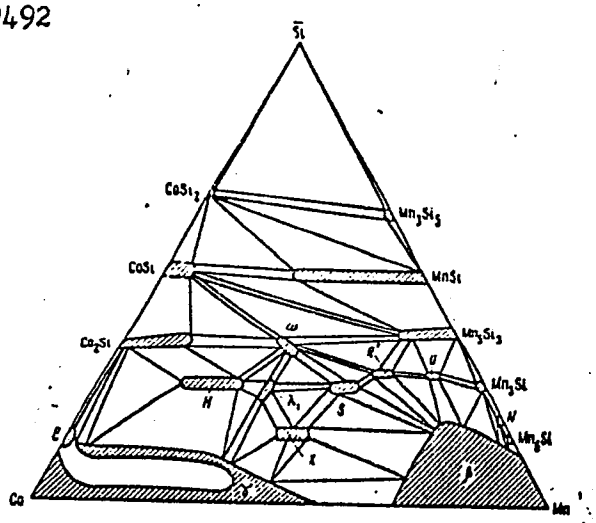


Figure 1

Isothermal section of the Mn-Co-Si system at 800C.

Card 3/3

ACCESSION NR: AP4043570 S/0078/64/009/008/1898/1904

AUTHOR: Kuz'ma, Yu. B.; Gladyshevskiy, Ye. I.; Cherkashin, Ye. Ye.

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 8, 1964, 1898-1904

TOPIC TAGS: manganese nickel silicon system, manganese nickel silicon alloy, manganese nickel silicon compound, manganese silicon compound,

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000928010

ACCESSION NR: AP4043576

ASSOCIATION: Ivanovskiy ordena Lenina Gosudarstvennyy Universitet

OTHER: 004

ENCLOSURE: 01

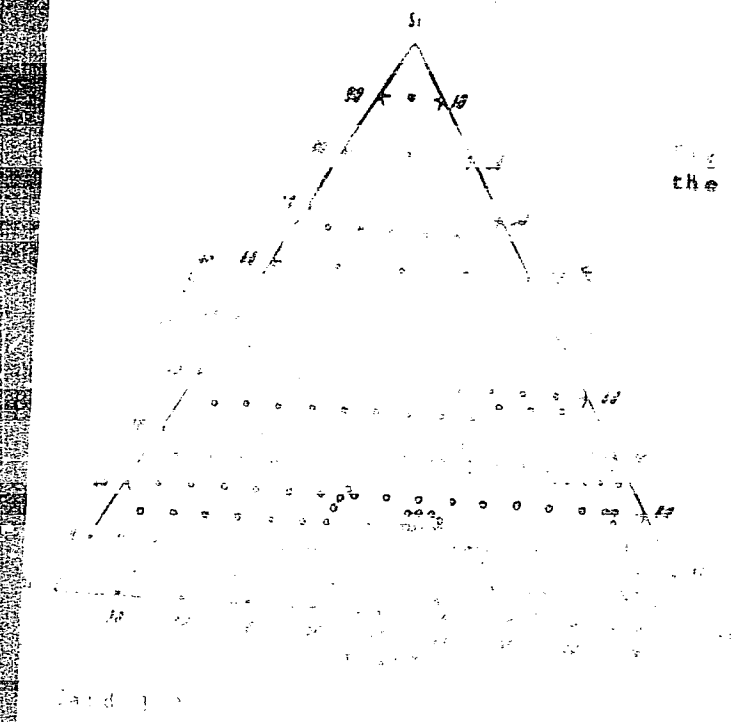
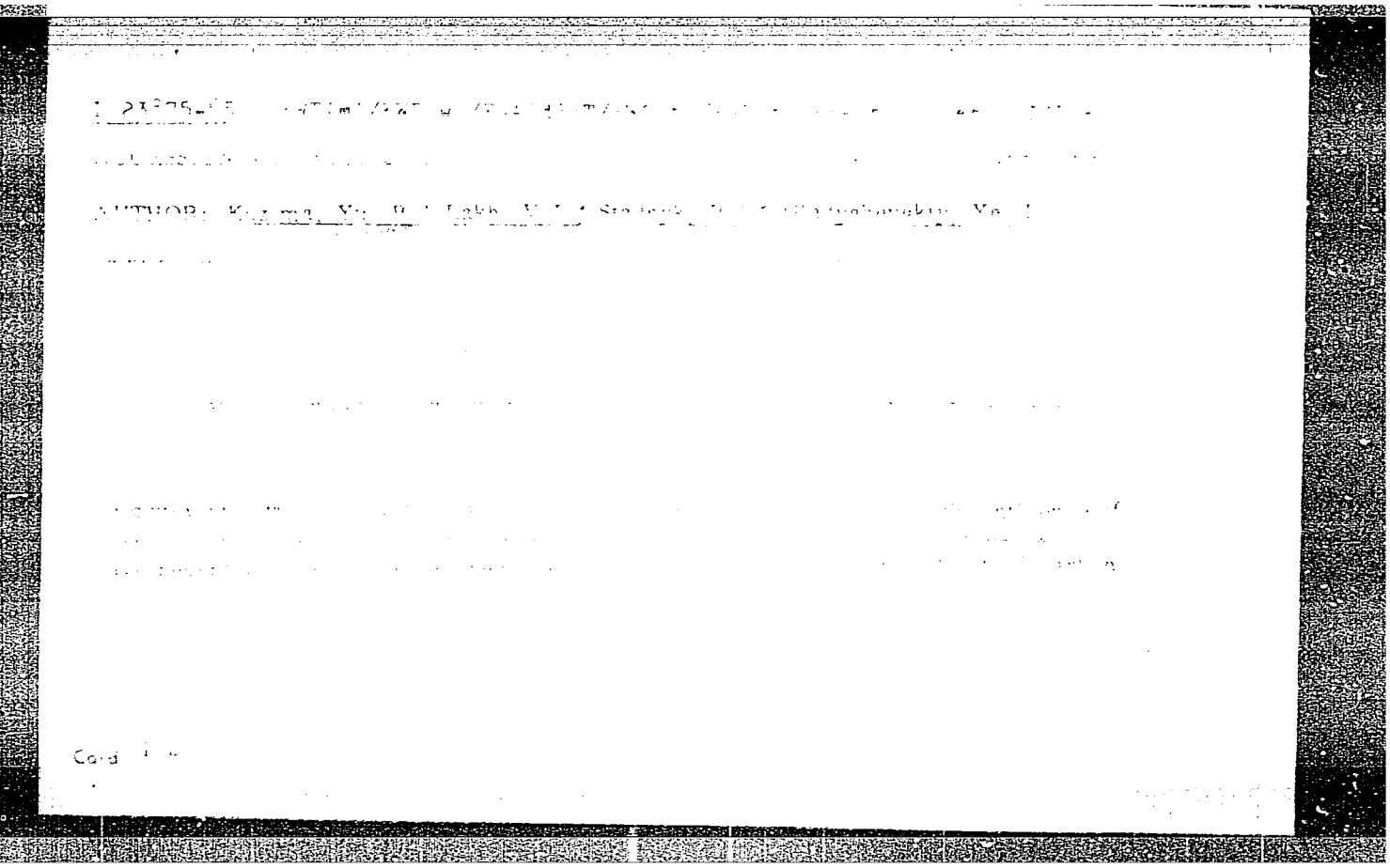


Fig. 1 ...isothermal section of the Mn-Hf-Si phase diagram



L 23875-65

ACCESSION NR: AT5002772

[illegible] temperatures.

ASSOCIATION: [illegible]

SUBMITTED: 05Aug64 ENCL: [illegible] SUB CODE: MM

NO REF SOV: 000 OTHER: 001

Card 2/2

L 23612-65 EWT(m)/EWP(t)/EWP(b) Pad IJP(c) JD/HW/JG/MLK

ACCESSION NR: AT5002773 S/0000/64/000/000/0170/0170

AUTHOR: [illegible]

TITLE: [illegible]

SOURCE: Vsesoyuznoye soveshchaniye po probleme renliya. 2d, Moscow, 1962. Renly (Rhenium); trudy soveschanlya. Moscow, Izd-vo Nauka, 1964, 170

TOPIC TAGS: rhenium, rhenium alloy, ternary rhenium alloy, iron containing alloy, cobalt silicide, nickel silicide, alloy phase analysis, xray structural analysis, rhenium alloy microstructure

ABSTRACT: X-ray structural and microstructural analysis was used to study the phase transformations and crystal structures of the phases in the systems Re - Fe - Si, Re - Co - Si, and Re - Ni - Si, using alloys annealed at 800C. In the first two systems, ternary intermetallic compounds having a W_6Fe_7-type structure form at a very low Si

Card 1/2

L 23612-65

ACCESSION NR: AT5002773

differences in the electron configuration of manganese and chenium

ASSOCIATION: none

SUBMITTED: 05Aug64 ENCL: 00 SUB CODE: MM

NO REF SOV: 002 OTHER: 000

Card 2/2

TOPIC TAGS: rhenium, scandium, rhenium [illegible] compound, rhenium [illegible] compound, rhenium aluminum compound, rhenium rich compound, compound structure

ABSTRACT: An investigation of the [illegible] allows re-

Card 1/2

L 23933-65
ACCESSION NR: AT5002777

ASSOCIATION: none

SUBMITTED: 03Aug64 [illegible] SUB CODE: [illegible]

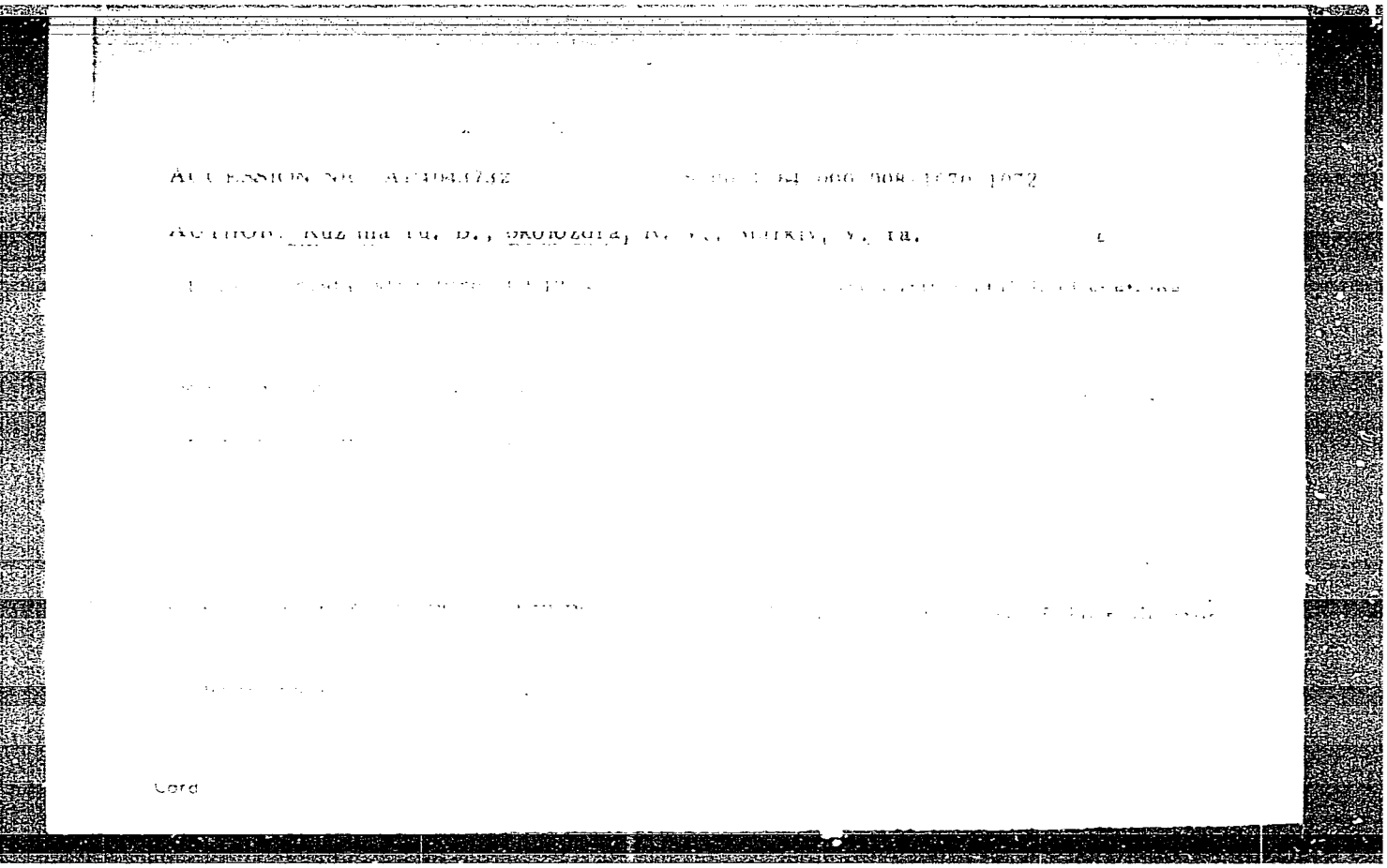
NO REF SOV: 003 OTHER: [illegible] ATD PRESS: 3177

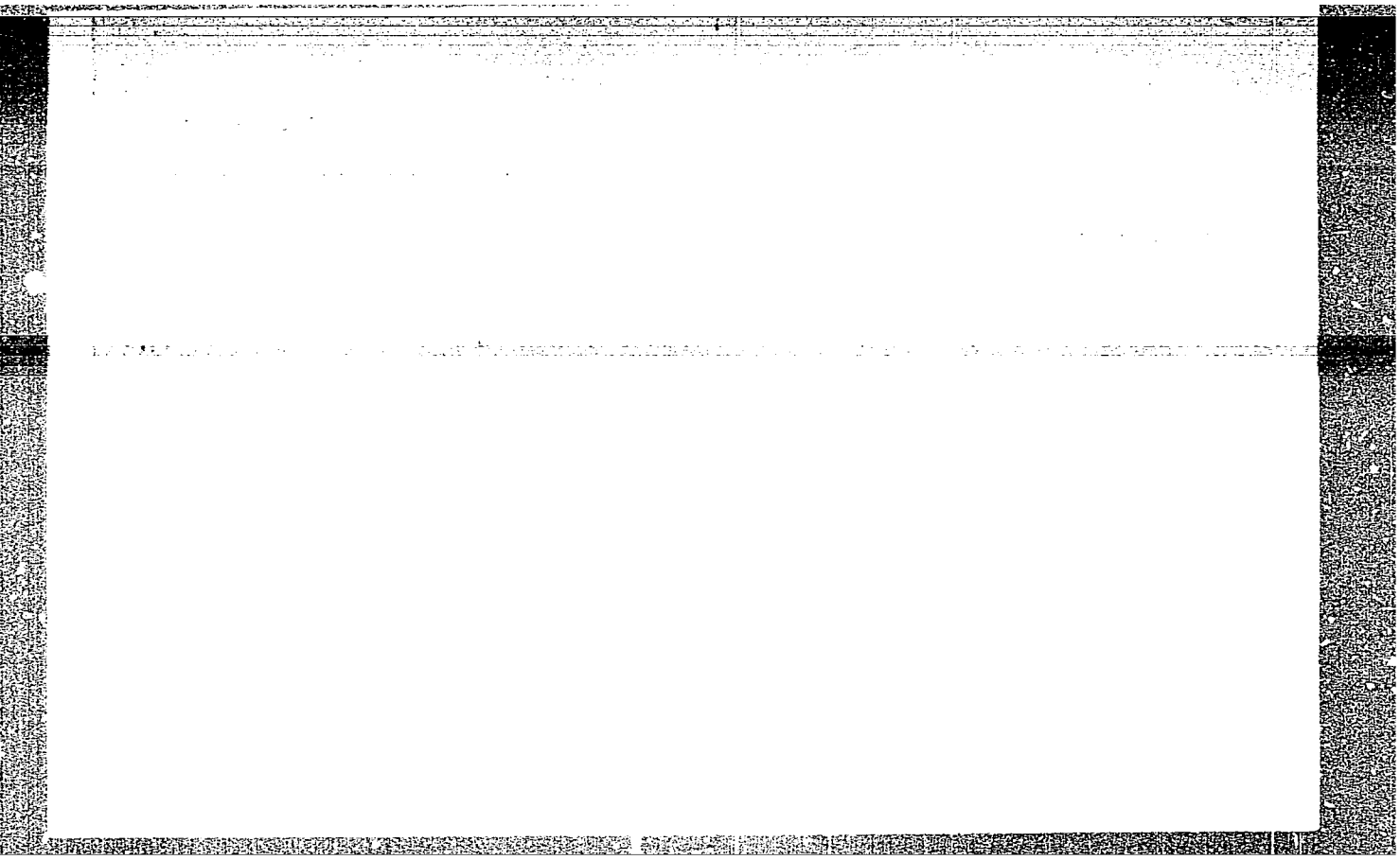
Card 2/2

KUZ'MA, Yu.B.; GLADYSHEVSKIY, Ye.I.; BYK, D.S.

Crystalline structures of some ternary compounds in the Nb - Co - Si system. Zhur. strukt. khim. 5 no.4:562-567 Ag '64. (MIRA 18:3)

1. L'vovskiy gosudarstvennyy universitet imeni Ivana Franko.





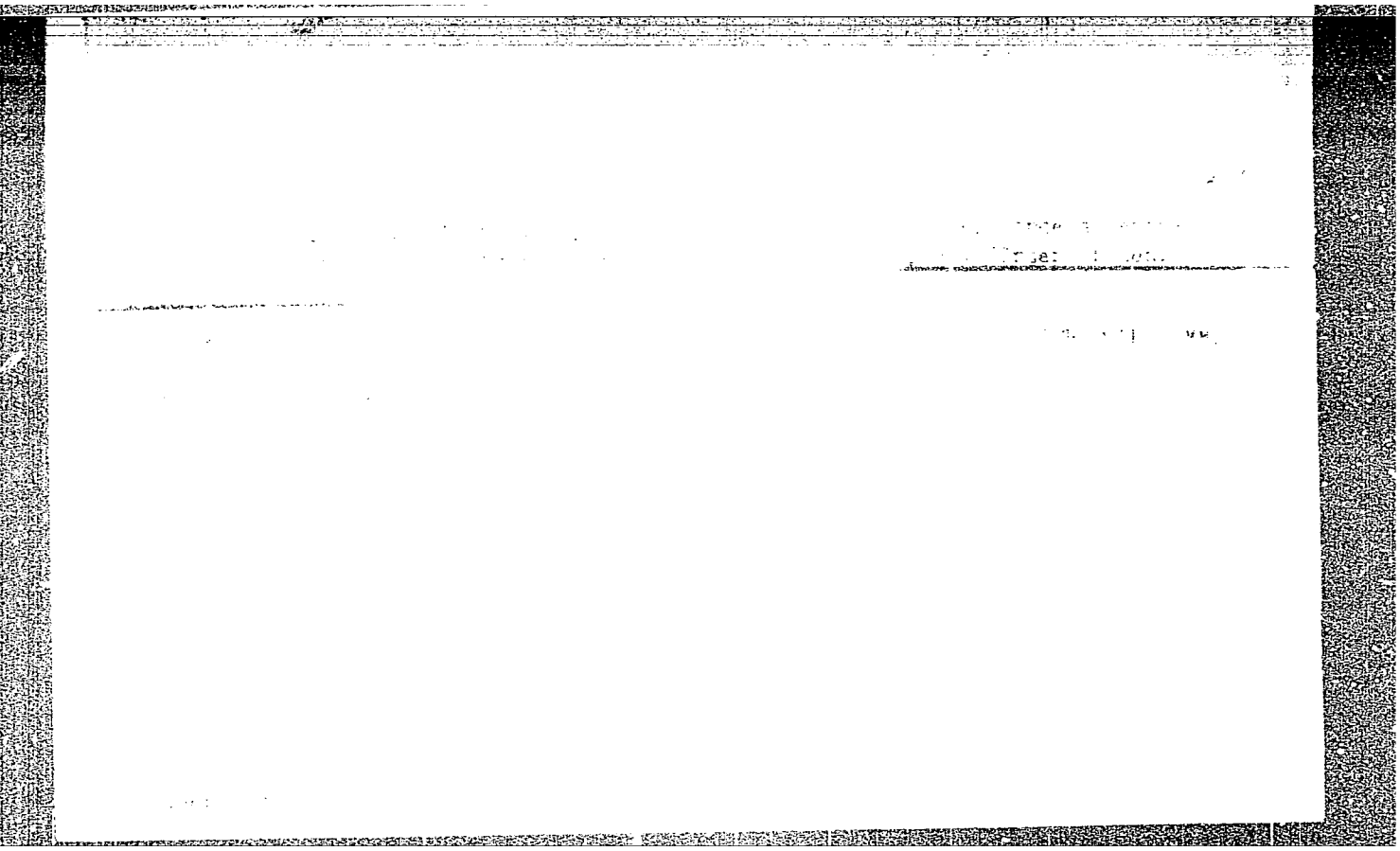
KUZ'MA, Yu.B.; GLADYSHEVSKIY, Ye.I.; CHERKASHIN, Ye.Ye.

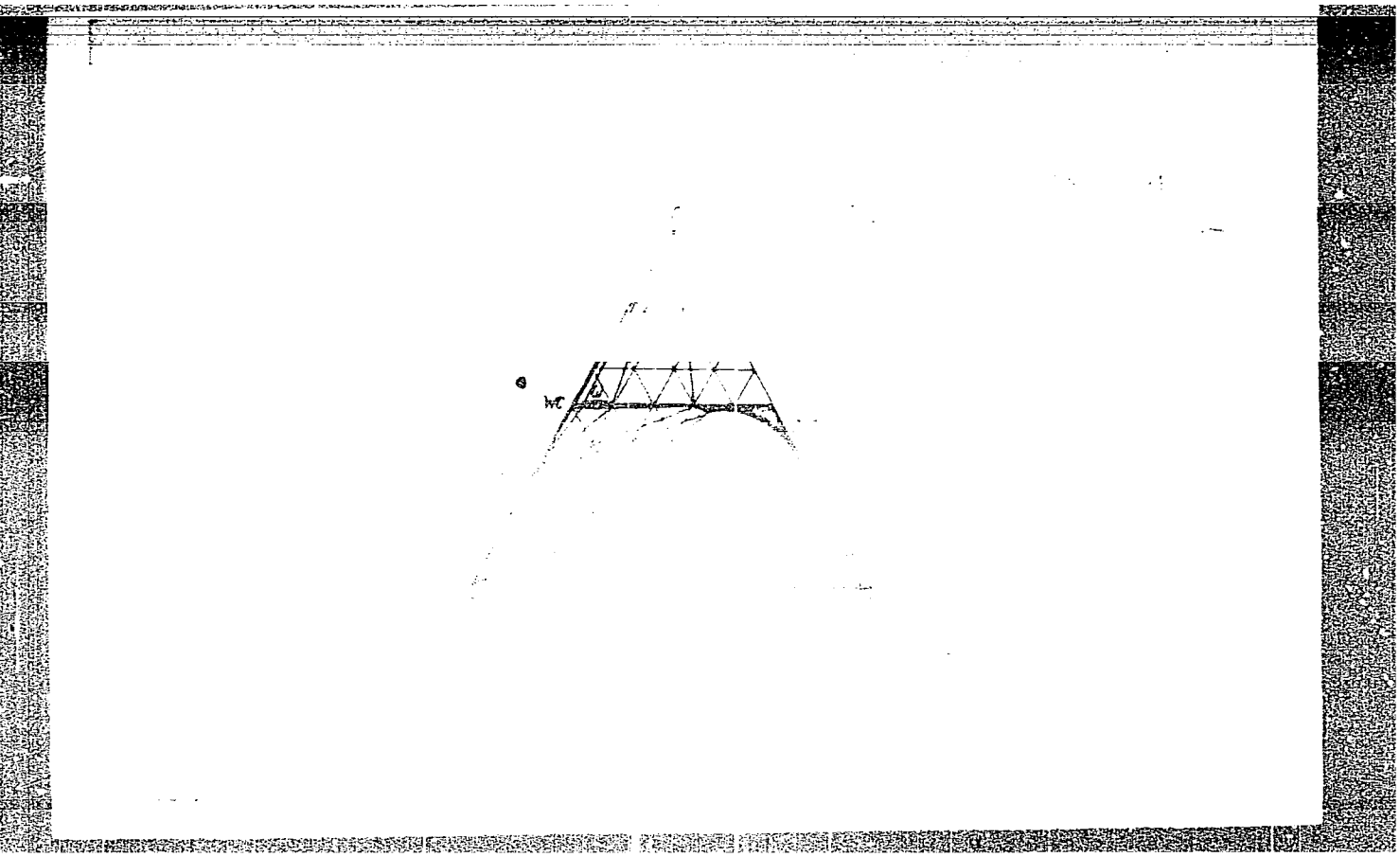
System Mn - Ni - Si. Zhur. neorg. khim. 9 no.8:1898-1904 Ag '64. (MIRA 17:11)

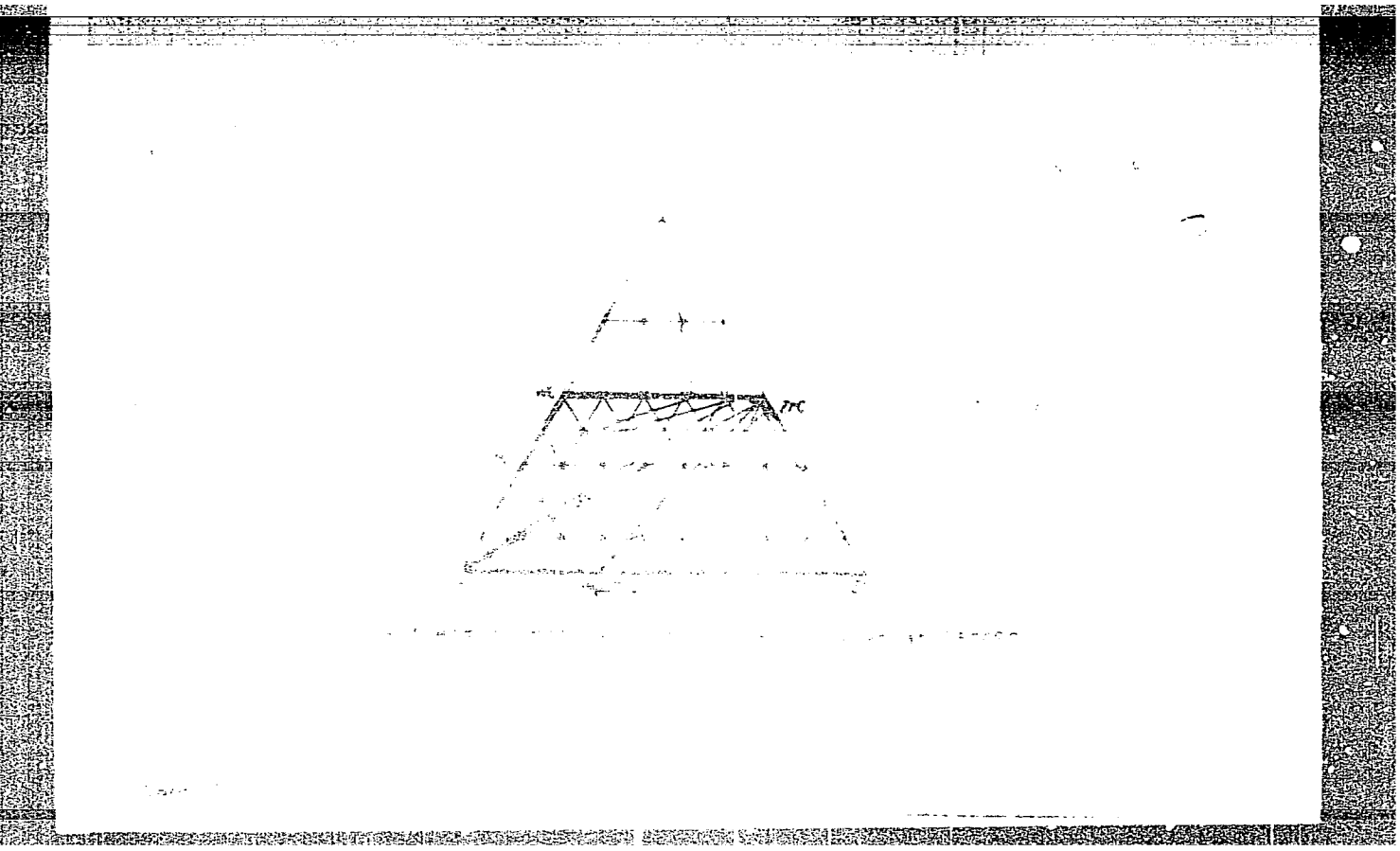
1. L'vovskiy ordena Lenina gosudarstvennyy universitet imeni Franko.

SOURCE [illegible]

TOPIC TAGS: zirconium alloy, tungsten alloy, phase equilibrium, solid solution,

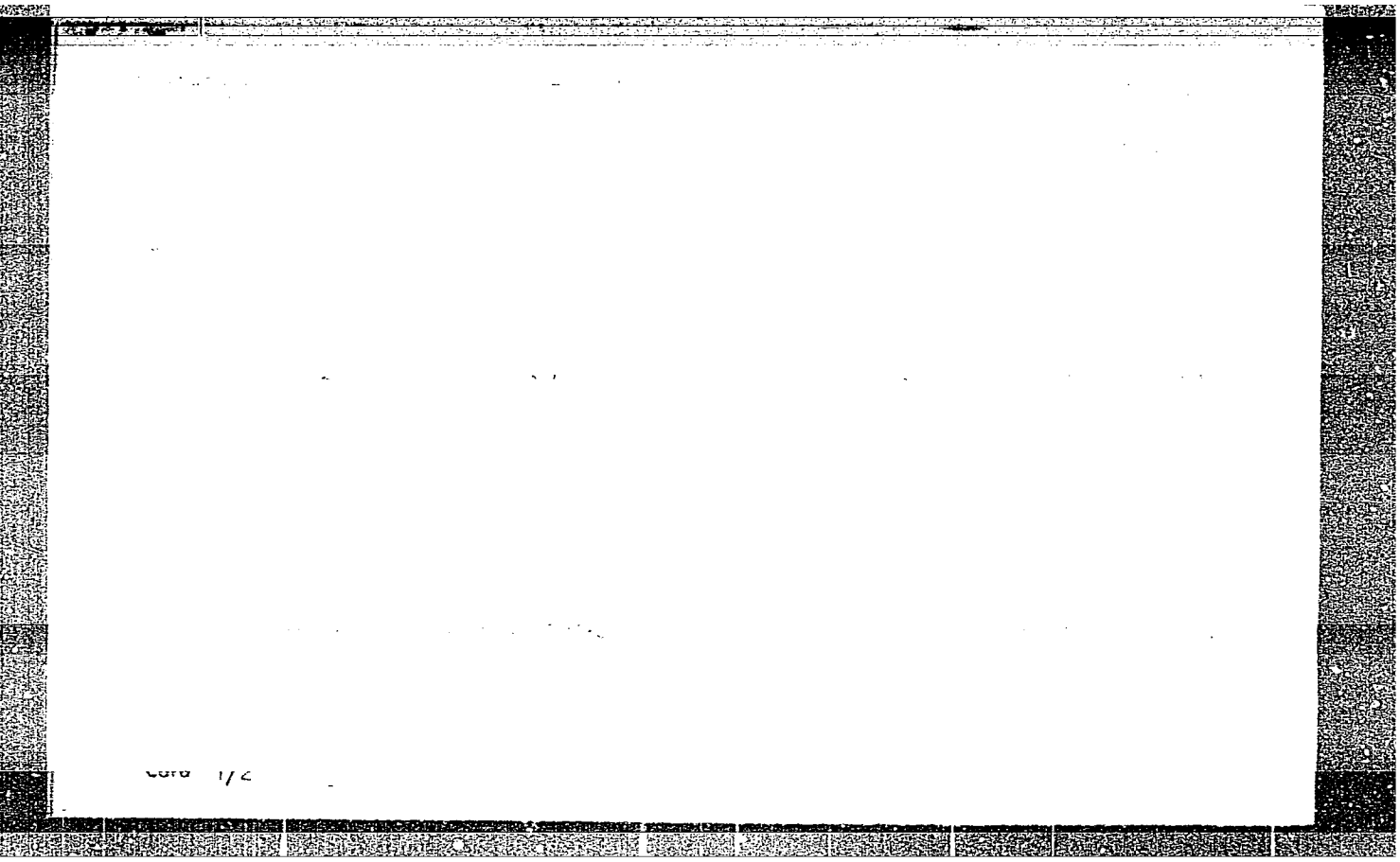






Abstract: This work is part of an investigation of the metallurgical properties of metals belonging to the groups IV, V, and VI of the periodic table. The simple systems Zr-Mo, Zr-C, and Mo-C are discussed, with special emphasis on intermolecular

LL
Card 2/2



Card 1/2

L 51873-65
ACCESSION NR: AP5009276

University)

SUBMITTED: 20Aug64

Card 1/2

KUZ'MA, Yu.B.; VOROSHILOV, Yu.V.; CHERKASHIN, Ye.Ye.

New ternary compounds having the structure type Mo_2FeB_2. Izv. AN SSSR. Neorg. mat. 1 no.7:1109-1111 Jl '65. (MIRA 18:9)

1. L'vovskiy gosudarstvennyy universitet imeni I.Franko.

L 2786-66 EWP(e)/EWT(m)/EWP(i)/EPF(n)-2/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)
IJP(c) JD/WW/EW/JG

ACCESSION NR: AP5022261 UR/0363/65/001/007/1112/1114
546.831+546.73+546.27

39
38
B

AUTHOR: Kuz'ma, Yu. B.; Lakh, V. I.; Voroshilov, Yu. V.; Stadnyk, B. I.

TITLE: The zirconium-cobalt-boron system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 7, 1965, 1112-1114

TOPIC TAGS: zirconium alloy, cobalt alloy, boron alloy, zirconium compound, cobalt compound, boron compound, thermometry

ABSTRACT: The object of the study was to establish the phase equilibria in the Zr-Co-B system and to determine whether alloys of this system can be used as new materials in thermometry. Samples of Zr-Co and Zr-Co-B were prepared by sintering powder mixtures. The phase compositions were determined by the x-ray powder technique. In the Zr-Co system, phase analysis showed the presence of the compounds Zr_6Co_{23}, $ZrCo_2$, ZrCo, Zr_2Co, and Zr_4Co, the crystal structures of which were determined. An isothermal section at 800C was plotted for the Zr-Co-B system. Two ternary compounds exist in this system: a γ phase $Zr_2Co_{21}B_6$ with the face-centered cubic structure of $W_2Cr_{21}C_6$ ($a = 10.597$ A), and a ρ phase of the

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L 2786-66

ACCESSION NR: AP5022261

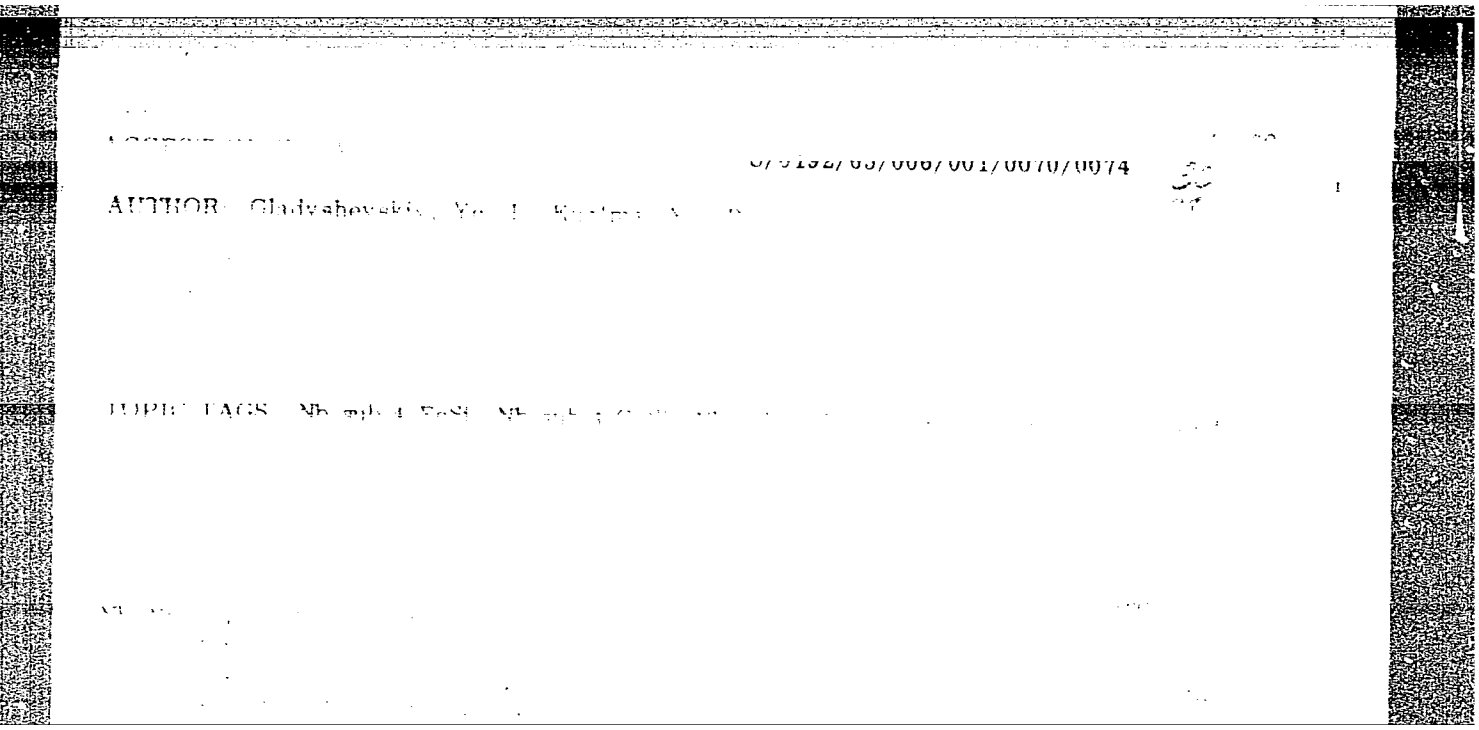
approximate composition $ZrCo_3B$. These ternary phases have much lower melting points than ZrB_2, form a low-melting eutectic (m. p. below 1200C) with the Co-base solid solution, and for this reason cannot be used as new materials in thermometry. Orig. art. has: 1 figure and 1 table.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet im. I. Franko (Lvov State University)

SUBMITTED: 23Feb65 ENCL: 00 SUB CODE: MM, IC

NO REF SOV: 003 OTHER: 003

Card 2/2 Md



Card 1/2

L 30986-65

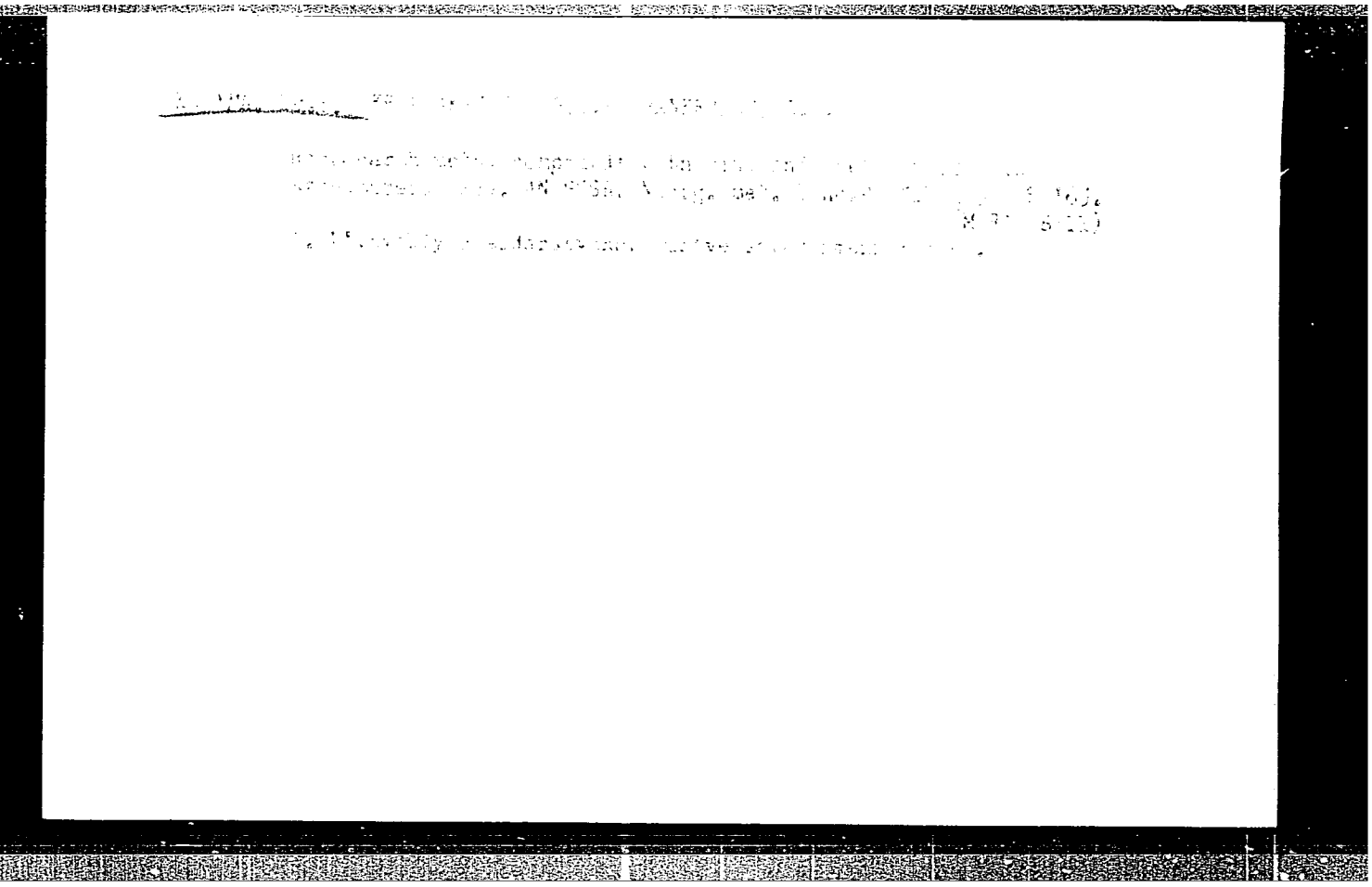
ACCESSION NR: AP5007757

the analogous sections of the two other systems under study. These had structures of the type $CuAl_n$ (spatial group I4/ mcm - D_{4h}^{18}) or superstructures of this type (spatial

FEDOROV, T.F.; KUZ'MA, Yu.B.

Phase equilibrium in the system zirconium - chromium - carbon.
Porosh. met. 5 no.3:75-79 Mr '65. (MIRA 18:5)

1. Institut metallurgii imeni Baykova AN SSSR, Moskva i L'vovskiy ordena Lenina gosudarstvennyy universitet imeni Franko.



GLADYSHEVSKIY, E.I.; KUZ'MA, Yu.B.

Nb_4FeSi, Nb_4CoSi, Nb_4NiSi compounds and their crystal structures. Zhur. strukt. khim. 6 no.1:70-74 Ja-F '65. (MIRA 18:12)

1. L'vovskiy gosudarstvennyy universitet imeni Iv. Franko.
Submitted November 25, 1963.

KUZ'MA, Yu.B. (L'vov); LAKH, V.I. (L'vov); VOROSHILOV, Yu.V. (L'vov); STADNYK, B.I. (L'vov); MARKIV, V.Ya. (L'vov)

Constitutional diagram of the system Zr - Fe - B. Izv. AN SSSR. Met. no.6:127-129 N-D '65. (MIRA 19:1)

1. Submitted September 18, 1964.

KUZ'MA, Yu.B.; FEDOROV, T.F.

Phase equilibrium in the system molybdenum - chromium - carbon. Porosh.met. 5 no.11:62-65 N '65.

(MIRA 18:12)

1. L'vovskiy ordena Lenina gosudarstvennyy universitet imeni I.Franko i Institut metallurgii imeni A.A.Baykova. Submitted January 24, 1965.

(A) L 13268-66 EWT(m)/EPF(n)-2/EWP(j)/T/EWP(t)/EWP(b)/EWA(c)/ETC(m)
ACC NR: AP6001476 IJP(c) DS/JD/WW/JG/RM SOURCE CODE: UR/0226/65/000/012/0063/0068

AUTHOR: Fedorov, T. F.; Kuz'ma, Yu. B.; Skolozdra, R. V.; Popova, N. M.

ORG: L'vov State University (L'vovskiy gosuniversitet im. I. Franko); A. A. Baykov Institute of Metallurgy (Institut metallurgii im. A. A. Baykova)

TITLE: Phase equilibria in the ternary systems Zr-Co-C and Nb-Fe-C

SOURCE: Poroshkovaya metallurgiya, no. 12, 1965, 63-68

TOPIC TAGS: phase equilibrium, ternary alloy, zirconium, cobalt, carbon, niobium, iron, X RAY ANALYSIS, TERNARY ALLOY

ABSTRACT: Specimens of the investigated alloys of the Zr-Co-C and Nb-Fe-C systems annealed at 800 and 1050°C, respectively, were examined by means of X-ray and microscopic analyses. The phase equilibria of these systems, as established by phase analysis, are shown in Figs. 1 and 2, respectively. ZrC is in an equilibrium with all the compounds of the Zr-Co system as well as with Co and Zr. For the alloys located in two-phase and three-phase regions the lattice constants of binary compounds do not change, which indicates an insignificant solubility of Co in ZrC and of C in binary compounds of the system Zr-Co. X-ray structural and microscopic analyses of 42 alloys revealed no ternary compounds in the Nb-Fe-C system. NbC at 1050°C is in an equilibrium with the phase $NbFe_2$, the μ-phase, α-Fe and Nb_2C, while the carbide Nb_2C is in

Card 1/4

L 13268-66

ACC NR: AP6001476

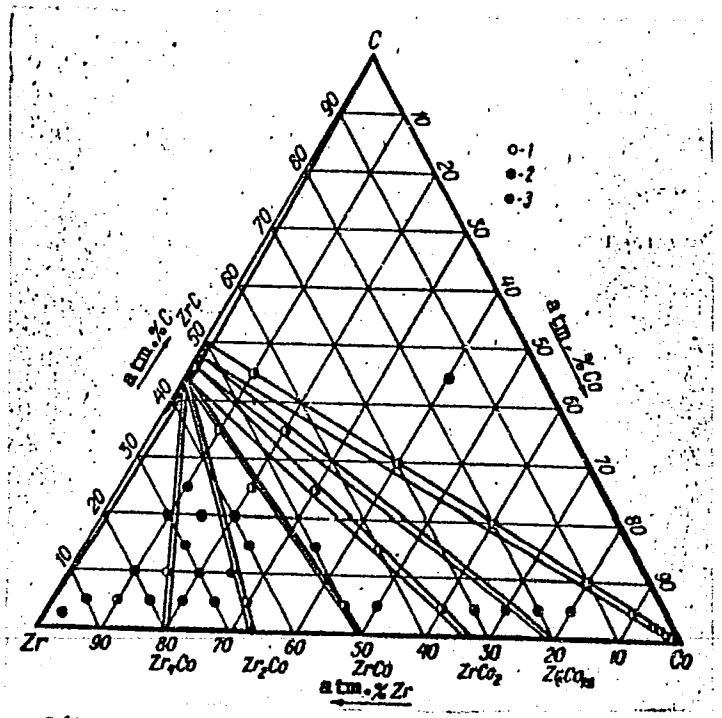


Fig. 1. Phase equilibria in the system Zr--Co-C at 800°C:

1 - single-phase; 2 - two--phase; 3 - three-phase

Card 2/4

L 13268-66
ACC NR: AP6001476

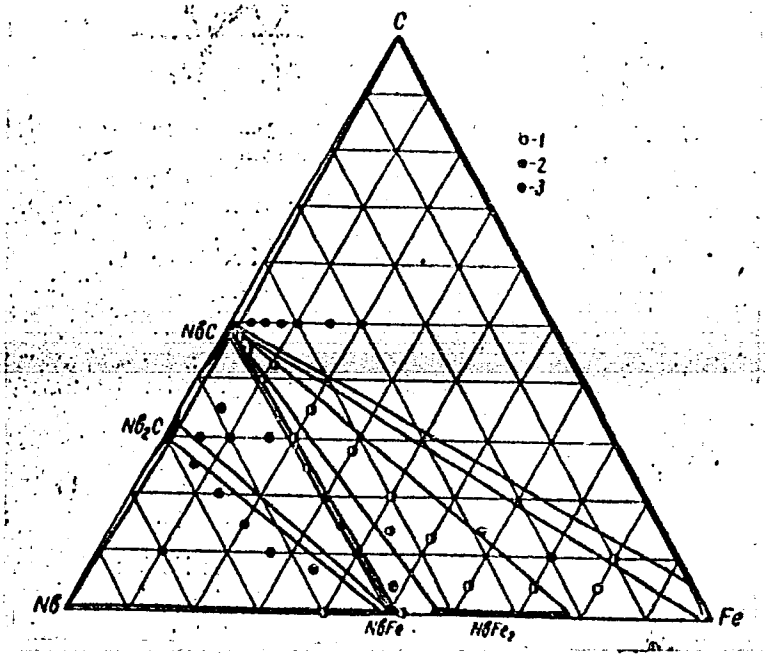


Fig. 2. Phase equilibria in the system Nb-Fe-C at 1050°C

1 - single-phase; 2 - two--phase; 3 - three-phase

Card 3/4

L 13268-66

ACC NR: AP6001476

equilibrium with Nb and μ-phase. No traces of Nb_3C_2 could be discovered. The absence of σ- and η-phases in alloys of the Nb-Fe-C system proves the invalidity of Goldschmidt's (H. Goldschmidt, J. Iron Steel Inst., 194, 2, 159, 1960) phase diagram of the Nb-Fe system. Orig. art. has: 4 figures.

SUB CODE: 11, 20/ SUBM DATE: 29Mar65/ ORIG REF: 007/ OTH REF: 013

Card 4/4

L 23585-66 EWT(m)/EWP(e)/T/EWP(t) IJP(c) JD/JG

ACC NR: AP6012772 SOURCE CODE: UR/0226/66/000/004/0055/0060

AUTHOR: Gladyshevskiy, Ye. I.; Fedorov, T. F.; Kuz'ma, Yu. B.; Skolozdra, R. V. 38 B

ORG: Lvov Order of Lenin State University im. Iv. Franko (L'vovskiy ordena Lenina gosuniversitet); Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: The system molybdenum-iron-boron

SOURCE: Poroshkovaya metallurgiya, no. 4, 1966, 55-60

TOPIC TAGS: molybdenum compound, boron compound, ternary compound, isothermal cross section

ABSTRACT: The system Mo-Fe-B has been investigated by x-ray and microscopic analyses, and its isothermal cross section is given. The phase equilibria were established at 1000C. The ternary compound Mo_2FeBe_2 was found to exist in the range 20--28 at % Fe, with a U_3Si_2-type superstructure (a = 5.807 -- 5.729 + 0.004 Å, c = 3.142 -- 3.151 + 0.003 Å). The ternary compound (Mo, Fe)B has a CrB-type structure (the lattice constants are similar to those of the high-temperature modification of MoB). The compound $MoFe_2B_4$ has a Ta_3B_4-type superstructure (a = 3.128

Card 1/2

L 23585-66
ACC NR: AP6012772

± 0.005 Å , b = 12.70 ± 0.01 Å, c = 2.984 ± 0.005 Å). Iron was found to have a stabilizing effect on the high-temperature modification of MoB. Orig. art. has: 3 figures and 3 tables. [Based on author's abstract]
[AM]

SUB CODE: 11, 07/ SUBM DATE: 05May65/ ORIG REF: 002/ OTH REF: 004

Card 2/2 PB

L 25055-66 EWT(m)/T/EWP(t) IJP(c) JD/JG

ACC NR: AP6011349 SOURCE CODE: UR/0226/66/000/003/0075/0077

AUTHOR: Gorshkova, L. V.; Fedorov, T. F.; Kuz'ma, Yu. B.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii); L'vov State University im. I. Franko (L'vovskiy gosudarstvennyy universitet)

TITLE: Rhenium-chromium-carbon system

SOURCE: Poroshkovaya metallurgiya, no. 3, 1966, 75-77

TOPIC TAGS: alloy, ternary alloy, rhenium alloy, chromium containing alloy, carbon containing alloy

ABSTRACT: A series of alloys of the Re-Cr-C system has been investigated and the isothermal section of the ternary diagram of the system at 1300C has been plotted (see Fig. 1). Alloys were melted from 99.96%-pure rhenium, 99.97%-pure chromium, and spectrographically pure graphite powders. It was found that $Cr_{23}C_6$ chromium carbide, formed at 1518C, dissolves up to 20 at% Re. The solubility of rhenium in other chromium carbides (Cr_7C_3 and Cr_3C_2) and that of carbon in the σ-phase of the Re-Cr system is insignificant. The solubility of chromium and carbon in ternary rhenium-base solid solution is not higher than that of these components in binary systems Re-Cr and Re-C.

Card 1/3

L 23053-66

ACC NR: AP6011349

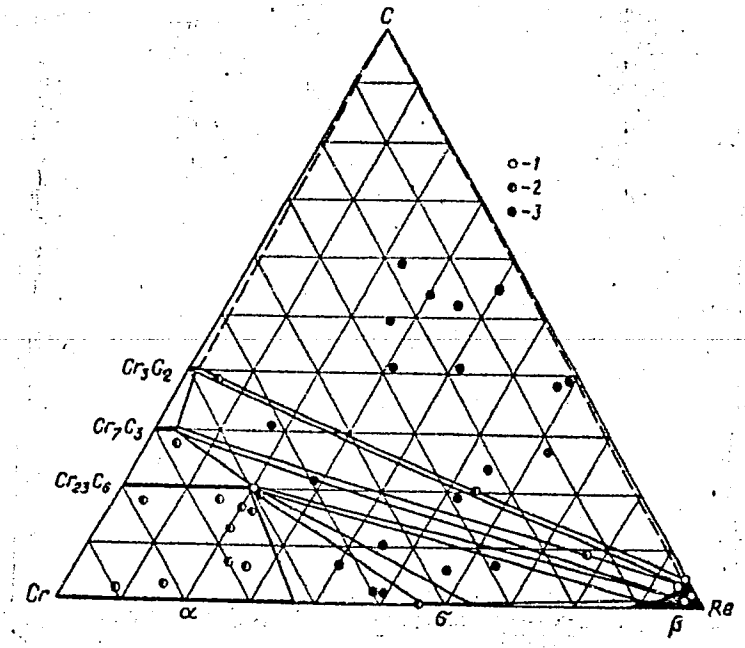


Fig. 1. Equilateral triangle of the Re-Cr-C system at 1300C

1 - Single-phase alloy;
2 - binary alloy;
3 - ternary alloy

Card 2/3

L 23053-65
ACC NR: AP6011349

No ternary compounds in the Re-Cr-C system were found. The solubility of transition metal in $Cr_{23}C_6$ in the Re-Cr-C, Mo-Cr-C, and W-Cr-C systems is generally high. However, the Re solubility (~20 at% Re) is considerably higher than that of Mo and W (~15 at%). This can be attributed to the smaller atomic radius of Re (1.37 Å) as compared to that of Mo or W (1.39 and 1.40 Å). In all these systems, the ordering of Mo, W, or Re atoms in $Cr_{23}C_6$-base solid solution is observed. As a result, a superstructure of the $W_2Cr_{21}C_6$ type is formed. The authors express their thanks to Ye. I. Gladyshevskiy for his advice. Orig. art. has: 2 figures.

SUB CODE: 11, 11/ SUBM DATE: 16Jun65/ ORIG REF: 004/ OTH REF: 005 [ND]
ATD PRESS: 4234

Card 3/3

L 43773-66 EWT(1)/EWP(e)/EWT(m)/T/EWP(t)/ETI IJP(c) JD/JG/LHB

ACC NR: AP6020964 SOURCE CODE: UR/0226/66/000/006/0073/0076

64
63
B

AUTHOR: Kuz' ma, Yu. B.; Lakh, V. I.; Stadnyk, B. I.; Voroshilov, Yu. V.

ORG: L' vov "Order of Lenin" State University im. Iv. Franko, Design Bureau "Termopribor" (L' vovskiy ordena Lenina gosudarstvennyy universitet, KB "Termopribor")

TITLE: X-ray diffraction study of the system niobium-tungsten-boron

SOURCE: Poroshkovaya metallurgiya, no. 6, 1966, 73-76

TOPIC TAGS: niobium, tungsten, boron, x ray diffraction analysis, phase equilibrium, lattice constant, ~~niobium-containing system, tungsten-containing system, boron-containing system~~ ALLOY SYSTEM, CRYSTAL LATTICE STRUCTURE

ABSTRACT: The paper deals with x-ray analyses of the system niobium-tungsten boron. The phase equilibriums were established for the first time at 1500°C and are shown in an isothermal cross-section view of the system in the original article.

Card 1/2

L 43773-66

ACC NR: AP6020964

In graphs included in the original article the authors show changes in the lattice constants of Nb_3B_2 and of NbB as a function of tungsten dissolution. Orig. art. has: 1 table and 3 figures. [Based on authors' abstract] [AM]

SUB CODE: 11/ SUBM DATE: 12Mar66/ ORIG REF: 001/ OTH REF: 007/

Card 2/2

L 46668-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6009517 (N) SOURCE CODE: UR/0226/65/000/011/0062/0065

AUTHOR: Kuz'ma, Yu. B.; Fedorov, V. F. 54 B

ORG: L'vov State University im. I. Franko (L'vovskiy ordena Lenina gosuniversitet im. I. Franko); Institute of Metallurgy im. A. A. Baykov (Institut metallurgii im. A. A. Baykova)

TITLE: Phase equilibria in the molybdenum-chromium-carbon system

SOURCE: Poroshkovaya metallurgiya, no. 11, 1965, 62-65

TOPIC TAGS: phase composition, ternary alloy, molybdenum, chromium, carbon, powder metal

ABSTRACT: Mixtures of the powders of Cr, Mo and spectrally pure graphite were sintered into rods weighing 20 g each which were then twice melted in an arc furnace. After this, the alloys of the compositions shown in Fig. 1 were investigated by methods of x-ray structural and metallographic analysis of cast, annealed and quenched (from 1350°C) specimens. The x-ray phase analysis of the non-heat-treated specimens established the presence in the alloys containing 20-50 at. % Mo, 20-4 at. % Cr and 60-46 at. % C of a phase (the ω-phase) with a cubic face-centered structure of the NaCl type (a = 4.24-4.27 Å). The carbide Mo_2C dissolves to

Card 1/3

L 46668-66

ACC NR: AP6009577

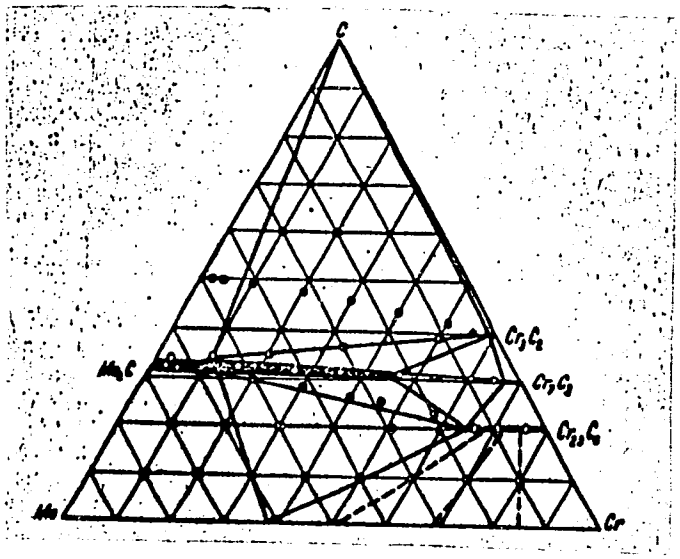


Fig. 1. Isothermic cross section of the Mo-Cr-C system at 1350°C:

○ - homogeneous alloys;
◐ - two-phase; ● - three-phase;
---- direction of tie lines

Card 2/3

L 46668-66

ACC NR: AP6009577

46 at.% Cr, and the carbide $Cr_{23}C_6$, to 15 at.% Mo. On dissolution in the carbide $Cr_{23}C_6$ the [illegible] atoms display an ordered distribution. The ω-phase is in an equilibrium with the solid solution of Cr in Mo_2Cr, the high-temperature hexagonal carbide Mo_3C_2 and the chromium carbides Cr_3C_2 and Cr_7C_3. Orig. art. has: 3 figures.

SUB CODE: 11,20 / SUBM DATE: 24Jan65/ ORIG REF: 001/ OTH REF: 003

Card 3/3 ns

L 46949-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6030734 SOURCE CODE: UR/0021/66/000/008/1025/1027

AUTHOR: Kuz'ma, Yu. B.; Uhrin, N. S.--Ugrin, N. S. 31 B

ORG: Lvov Government University (L'vivs'kiy derzhavniy universitet)

TITLE: Crystal structures of some compounds of rare-earth metals with cadmium 27 27

SOURCE: ANUkrRSR. Dopovidi, no. 8, 1966, 1025-1027

TOPIC TAGS: compound crystal structure, x ray diffraction analysis, rare earth metal, rare earth metal compound, cadmium containing compound

ABSTRACT: Alloys of terbium, holmium, and erbium with 40, 50, and 60 at% of cadmium, and alloys of thulium and lutecium with 40 at% of cadmium were prepared and subjected to x-ray diffraction analysis. The following compounds were identified in the alloys: (TbCd, HoCd, ErCd, TuCd, LuCd all five with C_sCl-type crystal structure) and $TbCd_2$, $HoCd_2$, $ErCd_2$ all three with a (AlB_2 or $CeCd_2$ type crystal structure). Orig. art. has: 3 tables. [TD]

SUB CODE: 20/ SUBM DATE: 29Apr65/ OTH REF: 004/

Card 1/1 afs

L 46243-66 EWT(m)/EWP(e)/EWP(t)/ETI IJP(c) JD/HW

ACC NR: AP6023916 SOURCE CODE: UR/0363/66/002/007/1218/1224

AUTHOR: Kuz'ma, Yu. B.; Chepiga, M. V.; Plakhina, A. M. 45 B

ORG: L'vov State University im. Iv. Franko (L'vovskiy gosudarstvennyy universitet)

TITLE: Phase equilibria in the systems Cr-Co-B, Mn-Fe-B, and Mn-Co-B

SOURCE: AN SSSR. Izv. Neorg materialy, v. 2, no. 7, 1966, 1218-1224

TOPIC TAGS: phase equilibrium, metal phase system, chromium compound, boron compound, iron compound, manganese compound, cobalt compound

ABSTRACT: The study constitutes a part of systematic investigations being carried out in the Inorganic Chemistry Department of L'vov University (Kafedra neorganicheskoy khimii L'vovskogo universitet), concerned with the phase diagrams of ternary systems of two transition metals with boron and the crystal structures of the ternary compounds formed. The systems Cr-Co-B, Mn-Fe-B, and Mn-Co-B were studied by x-ray structural analysis and in part by microstructural analysis, and the isothermal sections of these systems at 800°C were plotted. The compound $Cr_2Co_{21}B_6$ (τ phase), having a $W_2Cr_{21}C_6$-type structure (a = 10.471 Å), exists in the Cr-Co-B system. The boride Co_2B dissolves up to 30 at. % Cr. The presence of continuous solid solutions $(Mn, Fe_2)B$ and (Mn, Fe)B was confirmed in the Mn-Fe-B system. A ternary compound (τ phase) with a $W_2Cr_{21}C_6$-type structure (a = 10.518-10.641 Å) is formed in the Mn-Co-B system; the

Card 1/2 UDC: 541.123.3

L 46243-66

ACC NR: AP6023916

region of homogeneity of the τ phase is located between 10 and 40 at. % Mn. The existence of $(Mn, Co)_2B$ and (Mn, Co)B solid solutions was confirmed. Orig. art. has: 5 figures and 2 tables.

SUB CODE: 11/ SUBM DATE: 14Oct65/ ORIG REF: 010 / OTH REF: 004

hs

Card 2/2

L 47091-66 EWT(m)/EWP(t)/ETI IJP(c) JH/JD/WW/HW/JG
ACC NR: AP6030767 (A) SOURCE CODE: UR/0363/66/002/009/1581/1585

AUTHOR: Markiv, V. Ya.; Matushevskaya, N. F.; Rozum, S. N.; Kuz'ma, Yu. B. 57 B

ORG: Lvov State University im. I. Franko. (L'vovskiy gosudarstvennyy universitet)

TITLE: Study of aluminum-rich alloys of the Zr-Ni-Al system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 9, 1966, 1581-1585

TOPIC TAGS: aluminum alloy, aluminum compound, nickel containing alloy, zirconium containing alloy, aluminum nickel zirconium alloy, alloy phase composition

ABSTRACT: Ninety-nine aluminum-rich alloys of the Zr-Ni-Al system containing up to 33 at% Zr and up to 75 at% Ni have been melted from high-purity components and their phase composition and crystal structure investigated. On the basis of obtained results, an isothermal (800C) section of the ternary diagram was plotted. Five ternary compounds were identified in the alloys: $ZrNi_2Al$ (a = 6.123 Å) and $ZrNi_{0.5-0.2}Al_{1.5-1.8}$ (a = 7.355—7.444 Å) with respective structures of $MnCu_2Al$ and $MgCu_2$ type; $Zr_{0.8}Ni_{1.2}Al_2$ (a = 12.08 Å) with a cubic structure; ZrNiAl (a = 6.93 Å; c = 3.47 Å; c/a = 0.50) with a hexagonal lattice; and $ZrNiAl_4$, whose structure has not been determined. Orig. art. has: 3 figures and 3 tables. [TD]

SUB CODE: 11, 20/ SUBM DATE: 06Dec65/ ORIG REF: 007/ OTH REF: 014/

Card 1/1 hs UDC: 546.3—19—831—74—621

L 00892-67 EWP(e)/EWT(m)/T/EWP(t)/ETI LJP(c) JD/WW/HW/JG

ACC NR: AP6021616 SOURCE CODE: UR/0021/66/000/006/0772/0774

AUTHOR: Kuz'ma, Yu. B.; Lakh, V. I.; Voroshylov, Yu. V. -- Voroshilov, Yu. V.; Stadnyk, B. I.

ORG: L'vov State University (L'vivs'kyy derzhavnyy universytet)

55
B

TITLE: Crystal structure of the compounds $Zr_2Ni_{21}B_6$ and $Zr_2Co_{21}B_6$

SOURCE: AN UkrRSR. Dopovidi, no. 6, 1966, 772-774

TOPIC TAGS: phase equilibrium, zirconium alloy, nickel alloy, cobalt alloy, boron alloy, x ray diffraction analysis, intermetallic compound, inorganic crystal

ABSTRACT: The authors study phase equilibrium in the Zr-Ni-B and Zr-Co-B systems. Fifteen alloys were studied in each of these systems with compositions of 5-20 at.% Zr, 80-55 at.% Ni(Co) and 15-25 at.% B. The alloys were prepared from powdered zirconium (99.5% Zr), nickel (99.9% Ni), cobalt (99.9% Co) and boron (99.5% B). These were thoroughly mixed and pressed into briquettes. The briquettes were then sintered in a vacuum furnace at 1200°C for two hours. After this, the specimens were melted in a vacuum arc furnace and subjected to homogenizing annealing in evacuated quartz ampules at 800°C for 120 hours. X-ray diffraction analysis based on Cr radiation was used throughout the study. The analysis shows the existence of the compounds $Zr_2Ni_{21}B_6$ and $Zr_2Co_{21}B_6$ (τ-phases). These compounds have cubic structures of the $W_2Co_{21}C_6$ type

Card 1/2

L 00892-67

ACC NR: AP6021616

(space group $Fm3m-O_h^5$); for $Zr_2Ni_{21}B_6$ a=10.628±0.005 A, and for $Zr_2Co_{21}B_6$ a=10.597±±0.005 A. The compound $Zr_2Ni_{21}B_6$ has a region of homogeneity located on the 20 at.% B isoconcentrate at a zirconium concentration of 5-15 at.%. Increasing the Zr concentration from 5 to 15 at.% and reducing the Ni concentration from 75 to 65 at.% increases the lattice constant of the τ-phase from 10.609±0.005 A to 10.702±0.005 A. The existence of a second ternary compound was discovered in the Zr-Co-B system with a composition similar to $ZrCo_3B$. This article was presented for publication by Academician V. M. Svyechnikov. Orig. art. has: 1 table.

SUB CODE: 20/11/ SUBM DATE: 30Nov64/ OTH REF: 001

Card 2/2 afs

EWT(m)/EWP(t)/ETI IJP(c) WH/JD

ACC NR: AP6029828 (A) SOURCE CODE: UR/0363/66/002/008/1516/1520

AUTHOR: Kosolapova, T. Ya; Fedorus, V. B.; Kuz'ma, Yu. B.

ORG: Institute of Materials Science Problems, Academy of Sciences, UkrSSR (Institut problem materialovedeniya Akademii nauk UkrSSR)

TITLE: Reactions of carbides of transition metals with their oxides

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 8, 1966, 1516-1520

TOPIC TAGS: transition metal oxide, carbide

ABSTRACT: The reactions of oxides of titanium, zirconium, hafnium, vanadium, niobium and chromium with their carbides were studied in the range of 1000-2000°C (at 100°C intervals) at 10^{-3} mm Hg by using chemical and x-ray analyses. The formation of intermediate products was studied manometrically in certain reactions. In the TiO_2-TiC and ZrO_2-ZrC systems at 1000-2000°C, the reaction proceeds up to the formation of MC_xO_{1-x} oxycarbides. No reaction is observed in the HfO_2-HfC system in this temperature range. Carbides of group V metals, VC and NbC, react with the corresponding oxides to form the metals via stages of formation of lower oxides and carbides. The formation of chromium by the reaction of Cr_3C_2 with Cr_2O_3 is already observed at 1200°C. A rise in temperature leads to an increase in the yield of pure chromium, reaching 96% in the vicinity of the melting point of chromium. It is concluded that the difference in the nature of the reactions of group IV, V and VI transition metal

Card 1/2 UDC: 546.261+541.45

L 09314-67
ACC NR: AP6029828

oxides with carbides is due to the difference in the electronic structure of the metal atoms forming these oxides and carbides. Authors thank G. V. Samsonov for useful remarks and suggestions during the discussion of this work. Orig. art. has: 6 tables.

SUB CODE: 07/11/ SUBM DATE: 11Oct65/ ORIG REF: 011

Card 2/2

L 09313-67 EWT(m)/EWP(t)/ETI IJP(c) WH/WW/JD/JG

ACC NR: AP6029829 (A) SOURCE CODE: UR/0363/66/002/008/1521/1523

AUTHOR: Kosolapova, T. Ya.; Fodorus, V. B.; Kuz'ma, Yu. B.; Kotlyar, Yo. Yo.

ORG: Institute of Materials Science Problems, Academy of Sciences, UkrSSR (Institut problem materialovedoniya Akademii nauk UkrSSR)

TITLE: Nature of the reaction of zirconium dioxide with titanium, niobium and chromium carbides

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 8, 1966, 1521-1523

TOPIC TAGS: zirconium compound, titanium compound, niobium compound, chromium carbide, carbide

ABSTRACT: The reaction of ZrO_2 with TiC, NbC, or Cr_3C_2 was studied at 1000-2000°C at 10^{-2} mm Hg by means of phase chemical and x-ray analyses. The reaction in the ZrO_2-TiC system begins at 1300°C, and at 1900-2000°C results in the formation of a phase identified as a complex oxycarbide of the approximate composition $(Zr_{0.3}Ti_{0.7})(C_{0.56}O_{0.44})$ with lattice constant a = 4.43 Å. The reaction in the ZrO_2-NbC system begins at 1500°C. At about 1900-2000°C, a complex carbide of the type $(Nb_xZr_{1-x})C$ is formed in addition to a complex oxide of the type $(Nb_yZr_{1-y})O_2$. A chemical phase analysis based on the different solubilities of zirconium dioxide and niobium carbide in mixtures of H_2O_2 and citric acid was elaborated. The reaction of ZrO_2 with Cr_3C_2 results at 1300°C in the reduction of ZrO_2 to ZrC and in the formation of the lower

Card 1/2 UDC: 541.45+546.831-31

L 09313-67
ACC NR: AP6029829

chromium carbide Cr_7C_3. It is concluded that the difference in the nature of the reaction of ZrO_2 with carbides of group IV, V and VI metals is due to the difference in the electronic structure of the metal atoms forming the carbides. Authors thank G. V. Samsonov for useful remarks and suggestions during the course of this work. Orig. art. has: 3 tables.

SUB CODE: 07,11/ SUBM DATE: 11Oct65/ ORIG REF: 002

Card 2/2

ACC NR: AP6036787 (N) SOURCE CODE: UR/0363/66/002/011/1975/1979

AUTHOR: Kuz'ma, Yu. B.; Nych, O. V.; Skolozdra, R. V.

ORG: L'vov State Univeristy (L'vovskiy gosudarstvennyy universitet im. Iv. Franko)

TITLE: Molybdenum-cobalt-boron system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 11, 1966, 1975-1979

TOPIC TAGS: molybdenum cobalt boron system, molybdenum cobalt alloy, boron containing alloy, ternary alloy, alloy phase diagram, alloy crystal structure, sintered alloy

ABSTRACT: Experiments have been made to determine the phase equilibria in the Mo-Co-B system and the crystal structure of the Mo-Co-B ternary compounds. A series of Mo-Co-B alloys were prepared from component powders by cold compacting and vacuum sintering at 1500C. Alloys containing more than 50 at% B were then remelted in a nonconsummable electrode arc furnace. On the basis of the results of physicochemical analyses, the isothermal section of the Mo-Co-B system at 800C was plotted (see Fig. 1). Five ternary phases were indentified in the system at the temperature investigated: a $Mo_2Co_{21}B_6$ compound (the τ-phase) with a cubic lattice of the $W_2Cr_{21}C_6$ type; an x-phase with a composition close to that of $MoCo_4B$ compound and with an undetermined structure; a Mo_2CoB_2 compound characterized by the Mo_2NiB_2-type rhombic structure; a $(Mo_1Co)B$ phase (a cobalt-stabilized high-temperature modification of MoB) with the CrB-type rhombic structure with the lattice parameters almost identical with those

Card 1/3 UDC: 546.3-19-77-73-27

ACC NR: AP6036787

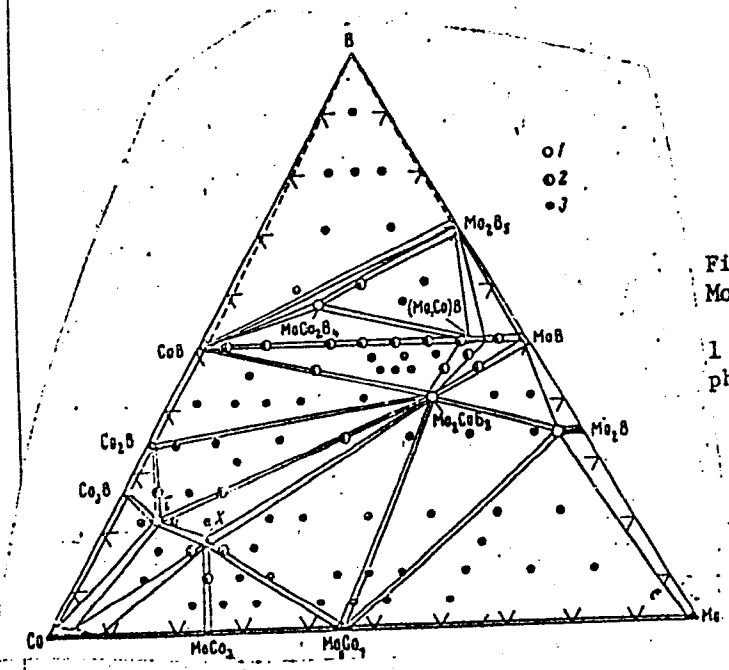


Fig. 1. Isothermal section of the Mo-Co-B ternary diagram at 800C

1 - Homogeneous alloys; 2 - two-phase alloys; 3 - three-phase alloys.

Card 2/3

ACC NR: AP6036787

of the MoB phase; a $MoCo_2B_4$ compound with a rhombic structure of the Ta_3B_4 type. At the $MoCo_2B_4$ composition, a ternary compound was identified which was in equilibrium with Mo_2B_5 and CoB binary compounds and a $(Mo_1Co)B$ ternary phase. Orig. art. has: 2 figures and 1 table.

SUB CODE: 11/ SUBM DATE: 03Jan66. ORIG REF: 005/ OTH REF: 006/
ATD PRESS: 5108

Card 3/3

ACC NR: AP6036445 SOURCE CODE: UR/0370/66/000/006/0127/0133

AUTHORS: Markiv, V. Ya. (L'vov); Matushevskaya, N. F. (L'vov); Kuz'ma, Yu. B. (L'vov)

ORG: none

TITLE: X-ray structural analysis of the system Nb-Ni-Al

SOURCE: AN SSSR. Izvestiya. Metally, no. 6, 1966, 127-133

TOPIC TAGS: alloy phase diagram, metal phase system, x-ray analysis, niobium, nickel, aluminum

ABSTRACT: The phase diagrams of the binary system Nb-Ni at 900C and of the ternary system Nb-Ni-Al at 800 and 900C respectively were investigated. The study supplements the results of Ye. N. Pylayeva, Ye.I. Gladyshevskiy, and P. I. Kripyakevich (Kristallicheskaya struktura soyedineniy Ni_3Nb i Ni_3Ta. Zh. neorg. khimii, 1958, 3, No. 7). The phase composition was determined by x-ray analysis. In addition, the crystal structure of the compounds $NbNi_2Al$ and $Nb(Ni, Al)_2$ were determined. The experimental results are presented in graphs and tables (see Fig. 1). It was found that at 900C Ni dissolves up to 11 at.% of Nb, and it was confirmed that the system Nb-Ni is homogeneous in the region of 50--60 at.% Nb, as stated by W. Jeitschko, H. Holleeck, H. Nowotny, F. Benesovsky (Phasen mit aufgefuellten Ti_2Ni-Typ M. Chemie,

Card 1/3 UDC: 669.293'24'71

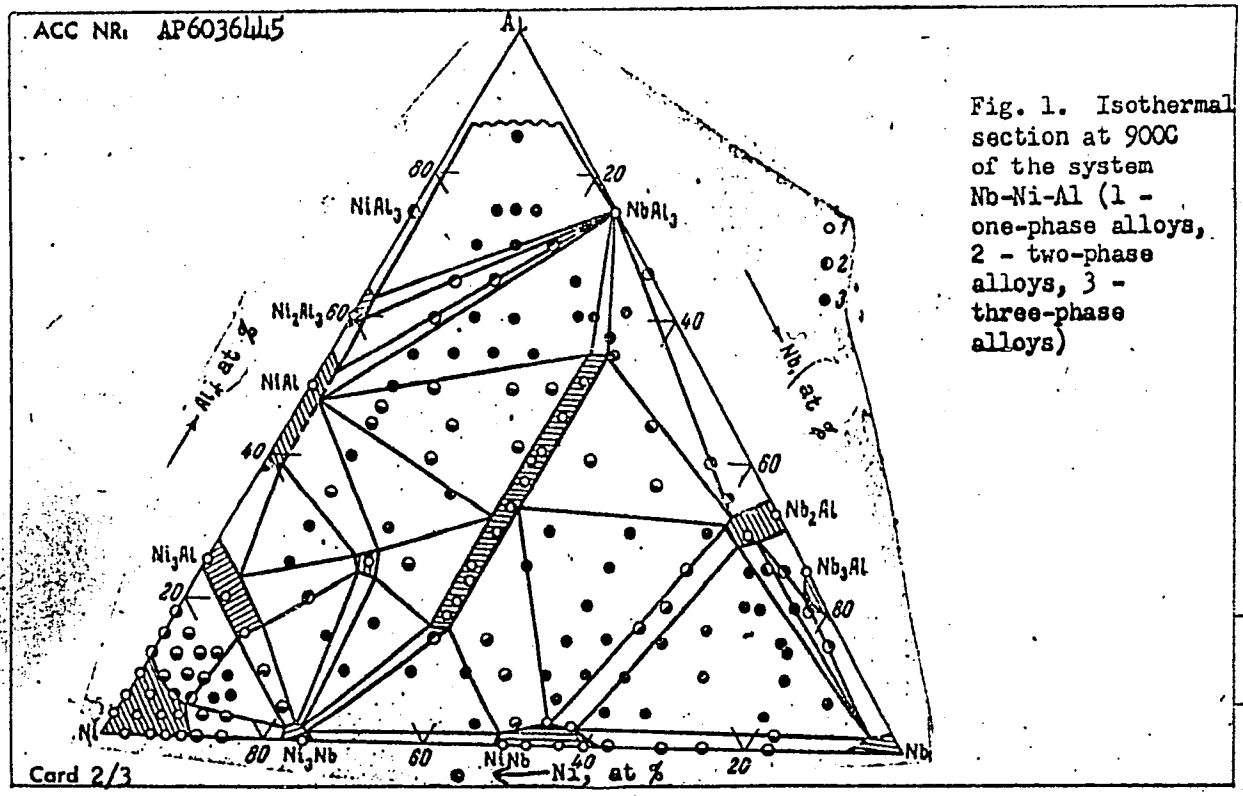


Fig. 1. Isothermal section at 900C of the system Nb-Ni-Al (1 - one-phase alloys, 2 - two-phase alloys, 3 - three-phase alloys)

ACC NR: AP6036445

1964, 95, N 3). The compound $NbNi_2Al$ has a $MiCu_2Al$ structure (a - 5.946 Å), and the compound $Nb(Ni,Al)_2$ has a $MgZn_2$ structure (a - 4.870 - 5.116 ± 0.003 Å, C - 7.902 - 8.278 ± 0.005 Å). Orig. art. has: 3 tables and 5 graphs.

SUB CODE: 11/ SUBM DATE: 03Mar65/ ORIG REF: 009/ OTH REF: 005

Card 3/3

ACC NR: AP7000013 (A) SOURCE CODE: UR/0080/66/039/011/2395/2400

AUTHOR: Makarenko, G. N.; Kripyakevich, P. I.; Kuz'ma, Yu. B.; Kosolapova, T. Ya.

ORG: Institute of Materials Science Problems, AN UkrSSR (Institut problem materialovedeniya AN UkrSSR); L'vov State University imeni I. Franko (L'vovskiy gosudarstvennyy universitet)

TITLE: Preparation of rare earth sesquicarbides

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 11, 1966, 2395-2400

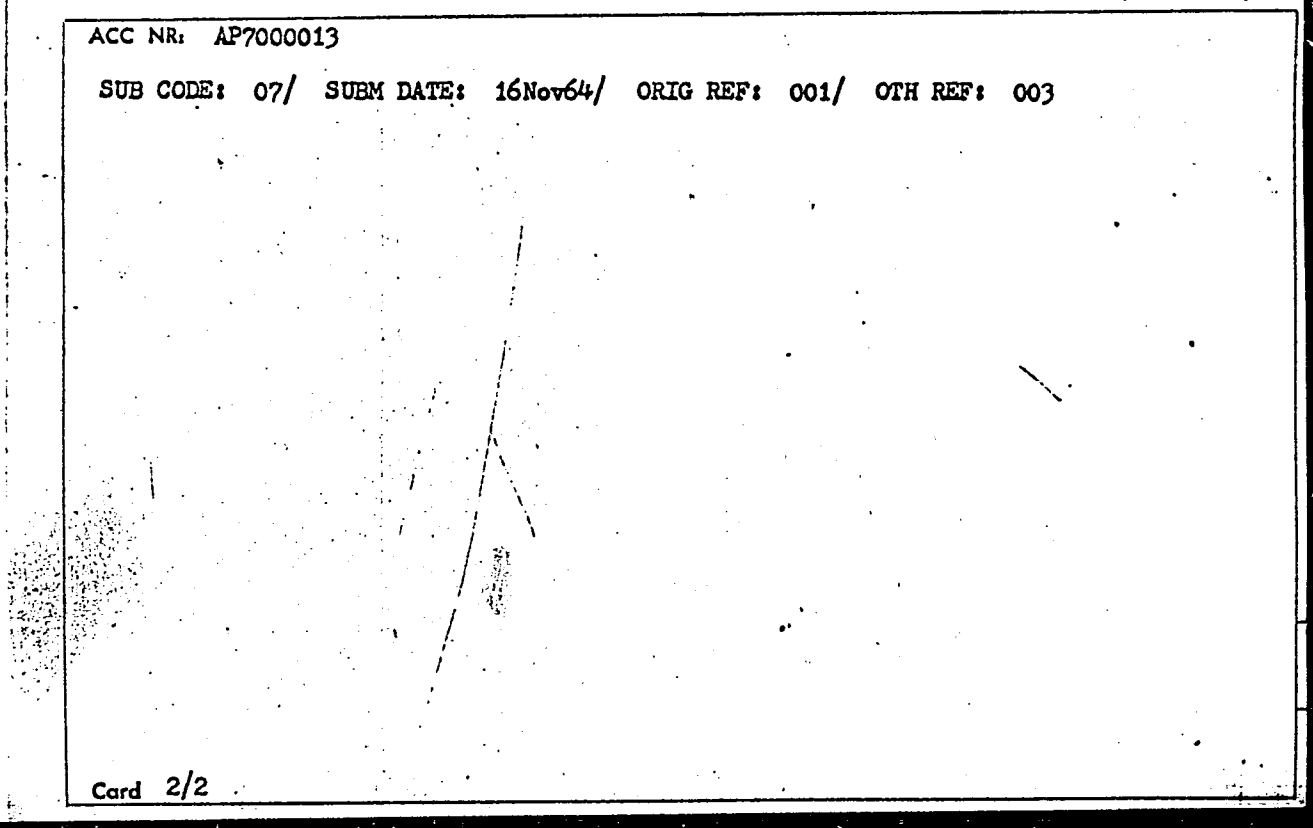
TOPIC TAGS: lanthanum compound, cerium compound, praseodymium compound, neodymium compound, carbide

ABSTRACT: A study of the possibility and conditions of preparation of lanthanum, cerium, praseodymium and neodymium sesquicarbides via reduction of the metal oxides with carbon in a vacuum and in argon and reaction of the dicarbides with the corresponding oxides showed that the preparation of sesquicarbides is impossible under these conditions because their formation is superseded by the formation of the stabler dicarbides. It is shown that the four sesquicarbides can be formed by reacting dicarbides with the corresponding metals in argon, and also by arc melting of metal fragments with spectroscopically pure graphite. The existence of isostructural oxycarbides of lanthanum and praseodymium of the approximate composition LaCO and PrCO is postulated. Orig. art. has: 9 tables.

Card 1/2 UDC: 546.65.261

ACC NR: AP7000013

SUB CODE: 07/ SUBM DATE: 16Nov64/ ORIG REF: 001/ OTH REF: 003



Card 2/2

S/137/62/000/010/028/028
A052/A101

AUTHOR: Kuźma, Zygmunt

TITLE: Spectrographic determination of Ga and Pb in In-Ga, In-Pb and In-Ga-Pb alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no.10, 1962, 8 - 9, abstract 10K46 ("Chem. analit." (Polska), v. 7, no. 1, 1962, 227 - 238, Polish; summary in English)

TEXT: The method is applicable to the analysis of In-alloys mainly to In-Ga alloys containing 0.5% Ga, In-Pb alloys containing 10% Pb and In-Ga-Pb alloys containing 8 - 10% Pb and 0.2 - 0.5% Ga. 100 mg of the 2-component alloy or 200 mg of the 3-component alloy are dissolved in 5 ml HNO_3 (1 : 1) and the solution is diluted to 10 ml. Thereafter 3 series of standard solutions for In-Pb, In-Ga and In-Pb-Ga alloys are prepared. To use In as an internal standard, its content in each series must be the same. For the analysis a spark-type ИГ-3 (IG-3) generator (C = 0.005 μF and L = 0.55 mhy) is used. When spectrographing two drops of the solution are applied to the flat electrode butt. As

Card 1/2

S/137/62/000/010/028/028
A052/A101

Spectrographic determination of...

the analytic pair the lines Ga 2943,64 - In 2710.27, Pb 2614.18 - In 2710.27 are selected. Analytic curves are plotted in coordinates W - lgC for Ga and S - lgC for Pb. The root-mean-square error of determination is $< \pm 4\%$ for Ga and $\pm 3.5\%$ for Pb.

L. Vorob'yeva

[Abstracter's note: Complete translation]

Card 2/2

KUZMA, Zygmunt

Spectrographic determination of Ga and Pb in In-Ga, In-Pb In Ga-Pb alloys. Chemia anal 7 no.1:227-228 '62.

1. The Tewa Transistor Works, Warsaw.

ACCESSION NR: AP4016603 P/0053/64/000/001/0009/0018

AUTHOR: Kuzma, Zygmunt

TITLE: Instrumental methods for analyzing certain indium alloys used in semiconductor technology

SOURCE: Przeglad elektroniki, no. 1, 1964, 9-18

TOPIC TAGS: instrumental analysis, indium alloy, semiconductor manufacture, mean relative error, spectrographic specimen, sensitivity

ABSTRACT: The paper discusses spectrographic and spectro-photometric analysis in determing the added components in indium-base alloys used in semiconductor manufacture, the initial sample being 10-200 mg of the alloy. The mean relative error was within 3-5%. The possibility of analyzing 0.2-10 mg. samples is considered. There are sections on: "Preparation of sample for analysis," "Spectrographic specimens," "Conditions: agitations, recordings of spectrum, processing of the photographic plate and pair of analytic lines," "Determination of Si in In-Si and In-Ga-Si alloys," "Spectrophotometric determination of Cd and Ga in In-Cd-Ga and In-Cd alloys," "Determination of gallium in In-Ga-Cd alloy,"

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ACCESSION NR: AP4016603

and "Comparison of the sensitivity of the analytic methods discussed." Taking into account the requirements as to the size of the sample and the accuracy of the determinations (mean relative percentual error), the author regards as appropriate the choice of methods proposed by him for solving this kind of analytic problems in the semiconductor industry.

"The author expresses his sincere thanks to mgr. inz. Henryk Hoffman and inz. Czeslaw Jaworski for perusing his paper and for a number of valuable remarks." Orig. art. has: 5 tables and 6 graphs.

ASSOCIATION: Fabryka Polprzewodnikow "TEWA", Warsaw ("TEWA" Semiconductor Factory)

SUBMITTED: 30Jul63 DATE ACQ: 05Mar64 ENCL: 00

SUB CODE: GE NO REF SOV: 001 OTHER: 006

Card 2/2

LEBEDINSKIY, N.F.; OKTYABR'SKIY, P.Ya.; SMIRNOV, D.V.; VINLGRADOV, N.I.; KUZ'MAK, B.S.; BLYAKHMAN, L.S.; RYASHCHENKO, B.R.; POLOZOV, V.R.; SHALGIN, G.N.; MARKIN, A.A.; IGNAT'YEVA, E.P.; VOROTILOV, V.A.; KLYUYEV, A.I., dots., otv.red.; KARPOVA, L.A., red.; YELIZAROVA, N.A., tekhn. red.

[Hiddent potentials for increasing labor productivity in the national economy] Rezervy rosta proizvoditel'nosti truda v narodnom khoziaistve. Leningrad, Izd-vo Leningr. univ., 1962. 223 p. (MIRA 16:2)

1. Leningrad. Universitet.

(Labor productivity)

KUZMAK, G. YE. PA 241T66

USSR/Mathematics - Hydrodynamics Nov/Dec 52

"One Representation for the Solution of the Basic Integro-Differential Equation of a Wing," G. Ye. Kuzmak, Moscow

"Priklad Matemat i Mekhan" Vol 16, No 6, pp 715-718

The familiar integro-differential expression for the circulation around a wing, namely the gamma function $\Gamma(\theta)$ involving the function $b(\theta)$ proportional to the wing chord, and the alpha function $\alpha(\theta)$ representing the geometric angle of attack, is represented in the form of an infinite orthonormal series (that is, terms from an orthonormal system). Submitted 26 Jul 52.

241T66

KUZMAK, G.E.

Mathematical Reviews
Vol. 14 No. 7
July - August, 1953
Mechanics.

Kuzmak, G. E. On a representation of the solution of the basic integro-differential equation of a wing. Akad. Nauk SSSR. Prikl. Mat. Mek. 16, 715–718 (1952). (Russian)

En utilisant les critères de N. Bary [C. R. (Doklady) Acad. Sci. URSS (N.S.) 37, 83-87 (1942); ces Rev. 4, 272] l'A. prouve que le système de fonctions:

$$f_n(\theta) = \left(1 + \frac{\sin n\theta}{c\,nb(\theta)}\right) \sin n\theta, \quad n = 1, 2, \cdots, \infty,$$

[où c est une constante positive, $b(\theta)$ est une fonction donnée] est complet chaque fois que pour tout n on a:

$$\int_0^\pi [f_n(\theta)]^2 d\theta < \frac{4}{\pi}\left[\int_0^\pi f_n(\theta) \sin n\theta\, d\theta\right]^2.$$

Ce résultat est utilisé pour former le développement suivant les $f_n(\theta)$ de la solution de l'équation intégro-différentielle de l'aile.

J. Kravtchenko (Grenoble).

2

1/22/54

USSR/Mathematics - Orthogonal functions FD-1426

Card 1/1 : Pub. 64 - 4/9

Author : Kuzmak, G. Ye. (Moscow)

Title : Concerning a system of functions

Periodical : Mat. sbor., 35 (77), pp 461-468, Nov-Dec 1954

Abstract : In this work the author considers the following system of functions: $p_0(x) = g_0 f(x)$; $p_{2m-1}(x) = g_{2m-1}[1+f(x)/m]\cdot\sin mx$; $p_{2m}(x) = g_{2m}[1+f(x)/m]\cdot\cos mx$ $(m = 1,2, \ldots)$, where g_n is determined from the normalization condition of the functions: $\int_0^{2\pi} p_n^2(x)\,dx = 1$ $(n = 0,1,2,\ldots)$. A system of this form is encountered in the theory of air foils of finite span in the solution of the integro-differential equation for circulation (in this case the function $f(x)$ depends upon the form and span of the wing). One reference (N. K. Bari, "Complete systems of orthogonal functions," Mat. sbor., 14 (56), 51-108, 1944).

Institution :

Submitted : October 27,1953

KUZMAK, G. Ye.

Call Nr: AF 1108825

Transactions of the Third All-union Mathematical Congress (Cont.) Moscow, Jun-Jul '56, Trudy '56, V. 1, Sect. Rpst., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp.

Volosov, V. M. (Moscow). On the Asymptotic Behaviour of Solutions of Some Differential Equation of Non-linear Oscillations. 219-220

Mention is made of Krylov, N. M. and Bogolyubov, N. N.

Glasko, V. B. (Moscow). On the Relationship of Eigenvalues and Eigenfunctions of Certain Boundary Problems of Small Parameter. 220

Goryainov, A. S. (Moscow). Electromagnetic Wave Diffraction on an Infinite Cylinder. 220-221

Mention is made of Fok, V. A.

Kuzmak, G. Ye. (Moscow). Asymptotic Solutions of Some Non-linear Differential Equations of Secondary Order With Variable Coefficients. 221-223

Card 74/80

KUZMAK, G. Ye.

AUTHOR: Kuzmak, G.Ye. (Moscow)

TITLE: Asymptotic Solution of a Non-Linear Differential Equation of Second Order (Asimptoticheskoye resheniye odnogo nelineynogo differentsial'nogo uravneniya vtorogo poryadka)

40-21-2-14/22

PERIODICAL: Prikladnaya Matematika i Mekhanika, 1957, Vol 21, Nr 2, pp 262-271 (USSR)

ABSTRACT: The author determines the first terms of the asymptotic expansion of the solutions of

$$\frac{d^2y}{dt^2} + a(\tau)y - b(\tau)y^3 = 0, \qquad \tau = \varepsilon t$$

for small ε (although this was made already several times). In this connection only the method is new. In this non-linear case the author uses the method of comparison equations (cf.e.g.: Dorodnytsin [Ref 3] elaborated for the linear theory. As a comparison equation he uses

$$\frac{\partial^2 snu}{\partial u^2} + (1+\gamma)snu - 2\gamma\, sn^3 u = 0 .$$

Card 1/2

Asymptotic Solution of a Non-Linear Differential Equation of Second Order 40-21-2-14/22

There are 5 references, 4 of which are Soviet, and 1 German.

SUBMITTED: December 3, 1955

AVAILABLE: Library of Congress

1. Non-linear differential equations—Solutions

Card 2/2

AUTHOR: Kuzmak, G.Ye. (Zhukovskiy) SOV/41-10-2-3/13

TITLE: On the Theory of Nonautonomous, Quasi-Linear Systems With Several Degrees of Freedom (K teorii neavtonomnykh kvazilineynykh sistem so mnogimi stepenyami svobody)

PERIODICAL: Ukrainskiy matematicheskiy zhurnal, 1958, Vol 10, Nr 2, pp 128-146 (USSR)

ABSTRACT: The author considers the system

$$(1) \qquad \frac{dx_j}{dt} + \sum_{l=1}^{p} a_{jl}x_l = \varepsilon f_j\left[x_1,..,x_p,v_{p+1}(t),..,v_n(t),\varepsilon\right]$$

$$j = 1,2,...,p$$

The investigation of such systems is carried out according to Krylov and Bogolyubov by series expansions, i.e. the solutions and certain auxiliary functions are expanded into series in terms of ε. The amplitudes and frequencies of the single harmonics of the solutions usually serve as auxiliary functions. The author deviates from this scheme inasmuch as he applies for the choice of the auxiliary functions the formal transfor-

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On the Theory of Nonautonomous, Quasi-Linear Systems With Several Degrees of Freedom

SOV/41-10-2-3/13

mations which were used by Birkhof [Ref 4] for the investigation of canonical systems. The method has certain advantages, it can be only applied, however, to such nonautonomous systems which can be reduced to autonomous systems with a larger number of variables. As examples for the application of the method the author considers two equations of second order.
There are 6 references, 4 of which are Soviet, 1 American, and 1 English.

SUBMITTED: May 15, 1956

1. Differential equations 2. Transformations (Mathematics)
3. Harmonic functions

Card 2/2

AUTHOR: Kuzmak, G.E. SOV/20-120-3-5/67

TITLE: The Asymptotic Solutions of the Equations of Motion of a Nonlinear Oscillatory System With one Degree of Freedom and Slowly Variable Parameters (Asimptoticheskiye resheniya uravneniya dvizheniya nelineynoy kolebatel'noy sistemy s odnoy stepen'yu svobody s medlenno izmenyayushchimisya parametrami)

PERIODICAL: Doklady Akademii nauk SSSR,1958, Vol 120,Nr 3,pp 461-464 (USSR)

ABSTRACT: The author considers the equations

$$(1) \quad \frac{d^2y}{dt^2} + \varepsilon f(\tau, y)\frac{dy}{dt} + F(\tau, y) = 0$$

and

$$(2) \quad \frac{d^2y}{dt^2} + \varepsilon f(\tau, y)\frac{dy}{dt} + a_0(\tau) + a_1(\tau)y + a_2(\tau)y^2 + a_3(\tau)y^3 = 0$$

where ε is a small parameter and $\tau = \varepsilon t$ is the so-called slow time. Under the assumption that (1) possesses an oscillating solution, the author calculates according to the method of comparison equations due to Dorodnitsyn [Ref 1], expressions which are suitable to investigate the solution of (1) with the exactness ε on the interval $0 \leq t \leq \tau_0/\varepsilon$.

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The Asymptotic Solutions of the Equations of Motion SOV/20-120-3-5/67
of a Nonlinear Oscillatory System With one Degree of Freedom and Slowly Variable Parameters

$$\varphi^2(\tau)\frac{\partial^2 y_0}{\partial \omega^2} + F(\tau, y_0) = 0$$

serves as a comparison equation. As asymptotic formulas for the solution of (1) and its derivative the author obtains

$$y_0(t) = y_0(\tau,\omega) \quad , \quad \left(\frac{dy}{dt}\right)_0 = \varphi(\tau)\frac{\partial y_0}{\partial \omega}$$

where

$$\omega = \omega_0 + \int_{t_0}^{t} \varphi(\varepsilon t)dt$$ and ω_0 denotes an arbitrary constant. The function $\varphi(\tau)$ is a momentary oscillation frequency and is obtained from a certain differential equation. The special case (2) is considered in detail.
There are 6 references, 5 of which are Soviet, and 1 French.

PRESENTED: January 16, 1958, by A.A. Dorodnitsyn, Academician

Card 2/3

The Asymptotic Solutions of the Equations of Motion of a Nonlinear Oscillatory System With one Degree of Freedom and Slowly Variable Parameters SOV/20-120-3-5/67

SUBMITTED: January 10, 1958

1. Topology 2. Differential equations--Applications 3. Functions

Card 3/3

AUTHOR: Kuzmak, G. Ye. SOV/20-121-1-9/55

TITLE: Asymptotic Solutions of the Motion Equation of a Dissipative System With One Degree of Freedom and With Slowly Variable Parameters (Asimptoticheskiye resheniya uravneniya dvizheniya dissipativnoy sistemy s odnoy stepenyu svobody s medlenno izmenyayushchimisya parametrami)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 1, pp 37-40 (USSR)

ABSTRACT: The author considers the equation

(1) $$\frac{d^2y}{dt^2} + f(\tau, \frac{dy}{dt}) + \varepsilon F(\tau, y) = 0$$

with the small parameter ε and with the slow time $\tau = \varepsilon t$. It is assumed: a) $f(\tau, 0)$, b) $\frac{\partial f}{\partial(\frac{dy}{dt})} \geq \Delta > 0$, c) let f be in G: $0 \leq \left|\frac{dy}{dt}\right| \leq w_t$, $0 \leq \tau \leq \tau_0$ analytic in $\frac{dy}{dt}$, likewise $\frac{\partial f}{\partial \tau}$, $\frac{\partial^2 f}{\partial \tau^2}$. Besides let f vanish in G only for $\frac{dy}{dt} = 0$, d) let $F(\tau, y)$ be defined in $0 \leq |y| \leq w$, $0 \leq \tau \leq \tau_0$, analytic in y and continuous in τ. The w_t and w are constants.

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(1) is compared with

$$(2) \qquad \varphi^2(\tau)\frac{\partial^2 y_0}{\partial \omega^2} + f\left[\tau, \varphi(\tau)\frac{\partial y_0}{\partial \omega}\right] = 0,$$

where $\varphi(\tau) = \left.\frac{\partial f(\tau, \dot{y})}{\partial \dot{y}}\right|_{\dot{y}=0}$, so that

$$y_0(\tau, \omega) = B_0(\tau) + A\left[\tau, e^{-\omega - c(\tau)}\right],$$

where $B_0(\tau)$ and $c(\tau)$ are arbitrary while

$$A\left[\tau, e^{-\omega - c(\tau)}\right] = \sum_{n=1}^{\infty} B_n(\tau) e^{-n[\omega + c(\tau)]}$$

is determined from (2).

Theorem: If f and F satisfy the conditions a),b),c),d) and if $B_0(\tau)$ and $c(\tau)$ are obtained from the conditions

$$\varphi(\tau)B_0'(\tau) + F[\tau, B_0(\tau)] = 0,$$

Asymptotic Solutions of the Motion Equations of a Dissipative System With One Degree of Freedom and With Slowly Variable Parameters SOV/20-121-1-9/55

$$c(\tau) = \int_0^{\tau} \frac{\varphi'(\tau) - F_y[\tau, B_0(\tau)] - f_{\dot{y}\dot{y}}(\tau, 0) F[\tau, B_0(\tau)]}{\varphi(\tau)} d\tau + \ln \left| \frac{B_1(\tau)}{B_1(0)} \right|,$$

then on the time interval $t \sim 1/\varepsilon$ for $|\varepsilon| \leq \varepsilon_0$ the functions $y_0(t) = y_0(\tau, \omega)$ and $\left(\frac{dy}{dt}\right)_0 = \varphi(\tau) \frac{\partial y_0}{\partial \omega}$, $\tau = \varepsilon t$, $\omega = \int \varphi(t) dt$, approximate the solution of (1) and its derivative with the exactness $1/\varepsilon$.
There are 2 Soviet references.

PRESENTED: February 22, 1958, by A.A.Dorodnitsyn, Academician
SUBMITTED: February 22, 1958

1. Mathematics

Card 3/3

KUZMAK, G.Ye. (Moskva)

Asymptotic solutions of nonlinear differential equations of the second order with variable coefficients. Prikl. mat. i mekh. 23 no.3:515-526 My-Je '59. (MIRA 12:5)
(Differential equations)

16 (1), 24 (0)

AUTHOR: Kuzmak, G. Ye.

SOV/20-125-5-10/61

TITLE: On the Calculation of the Asymptotic Solutions Which Correspond to the Non-closed Integral Curves of the "Standard" Equation (O vychislenii asimptoticheskikh resheniy, soot-vetstvuyushchikh nezamknutym integral'nym krivym "standartnogo" uravneniya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 5, pp 992 - 995 (USSR)

ABSTRACT: The present paper deals with the equation $\frac{d^2y}{dt^2} + \varepsilon f(\tau,y)\frac{dy}{dt} + F(\tau,y) = 0$. Here ε denotes a small parameter and $\tau = \varepsilon t$ the slow time. In an earlier paper (Ref 1) it was shown that by suitable selection of the arbitrary functions of τ (which enter into the solution of the "standard" equation

$$\varphi^2(\tau)\frac{\partial^2 y_0}{d\omega^2} + F(\tau,y_0) = 0$$

it is possible to cause the functions $y_0(t) = y_0(\tau,\omega)$, $\left(\frac{dy}{dt}\right)_0 = \varphi(\tau)\frac{\partial y_0}{\partial \omega}$ at $0 \leq t \leq \tau_0/\varepsilon$ to approach the solution of the first-mentioned equation and its

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derivative, in which case $\omega = \omega_0 + \int_{t_0}^{t} \varphi(\xi t)\, dt$ holds. In some cases (especially if the phase plane of the equation $\varphi^2(\tau) \frac{\partial^2 y_0}{d\omega^2} + F(\tau, y_0) = 0$ is periodic with respect to y_0), also an investigation of the processes at $0 \leq t \leq \tau_0/\xi$ is of interest. These processes are near the non-closed integral curves. It is of particular importance to investigate these processes which are connected with the transition (or non-transition) of the non-oscillation process into an oscillation process. For the purpose of carrying out such an investigation it is necessary to be able to form some approximated notions concerning the solution for the domain V, which is represented by a figure. The present paper aims at extending the method of calculating the asymptotic solutions suggested in the aforementioned earlier paper to the case mentioned. This problem is

investigated on the basis of the following conditions: a) the functions $f(\tau,y)$ and $F(\tau,y)$ are sufficiently smooth at $0 \leq \tau \leq \tau_0$ and $0 \leq y \leq T_y$, and have the period T_y with respect to y, in which case this period does not depend on τ. b) $f(\tau,y)$ is an even function of y, but $F(\tau,y)$ is an odd function. The author first describes some properties of the solutions of the "standard equation" which are aperiodic with respect to ω, and then proves the following theorem: If the functions $f(\tau,y)$, $F(\tau,y)$ satisfy the (above mentioned) conditions a and b, if the function $\varphi(\tau)$ is determined from the equation

$$\frac{d}{d\tau}\left[\varphi(\tau)\int_0^{T_\omega/2}\left(\frac{\partial y_0}{\partial \omega}\right)^2 d\omega\right] + \varphi(\tau)\int_0^{T_\omega/2} f(\tau,y_0)\left(\frac{\partial y_0}{\partial \omega}\right)^2 d\omega = 0$$

in such a manner that at $0 \leq \tau \leq \tau_0$ the relation $\varphi(\tau) \geq \delta > 0$ holds, and if the arbitrary functions entering into the "standard" equation are defined in such a manner that $y_0(\tau,0) = 0$ holds and that

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On the Calculation of the Asymptotic Solutions Which Correspond to the Non-closed Integral Curves of the "Standard" Equation

SOV/20-125-5-10/61

the "period" T_ω does not depend on τ, the function $\tilde{y}(t) = y_0(\tau,\omega) + \varepsilon y_1(\tau,\omega)$ satisfies the equation

$$\frac{d^2y}{dt^2} + \varepsilon f(\tau,y)\frac{dy}{dt} + F(\tau,y) = 0 \text{ at } 0 \leqslant t \leq \tau_c/\varepsilon \text{ and } 0 \leqslant \varepsilon \leqslant \varepsilon_0$$

with an accuracy of up to terms of the order of magnitude ε^2. The author then investigates the example, which is of practical importance, $\frac{d^2y}{dt^2} + \varepsilon f(\tau)\frac{dy}{dt} + g(\tau) \sin y$ and also the case in which the function $g(\tau)$ in the initial instant of time ($t = t_0$) is very small and then increases rapidly. There are 1 figure and 2 Soviet references.

PRESENTED: January 9, 1959, by A. A. Dorodnitsyn, Academician

SUBMITTED: January 2, 1959

Card 4/4

S/020/60/132/03/17/066
B014/B011

AUTHOR: Kuzmak, G. Ye.

TITLE: On the Problem Concerning the Spatial Motion of an Axisymmetric Solid Body Around a Fixed Point Under the Action of Moments Slowly Changing With Time

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 3, pp. 549-552

TEXT: The motion of a body under the action of the restoring moment $M_z(\tau, \theta)$ is investigated in the present paper. This moment is assumed to be dependent on the "slow" time $\tau = \varepsilon t$ (ε is a small parameter, t denotes time), on the angle of nutation θ and on small damping moments. The angular velocity is described by three equations of same effect. The author restricts himself to the solution of the more difficult part of the problem: the determination of the nutation angle θ and the precession rate λ. The differential equation system (1) is written down for the determination of these quantities, and the system is solved by making use of the method of "standard" equations. By this method the

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On the Problem Concerning the Spatial Motion of an Axisymmetric Solid Body Around a Fixed Point Under the Action of Moments Slowly Changing With Time

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author understands the way of expressing the solution of the equations considered by solutions of simpler equations. By equations (2) he gives the standard equation system and assumes that the solution $\theta_0(\tau,\omega)$ determined by this system has the properties $\theta_0(\tau,\omega+T_\omega) = \theta_0(\tau,\omega) + \begin{cases}0\\2\pi\end{cases}$; $\theta_0(\tau,-\omega) = \pm\,\theta_0(\tau,\omega)$. The general solution of the system (2) depends on four arbitrary functions. Under the premises established above for the solution, one of these arbitrary functions vanishes, and furthermore, by allowing for the condition that the period T_ω be independent of τ, any of the remaining three arbitrary functions can be expressed by the other two. Equations (9) are given for the computation of the last two arbitrary functions. The author thus obtains relations to calculate functions $\tilde{\theta}(t)$ and $\tilde{\lambda}(t)$, which satisfy the system of equations (1) with an accuracy of ε^2 with $0 \leq t \leq \tau_0/\varepsilon$. Here, the functions $\tilde{\theta}(t) = \theta_0(\tau,\omega) + \varepsilon\theta_1(T,\omega)$, $\tilde{\lambda}(t) = \lambda_0(\tau,\omega) + \varepsilon\lambda_1(\tau,\omega)$ hold. In such formulas, the terms with ε, which are small oscillating additive terms

Card 2/3

VC

On the Problem Concerning the Spatial Motion of an Axisymmetric Solid Body Around a Fixed Point Under the Action of Moments Slowly Changing With Time

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B014/B011

to the principal terms, are usually left unconsidered. This case is discussed, and the case in which the solution of the standard equations can be written down in form of equation (12) (Lagrange's case) is then dealt with. The last specific case is the one in which the solution of the standard equations is not dependent on ω. There are 1 figure and 5 Soviet references.

PRESENTED: October 12, 1959, by A. A. Dorodnitsyn, Academician

SUBMITTED: October 9, 1959

Card 3/3

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