Five New Millisecond Isomer [illegible] in Nuclear Reactions With [illegible]-Mev [illegible]

S/056/60/[illegible]
B004/B07[illegible]

the isomer, the determination of the cross section of reaction, and the estimate of the relative yield of the radiation of the isomer from thick targets are explained. The authors mention the following results of their experiments: By irradiation of Sc_2O_3, a short-period emitter with E_γ = (0.28±0.01) Mev $T_{1/2}$ = (5.8±0.4) msec was observed. Fig. 2 shows the spectrum of gamma radiation; Fig. 3 shows the decay curve of the short-period isomer. $Sc^{45}(p,n)Ti^{45m}$ is suggested as the most probable reaction. Fig. 4 shows the yield of the activity of Ti^{45m} from a thick Sc_2O_3 target as a function of the proton energy. Two lines with E_γ = (0.25±0.01) Mev $E_{\gamma 2}$ = (0.40±0.01) Mev were measured in titanium. For $E_{\gamma 2}$ $T_{1/2}$ = (5.7±0.3)msec; for E_γ $T_{1/2}$ = 4.8 msec approximately. Samples with different enrichment of the individual isotopes were used for cadmium (Table 1). The observed isomer level with E_γ = [illegible] Mev $T_{1/2}$ = (42.2±2.0)msec corresponds to the reaction $Cd^{114}(p,n)In^{114m}$. Fig. 5 shows the excitation function of the activity of In^{114m}. The

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Five New [illegible] S/056/6[illegible]
Nuclear Reactions [illegible] P. 4/[illegible]

identity of the radiation characteristic of [illegible] and In lead the authors to the conclusion that the same isomer is formed on the irradiation of indium according to the reaction $In^{115}(p,pn)In^{114m}$. La_2O_3 gave a short-period gamma radiation with a large yield (Figs. 6 - 9). $E_{\gamma 1}$ = (0.30±0.01) Mev, $E_{\gamma 2}$ = (0.80±0.01) Mev, $E_{\gamma 3}$ = (1.04±0.01) Mev. $T_{1/2}$ was (9.2±0.5) msec for all of the three lines. This reaction is said to be caused by reaction $La^{139}(p,2n)Ce^{138m}$. For Nd_2O_3, two gamma lines with $E_{\gamma 1}$ = (0.21±0.01) Mev, $E_{\gamma 2}$ = (0.43±0.01) Mev, and $T_{1/2}$ = (2.2±0.2) msec were measured. No identification was undertaken. The sample holds for the short-period radiation found on the irradiation of osmium: E_γ = (0.32±0.01) Mev, $T_{1/2}$ = (10±0.6)msec. Irradiation of tantalum are two lines with (0.24±0.01 and (0.32±0.01) Mev, $T_{1/2}$ = 5.5±0.3 msec according to the reaction $Ta^{181}(p,2n)W^{180m}$. The experimental data are given in Table 2. The authors mention papers by Yu. V. Yakovlev, A. P. Morozov (Ref. 12), V. I. Glazolev et al. (Ref. 2), B. S. Dzhelepov,

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84395

Five New Millisecond Isomers Produced in Nuclear Reactions With 19.2-Mev Protons

S/056/60/[illegible] 18
B004/B07[illegible]

L. K. Peker (Ref. 20). They thank A. P. Klyucharev for his interest in the work, A. M. Smirnov for the smooth working of the accelerator and the technician V. T. Deren'ko for assistance in the experiments. There are 9 figures, 2 tables, and 24 references. 14 Soviet, 7 US, 1 Canadian, 1 British, and 1 Dutch.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences, USSR).
Fiziko-tekhnicheskiy institut Akademii nauk USSR (Institute of Physics and Technology of the Academy of Sciences, UkrSSR)

SUBMITTED: May 23, 1960

Card 4/4

S/056/60/039/006/026/063
B006/B056

AUTHORS: Glagolev, V. L., Morozov, A. M., Yampol'skiy, P. A.

TITLE: Reactions Leading to the Formation of the Isomer Pb^{205m}

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 6(12), pp. 1621 - 1624

TEXT: It was the aim of the authors to investigate more closely the characteristics of the short-period gamma radiation emitted from thallium irradiated by 19.2-Mev protons and from lead, irradiated by 14.7-Mev neutrons, and to prove that this radiation must be ascribed to the isomer Pb^{205m}. The experimental method is described in an earlier paper (Ref.5). From a multiple of measurements the energy of this short-period radiation could be determined as (0.97 ± 0.01)Mev; however, in the spectrum of this radiation also lines with 0.73 ± 0.01 and (0.27 ± 0.02)Mev may be observed. Investigation is rendered more difficult because of the considerable background. The half-life of the radiation with 0.97 Mev could be determined as (5.2 ± 0.3)msec, and it was shown that this isomeric radiation occurs in the reaction of Tl^{205} with

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protons. The minimum proton energy at which it occurs was determined as (7.7 ± 0.4)Mev. The data obtained can be explained only by assuming that the isomer is formed according to the reaction $Tl^{205}(p,n)Pb^{205m}$. With a 32.3 mg/cm^2 thick thallium target, the cross section of the reaction was determined as $\sigma_m = (20 \pm 4)$mb for an energy of 19.2 Mev. Further investigations of the short-period radiation were made by bombarding lead by 14.7-Mev protons; in these experiments, the half-life of radiation was determined as (5.0 ± 0.2)msec, the maximum intensity corresponded to an energy of (0.94 ± 0.02)Mev. Further investigations showed that this reaction was $Pb^{206}(n,2n)Pb^{205m}$; its cross section was determined as $\sigma_m = (1.1 \pm 0.2)$b. The results are compared with those obtained by other authors and are discussed. The authors thank A. P. Klyucharev for his interest and the accelerator team of the FTI AN USSR (Institute of Physics and Technology AS UkrSSR) as well as M. V. Nikishova for experimental help. There are 1 table and 7 references: 4 Soviet, 2 US, and 1 Dutch.

Reactions Leading to the Formation of the Isomer Pb^{205m}

S/056/60/039/006/026/063
B006/B056

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

SUBMITTED: July 29, 1960

Card 3/3

MOROZOV, A. M., CAND PHYS-MATH SCI, "SHORT-PERIOD ISOMERS PRODUCED AS A RESULT OF NUCLEAR REACTIONS WITH PROTONS HAVING AN ENERGY OF 19.2 MEV." MOSCOW, 1961. (MIN OF HIGHER AND SEC SPEC ED RSFSR, MOSCOW ENG-PHYS INST). (KL, 3-61, 204).

MOROZOV, A.M.

Investigating the short-period isomer activities produced by irradiation of Ga, Ge, and As nuclei with 19.2 Mev. protons. Zhur. eksp. i teor. fiz. 40 no.1:101-104 Ja '61. (MIRA 14:6)

1. Institut khimicheskoy fiziki AN SSSR.
(Protons) (Metals, Effect of radiation on)

LEPSVERIDZE, D.S.; MOROZOV, A.M.

Attachment to a 25-I oscillograph for recording sets of characteristics of semiconductor triodes and diodes. Trudy Vych.tsentra AN Gruz.SSR 2:345-351 '62. (MIRA 16:1)
(Oscillograph) (Electron tubes)

AUTH: Rozovskiy, M. I., Rozovskiy, V. V.

TITLE: [illegible]

SOURCE: [illegible]

ABSTRACT: [illegible]

IDENTIFICATION: [illegible]

Card 1/2

TiO_2	0,16±0,01 0,30±0,01	1,0±0,1	60±15	0,2	$_{22}Ti^{46}(p,n)V^{46m}$
$SrCO_3$	0,25±0,01 0,38±0,01	14,5±0,7	8±0,8	0,3	$_{38}Sr^{88}(p,n)Y^{88m}$
Y_2O_3	0,24±0,01 0,45±0,01	13,5±0,5	—	—	$_{39}Y^{89}(p,pn)Y^{88m}$
Zr	0,26±0,01	10,0±1,0	60±10	0,5	$_{40}Zr^{90}(p,n)Nb^{90m}$
Ta	0,24±0,01[4] 0,37±0,01[4]	5,5±0,3[4]	$\geq 20\frac{h}{min}$	≤ 1	$_{73}Ta^{181}(p,2n)W^{180m}$
HgO	0,37±0,01 0,60±0,01	20,0±1,5 1,5±0,1	— —	1 0,6	—
Pb	0,08±0,01 0,01±0,01	2,5±0,1	—	0,6*	$_{82}Pb^{206}(p,n)Bi^{206m}$
Bi	0,09±0,01 0,03±0,01	2,0±0,1	—	0,082*	$_{83}Bi^{209}(p,pn)Bi^{208m}$

S/051/63/014/002/026/026
E039/E120

AUTHORS: Maksakov, B.I., Morozov, A.M., and Romanova, N.G.

TITLE: Absorption and luminescence spectra of single crystals of lead molybdate

PERIODICAL: Optika i spektroskopiya, v.14, no.2, 1963, 312-315

TEXT: Single crystals of $PbMoO_4$ are grown from a melt. Two types are obtained: transparent slightly yellow discs, and dark yellow rods. Both types are transparent in the ultraviolet, visible and infrared, and luminesce in the visible and near infrared. In the long wavelength region beginning at 500 mμ the absorption of all the crystals is small and maintains an approximately constant value. The absorption edge for the disc occurs at 3800 Å and for the rod at 3900 Å (both samples 1 mm thick). The dark yellow type has an additional absorption band with a maximum at 4180 Å. Samples 0.19 mm thick do not give qualitatively different results. Luminescence is excited by λ = 365 mμ at the temperature of liquid nitrogen but not at room temperature. Maximum luminescence occurs in the yellow-green 5300-5400 Å and there is some absorption of the short wave part of the luminescence in samples from the rod.

The additional absorption band in these samples is not connected with the centres of luminescence. For all samples the lifetime of the excited state is 10^{-5} sec and there is no significant difference in their infrared absorption. All the crystals absorb weakly up to 5.5 μ with a strong absorption band at 6.3 μ. For wavelengths greater than 10.5 μ the samples are fully opaque. Single crystals of $PbMoO_4$ show 70-75% transmission over the range 0.5 to 5.5 μ for 1 mm thick samples. Such transparency coupled with a high refractive index makes $PbMoO_4$ a good optical material in the visible and infrared.
There are 2 figures.

SUBMITTED: August 20, 1962

L 63667-65

ACCESSION NR: AR5003341 S/0271/64/000/011/A043/A043

62-51519.25

SOURCE: Ref. zh. Avtomatika, telemekhanika i vychislitel'naya tekhnika. Svodnyy tom, Abs. 11A253

AUTHOR: Krikheli, I. M.; Morozov, A. M.

TITLE: Development of electronic devices for simulating statistical automatic-control problems

CITED SOURCE: Tr. Golovn. n.-i. in-ta avtomatiz. proizv. protsessov v prom-sti, vyp. 2, 1963, 51-74

TOPIC TAGS: automatic control simulation, random number generator, random process generator

TRANSLATION: Some peculiarities of the method of statistical simulation of random physical processes are noted. The method provides for some prerequisites for utilizing the complete information contained in multivariable distribution functions. From this viewpoint, it is essential that the Monte-Carlo method is used not for obtaining a numerical-solution algorithm but rather for reproducing

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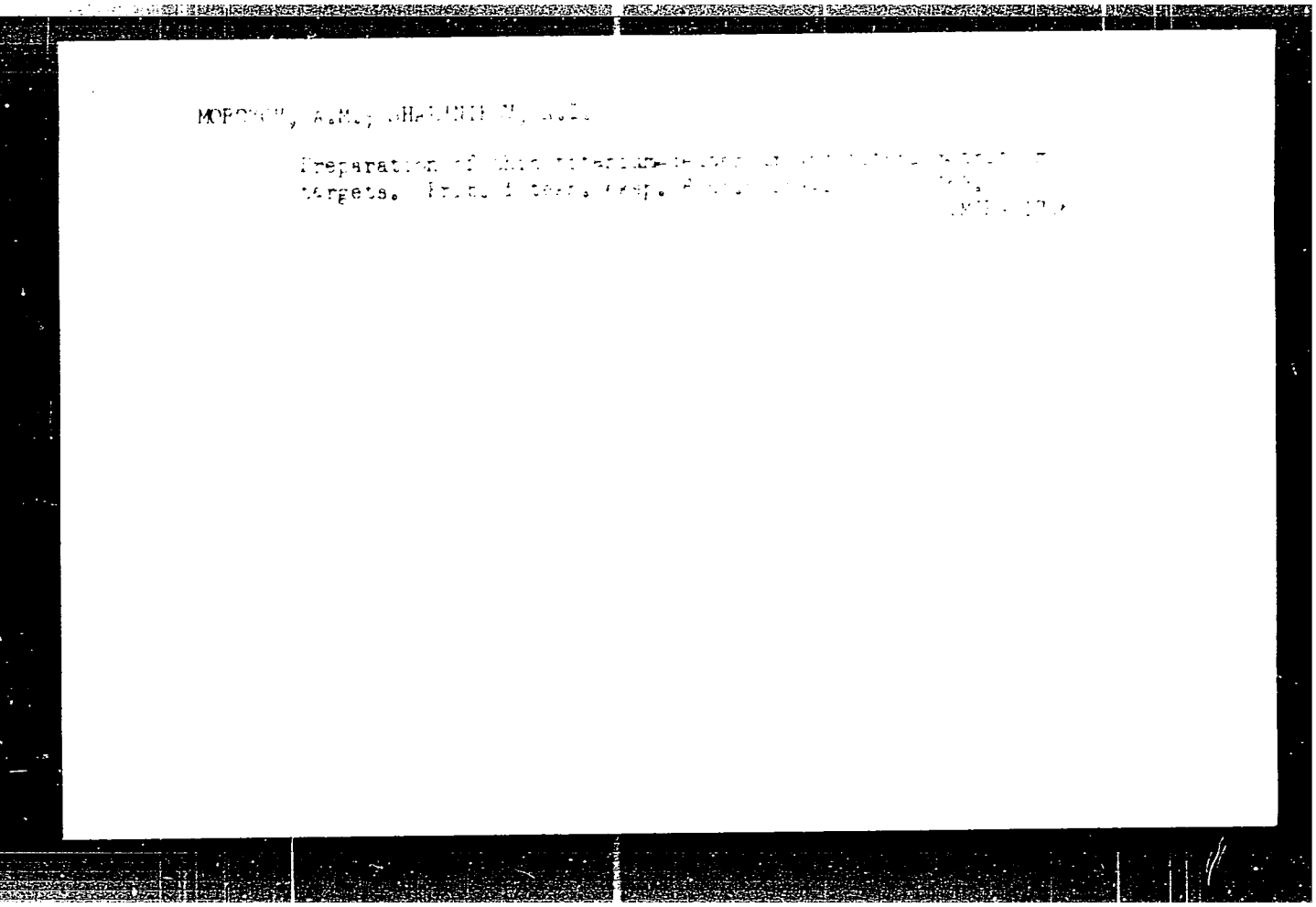
L 63667-65

ACCESSION NR: AR5003341

a model of the real process defined by a set of multivariable distribution functions or by other statistical characteristics. As a rule, the existing methods of statistical analysis and synthesis of automatic control systems are restricted to correlation approximations, which is inacceptable for those automatic control systems in which probabilistic distributions essentially differ from Gaussian. Adoption of the statistical-simulation methods requires a set of electronic devices for reproducing random processes, for measuring and evaluating the process parameters. Despite an intensive development of such devices, the industry has not yet started their manufacture. The results are reported of a development of the electronic devices for reproducing random quantities continuously or discretely; the devices are intended for simulating random processes according to a specified correlation function. The principles are described of synthesizing random-number generators and random-process generators intended for operation in conjunction with digital and analog computers. The description and circuit diagrams are presented of laboratory models of random-process pulse generators and normal random binary-code generators intended for a specialized digital computer. Twelve illustrations. Bibliography: 31 titles.

SUB CODE: DP, EC ENCL: 00

Card 2/2



L 18315-65 EWT(l)/EEC(b)-2 EJP(c)/ASD(a)-5/ESD(ga)
ACCESSION NR: AP5000548 S/0051/64/017/006/0887/0892

AUTHOR: Karlas, Ya. P.; Morozov, A. M.; Feofilov, P. P.

TITLE: Luminescence of Nd^{3+} in $CaWO_4$

SOURCE: Optika i spektroskopiya, v. 17, no. 6, 1964, 887-892

TOPIC TAGS: crystal luminescence spectrum, crystal absorption spectrum, activated crystal

ABSTRACT: The absorption and luminescence spectra of single $CaWO_4$ crystals activated with Nd^{3+} ions were investigated in the near infrared region at temperatures of 300, 77, and 4.2K. The neodymium concentration in crystals was 0.1 to 0.5 mol%. Na^+ ions were added to compensate for the excess charge of Nd^{3+}. For comparison, some specimens were grown without adding Na. A diagram for term levels was obtained for all intense lines observed in absorption and luminescence spectra. There are relatively weak lines whose intensity changes for different specimens. Especially strong changes in lines were observed for specimens in which Na was not used to compensate for the excess charge. The results show that the absorption and

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L 18315-65
ACCESSION NR: AP5000548

Luminescence spectra of Nd^{3+} ions in $CaWO_4$ are very similar in structure to $PbMoO_4—Nd^{3+}$ spectra because of the similarity of the crystalline structures of the bases. Splitting is maximum for the $^4I_{9/2}$ (about 470 cm^{-1}) and $^4I_{15/2}$ (about 530 cm^{-1}) terms, and considerably smaller for the terms $^4I_{11/2}$ (about 250 cm^{-1}) and $^4I_{13/2}$ (about 275 cm^{-1}). The number of experimentally observed components of splitting terms of the ^4I multiplet is close to the theoretically expected number or coincides with it (for $^4I_{9/2}$ and $^4I_{13/2}$). The luminescence attenuates exponentially with a single value for the time constant τ equal to (1.7—1.8) x 10^{-4} sec at 300K and (1.9 to 2.0) x 10^{-4} sec at 77K. These values exceed the value of τ for $PbMoO_4—Nd$, but are considerably lower than in the case of CaF_2 and SrF_2 luminescence. In the 0.9 and 1.06-μ regions, the luminescence was investigated in polarized light. The character of the spatial distribution of this radiation shows that, as in the case of $PbMoO_4—Nd$, it is forced electric dipole radiation. Orig. art. has: 6 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 06Jan64 ENCL: 00 SUB CODE: SS, OP

NO REF SOV: 004 OTHER: 002 ATD PRESS: 3155

Card 2/2

KARISS, Ya.E.; MOROZOV, A.M.; FEOFILOV, P.P.

Luminescence of Nd^{3+} in $CaWO_4$. Opt. i spektr. 17 no.6, 887-892 D '64. (MIRA 18:3)

ACC NR: AT6026764 SOURCE CODE: UR/2774/65/006/001/0042/0058

AUTHOR: Kipshidze, Z. Sh.; Morozov, A. M.

ORG: none

TITLE: An analog computer adaptor unit for determining the autocorrelation and crosscorrelation functions

SOURCE: AN GruzSSR. Vychislitel'nyy tsentr. Trudy, v. 6, no. 1, 1965. Modeliruyushchiy agregat regulirovaniya i spetsializirovannyye vychislitel'nyye ustroystva (Analog simulators and specialized computers), 42-58

TOPIC TAGS: correlation function, special purpose computer, computer component, analog computer, discrete automaton

ABSTRACT: An adaptor unit is described for a special purpose analog computer for calculating the auto- and the crosscorrelation functions of random input signals. It contains a calibrating cathode follower, three tube-capacitor memory cells, a monostable multivibrator, and a pulse shaper circuit. The correlator multiplier and integrator blocks are not part of the adaptor unit. The cathode follower is used for checking the linearity of the memory cells. The monostable multivibrator delay time may be varied from 5 to 550msec in 5msec steps. The correlator unit may accept input signals which are bandlimited to 800cps. Its minimum and maximum correlation times

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ACC NR: AT6026764

are 5msec and 0.55sec, respectively. It operates in the discrete mode utilizing the signal-sampling technique. The error analysis for both the auto- and the crosscorrelation mode of operation is given. The errors depend on the number of samples, duration between samples, and the total integration time. Orig. art. has: 41 formulas, 4 tables, and 4 figures.

SUB CODE: 09/ SUBM DATE: none/ ORIG REF: 006

Card 2/2

KURKIN, I.N.; SHEKUN, L.Ya.; Prinimal uchastiye: MOROZOV, A.M.

Electron paramagnetic resonance spectrum of Yb^{3+} ions in synthetic $PbMoO_4$ single crystals. Opt. i spektr. 18 no.4:738-740 Ap '65. (MIRA 18:8)

L 50524-65 EWT(1)/EWT(m)/EPF(c)/EEC(t)/T/EWP(t)/EWP(b)/EWA(c) P1-4
IJP(c) JD/JG/GG/WW

ACCESSION NR: AP5010157 UR/0020/65/161/002/0322/0323

AUTHOR: Kurkin, I. N.; Morozov, A. M.; Shekun, L. Ya.

TITLE: Paramagnetic resonance of cerium in single-crystal $PbMoO_4$

SOURCE: AN SSSR. Doklady, v. 161, no. 2, 1965, 322-323

TOPIC TAGS: electron paramagnetic resonance, cerium, lead molybdate, single crystal, rare earth element

ABSTRACT: Results are presented of an investigation of electron paramagnetic resonance of the simplest of the rare-earth ions (Ce^{3+}, $4f^1$, $^2F_{1/2}$) in a single crystal of $PbMoO_4$ (scheelite structure). The measurements were made with a sample drawn from a melt and containing nominally 0.3 mol.% of Ce^{3+} and Yb^{3+} each, introduced into the melt in the form of CeO_2 and Yb_2O_3. The excess charge was compensated with a suitable amount of Na_2MoO_4. In spite of the fact that the sample was far from perfect, the magnetic resonance of Ce^{3+} and Yb^{3+} was reliably observed at 4.2K, one intense line belonging to Ce^{3+}, indicating that only one of the doublets is populated at 4.2K. The parallel and perpendicular g-factors were found to be

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L 50524-65 2

ACCESSION NR: AP5010157

2.684 ± 0.005 and 1.514 ± 0.015, respectively. This is within 4% of the values obtained if it is assumed that the wave function of the principal doublet is transformed in accordance with the irreducible representation Γ_{17}. Certain data derived on the quality of the investigated crystals and on the character of their imperfections, based on the EPR results, are summarized. "The authors thank P. P. Feofilov for interest in the work." This report was presented by Ye. K. Zavoyskiy. Orig. art. has: 4 formulas.

ASSOCIATION: Kazanskiy gosudarstvennyy universitet im. V. I. Ul'yanova-Lenina (Kazan' State University)

SUBMITTED: 05Oct64 ENCL: 00 SUB CODE: SS, NP

NR REF SOV: 000 OTHER: 002

Card 2/2

L 34416-66 EWT(l)/EWT(m)/T/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6015441 SOURCE CODE: UR/0051/66/020/005/0918/0920

AUTHOR: Bakhshiyeva, G. F.; Karapetyan, V. Ye.; Morozov, A. M.

ORG: none

TITLE: Optical characteristics of lanthanum sodium molybdate single crystals

SOURCE: Optika i spektroskopiya, v. 20, no. 5, 1966, 918-920

TOPIC TAGS: molybdate, lanthanum compound, sodium compound, refractive index, crystal optic property

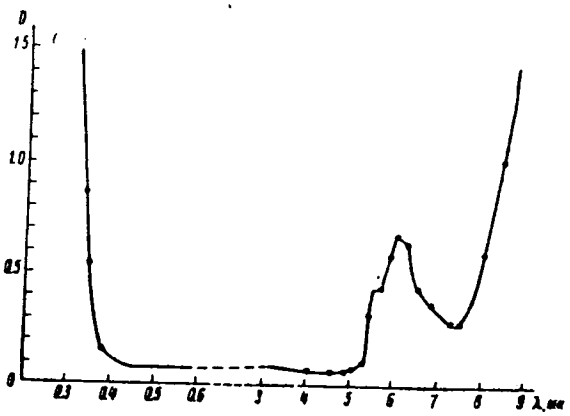
ABSTRACT: Large single crystals of $LaNa(MoO_4)_2$ whose C axis was parallel to the axis of growth were grown on a seed by pulling from the melt, and their absorption spectra and refractive indices were measured. The absorption spectrum of an $LaNa(MoO_4)_2$ crystal taken with SF-4 and IKS-14 spectrophotometers is shown in the figure. It is noted that the absorption spectra are typical of all crystals having a scheelite structure. Refractive index measurements showed that the light ray is "fractionated" on passing through an $LaNa(MoO_4)_2$ prism, apparently because the lattice of this binary molybdate is highly disordered. This factor is also thought to cause the relatively broad luminescence lines of Nd^{3+} in $LaNa(MoO_4)_2$ and the broad ESR lines of this compound reported by other authors. Authors express their deep appreciation to A. I. Stozharov and P. P. Feofilov for their steady interest and helpful discussions, and

Card 1/2 UDC: 535.321 + 535.341:548.0

L 34416-66

ACC NR: AP6015441

tc Ye. M. Sychev and I. A. Shubo for assistance in the work. Orig. art. has: 1 figure and 1 table.



SUB CODE: 20/ SUBM DATE: 18Oct65/ ORIG REF: 003/ OTH REF: 006

Card 2/2 BLG

ACC NR: AP7000026 SOURCE CODE: UR/0051/66/0[illegible]/0564/0573

AUTHOR: Morozov, A. M.; Reut, Ye. G.; Ryskin, A. I.

ORG: none

TITLE: Luminescence, absorption, and level scheme of the Pr^{3+} ion in single crystals of lead molybdate

SOURCE: Optika i spektroskopiya, v. 21, no. 5, 1966, 564-573

TOPIC TAGS: lead compound, luminescence spectrum, absorption spectrum, color center, crystal symmetry

ABSTRACT: The purpose of the investigation was to establish the type of centers and the nature of symmetry of rare-earth ions in crystals of the scheelite type, particularly for ions such as Pr^{3+} for which electron paramagnetic resonance is not observed. The tests were made on $PbMoO_4$ and $CaWO_4$ with Pr^{3+} content [illegible] - 4.0 mol.%, grown by the Czochralski method from a stoichiometric oxide mixture. The absorption and luminescence spectra were investigated in the range from 25 000 to [illegible] 000 cm^{-1}. The measurements were made on the crystals with 0.5% Pr concentration. The phenomenological procedure used to determine the level symmetry and the level splitting is described. The results show that the Pr^{3+} ion in crystals of the scheelite type can be situated in a tetragonal field with mirror-rotation fourfold axes, and that the impurity ions or defects that realize the charge compensation do not eliminate this axis. On the basis of the experiments, it is deduced that the most likely model

Card 1/2 UDC: 535.37: 548.0

ACC NR: AP7000026

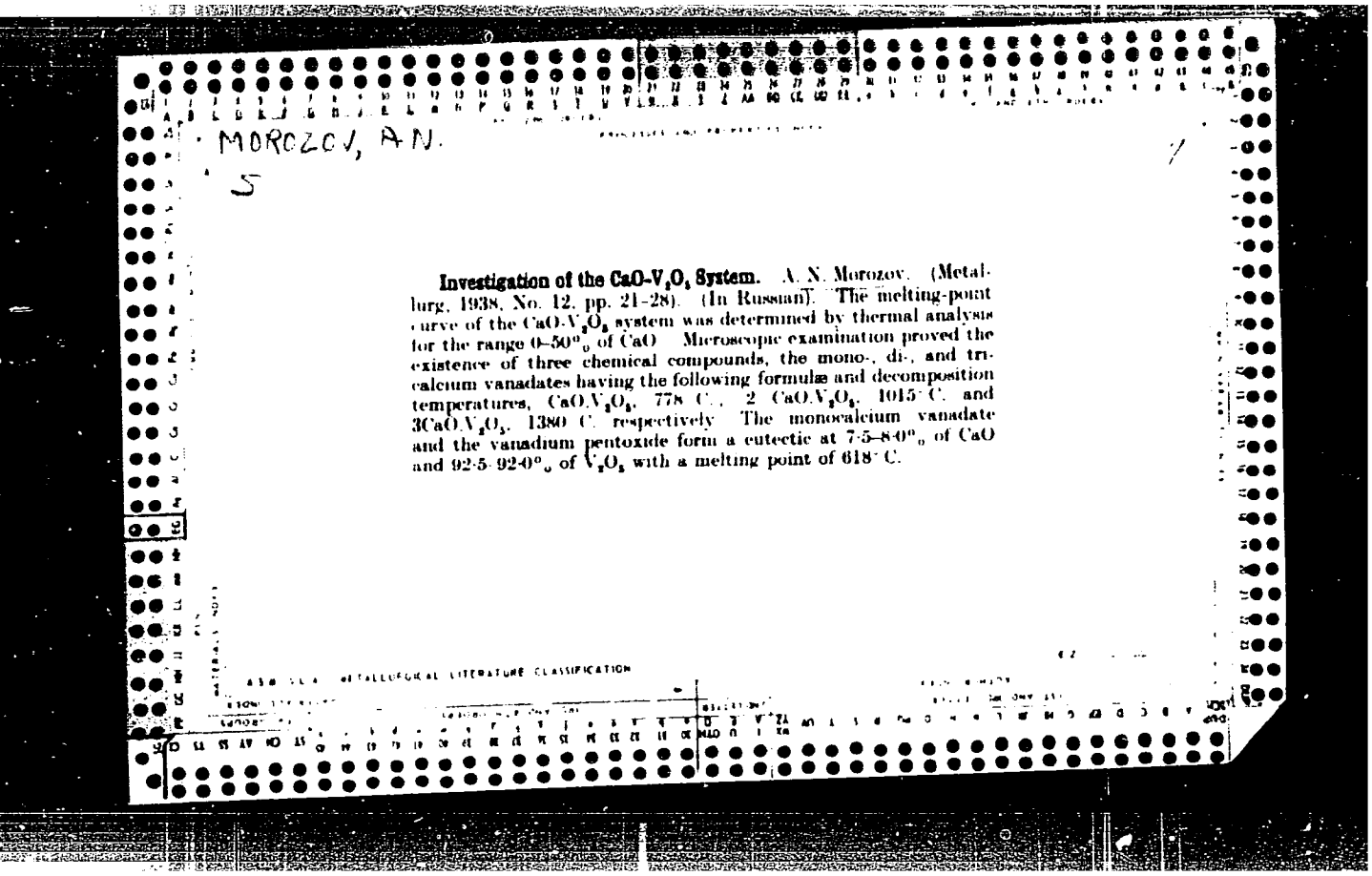
tetragonal center in scheelite is one in which the Pr^{3+} replaces a Pb^{2+} ion and is sufficiently screened from the action of the compensating charge. The presence of a number of weak lines in the spectrum demonstrates that this is not the only type of center present in the scheelite. The parameters of the crystalline field are determined. The authors thank M. N. Tolstoy for photographing part of the spectra in the infrared region, B. P. Zakharchenya and L. M. Kanskaya for supplying the apparatus for the Zeeman-effect investigation and help in the work, P. P. Feofilov for interest in the work and useful discussions, and Graduate Student of the Kazan' State University for participating in earlier stages of the experiment. Orig. art. has: 3 figures, 3 formulas, and 3 tables.

SUB CODE: 20/ SUBM DATE: 02Jul65/ ORIG REF: 007/ OTH REF: 007

Card 2/2

OSTER-VOLKOV, Nikolay Nikolayevich; RIZAYEV, N.U., kand. tekhn. nauk, retsenzent; MAKSUDOV, Yu.M., kand. tekhn. nauk, retsenzent; MOROZOV, A.M., kand.tekhn. nauk, retsenzent; BYCHEROVA, A., red.

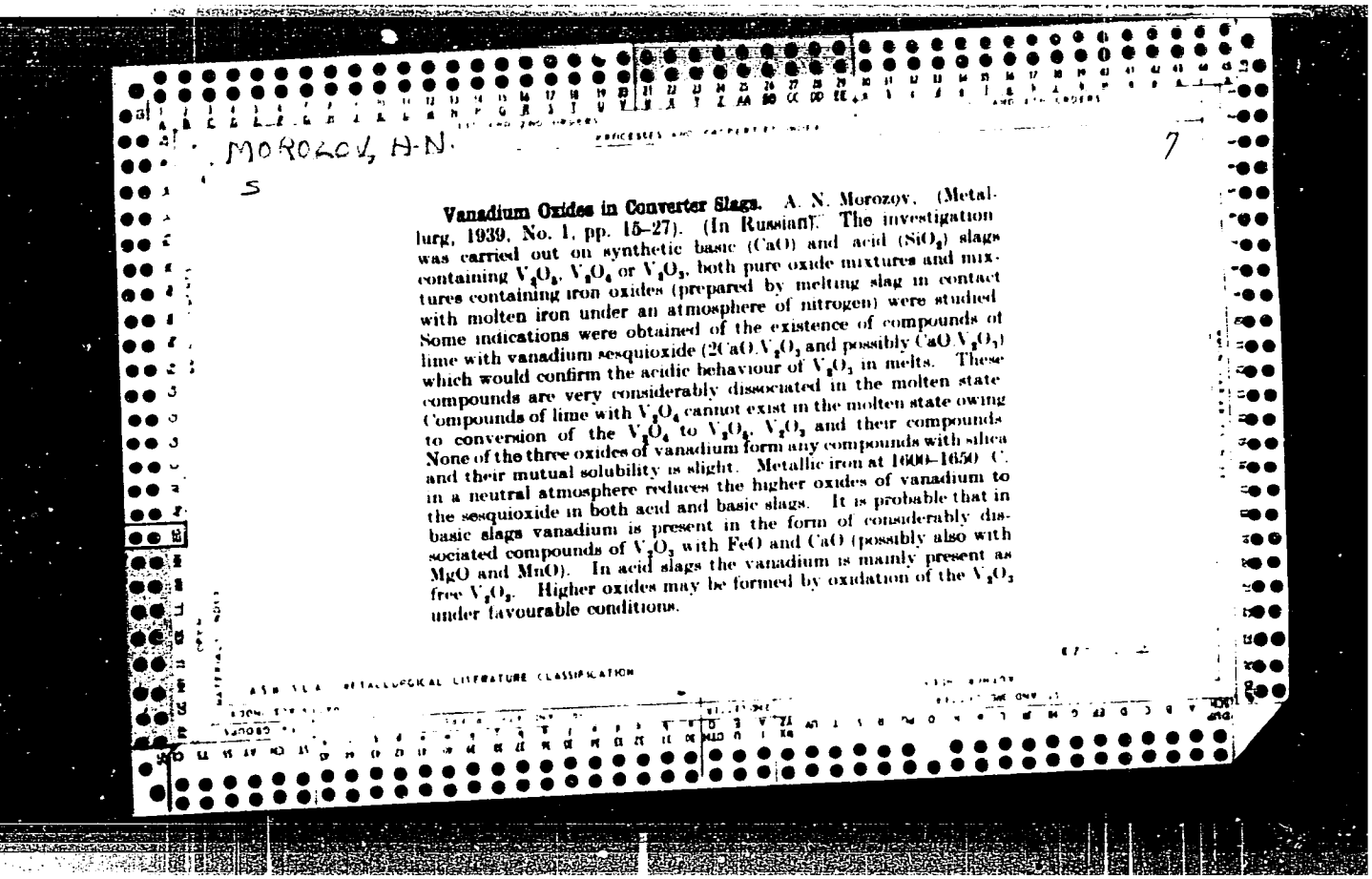
[New synthetic materials based on furan compounds] Novye sinteticheskie materialy na osnove furanovykh soedinenii. Tashkent, Gos.izdat UzSSR, 1963. 45 p. (MIRA 17:11)



MOROZOV, A.N.

5

Investigation of the CaO-V_2O_5 System. A. N. Morozov. (Metallurg, 1938, No. 12, pp. 21–28). (In Russian). The melting-point curve of the CaO-V_2O_5 system was determined by thermal analysis for the range 0–50% of CaO. Microscopic examination proved the existence of three chemical compounds, the mono-, di-, and tri-calcium vanadates having the following formulæ and decomposition temperatures, $CaO.V_2O_5$, 778° C.; $2\ CaO.V_2O_5$, 1015° C. and $3CaO.V_2O_5$, 1380° C. respectively. The monocalcium vanadate and the vanadium pentoxide form a eutectic at 7·5–8·0% of CaO and 92·5–92·0% of V_2O_5 with a melting point of 618° C.

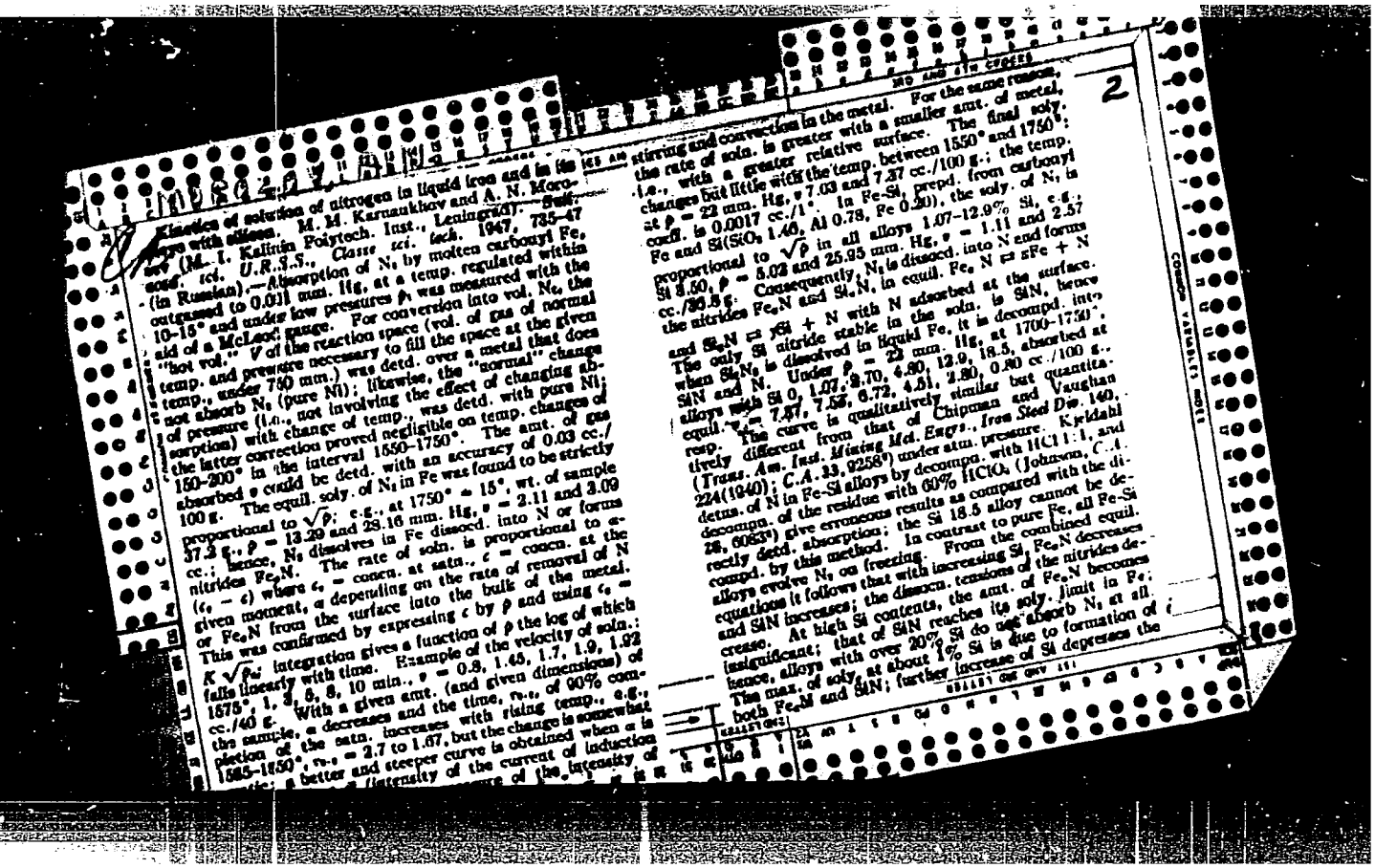


MOROZOV, A-N.

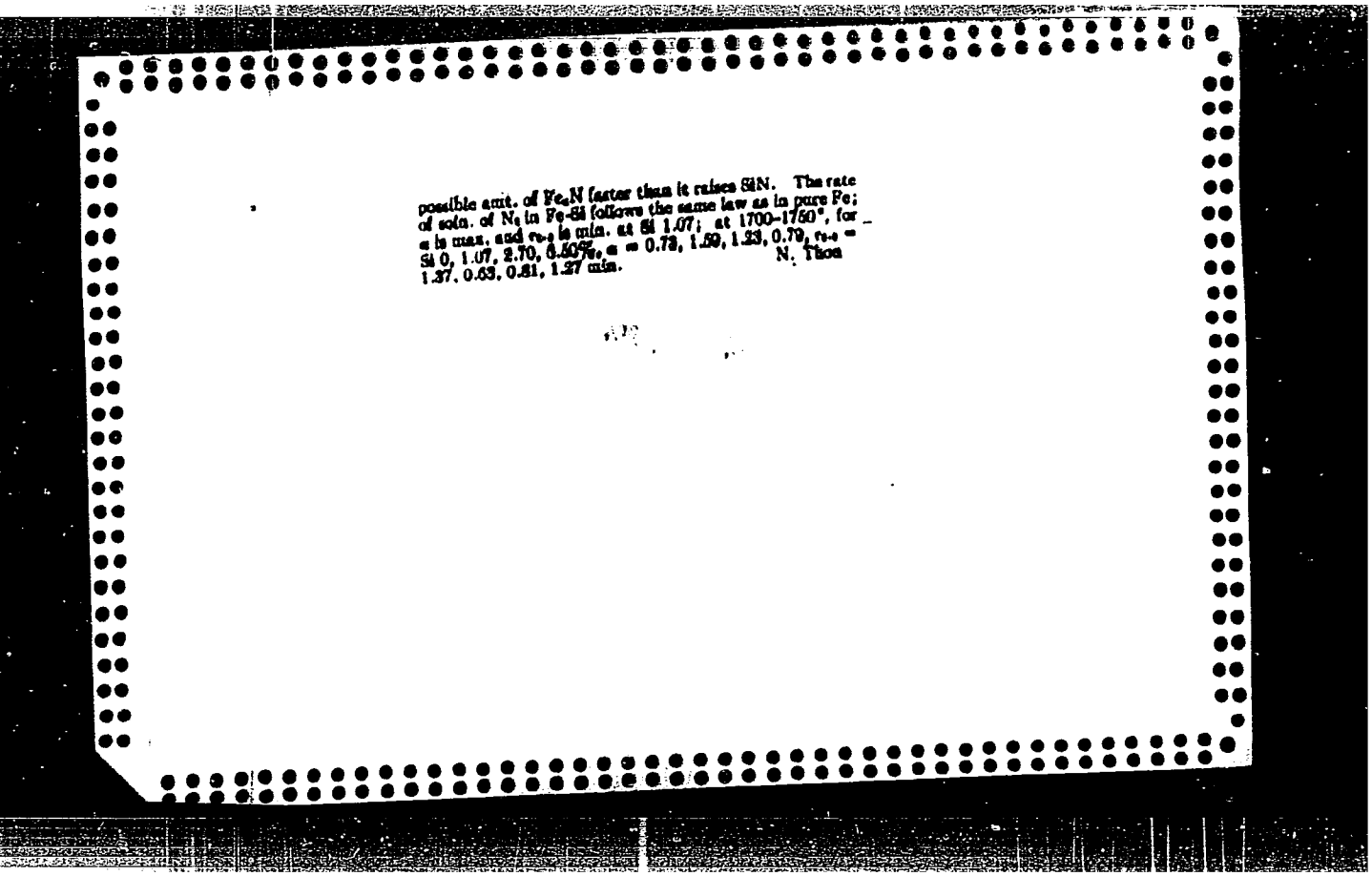
7

Vanadium Oxides in Converter Slags. A. N. Morozov. (Metallurg, 1939, No. 1, pp. 15–27). (In Russian). The investigation was carried out on synthetic basic (CaO) and acid (SiO_2) slags containing V_2O_3, V_2O_4 or V_2O_5, both pure oxide mixtures and mixtures containing iron oxides (prepared by melting slag in contact with molten iron under an atmosphere of nitrogen) were studied. Some indications were obtained of the existence of compounds of lime with vanadium sesquioxide ($2CaO.V_2O_3$ and possibly $CaO.V_2O_3$) which would confirm the acidic behaviour of V_2O_3 in melts. These compounds are very considerably dissociated in the molten state. Compounds of lime with V_2O_4 cannot exist in the molten state owing to conversion of the V_2O_4 to V_2O_5, V_2O_3 and their compounds. None of the three oxides of vanadium form any compounds with silica and their mutual solubility is slight. Metallic iron at 1600–1650° C. in a neutral atmosphere reduces the higher oxides of vanadium to the sesquioxide in both acid and basic slags. It is probable that in basic slags vanadium is present in the form of considerably dissociated compounds of V_2O_3 with FeO and CaO (possibly also with MgO and MnO). In acid slags the vanadium is mainly present as free V_2O_3. Higher oxides may be formed by oxidation of the V_2O_3 under favourable conditions.

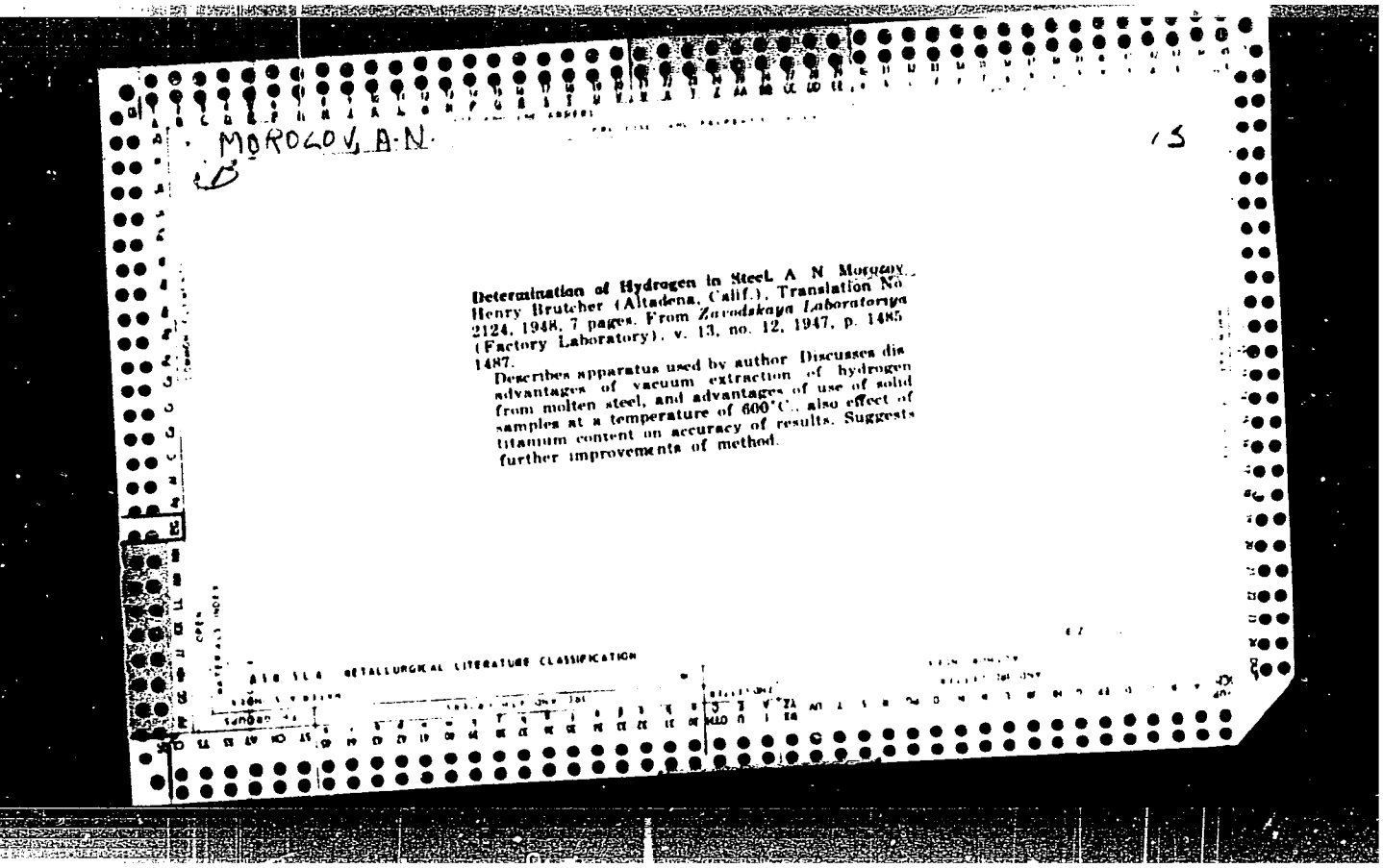
ASM-WSA METALLURGICAL LITERATURE CLASSIFICATION



Kinetics of solution of nitrogen in liquid iron and in its alloys with silicon. M. M. Karnaukhov and A. N. Morozov (M. I. Kalinin Polytech. Inst., Leningrad). *Izvest. Akad. Nauk U.R.S.S., Classe Sci. tech.* 1947, 735–47 (in Russian).—Absorption of N_2 by molten carbonyl Fe, outgassed to 0.001 mm. Hg, at a temp. regulated within 10–15° and under low pressures p, was measured with the aid of a McLeod gauge. For conversion into vol. N_2, the "hot vol." V of the reaction space (vol. of gas of normal temp. and pressure necessary to fill the space at the given temp., under 760 mm.) was detd. over a metal that does not absorb N_2 (pure Ni); likewise, the "normal" change of pressure (i.e., not involving the effect of changing absorption) with change of temp., was detd. with pure Ni; the latter correction proved negligible on temp. changes of 150–200° in the interval 1550–1750°. The amt. of gas absorbed q could be detd. with an accuracy of 0.03 cc./100 g. The equil. soly. of N_2 in Fe was found to be strictly proportional to $\sqrt{p}$; e.g., at 1750° = 15°, wt. of sample 37.2 g., p = 13.29 and 28.16 mm. Hg, q = 2.11 and 3.09 cc.; hence, N_2 dissolves in Fe dissocd. into N or forms nitrides Fe_4N. The rate of soln. is proportional to $(c_e - c)$ where c_e = concn. at satn., c = concn. at the given moment, α depending on the rate of removal of N or Fe_4N from the surface into the bulk of the metal. This was confirmed by expressing c by p and using c_e = $K\sqrt{p_e}$; integration gives a function of p the log of which falls linearly with time. Example of the velocity of soln.: 1575°, 1, 3, 6, 8, 10 min., p = 0.8, 1.45, 1.7, 1.9, 1.92 cc./40 g. With a given amt. (and given dimensions) of the sample, α decreases and the time, $\tau_{0.5}$, of 90% completion of the satn. increases with rising temp., e.g., 1585–1850°, $\tau_{0.5}$ = 2.7 to 1.07, but the change is somewhat better and steeper curve is obtained when α is [illegible] intensity of the current of induction [illegible] of the intensity of stirring and convection in the metal. For the same reason, the rate of soln. is greater with a smaller amt. of metal, i.e., with a greater relative surface. The final soly. changes but little with the temp. between 1550° and 1750°; at p = 22 mm. Hg, q 7.03 and 7.37 cc./100 g.; the temp. coeff. is 0.0017 cc./1°. In Fe-Si, prepd. from carbonyl Fe and Si(SiO_2 1.40, Al 0.78, Fe 0.20), the soly. of N_2 is proportional to $\sqrt{p}$ in all alloys 1.07–12.9% Si, e.g., Si 8.50, p = 5.03 and 25.95 mm. Hg, q = 1.11 and 2.57 cc./35.5 g. Consequently, N_2 is dissocd. into N and forms the nitrides Fe_4N and Si_3N_4 in equil. $Fe_4N \rightleftarrows xFe + N$ and $Si_3N_4 \rightleftarrows ySi + N$ with N adsorbed at the surface. The only Si nitride stable in the soln. is SiN, hence when Si_3N_4 is dissolved in liquid Fe, it is decompd. into SiN and N. Under p = 22 mm. Hg, at 1700–1750°, alloys with Si 0, 1.07, 3.70, 4.80, 12.9, 18.5, absorbed at equil. q = 7.37, 7.55, 6.72, 4.81, 2.80, 0.80 cc./100 g., resp. The curve is qualitatively similar but quantitatively different from that of Chipman and Vaughan (*Trans. Am. Inst. Mining Met. Engrs., Iron Steel Div.* 140, 224(1940); *C.A.* 33, 9258[9]) under atm. pressure. Kjeldahl detns. of N in Fe-Si alloys by decompn. with HCl 1:1, and decompn. of the residue with 60% $HClO_4$ (Johnson, *C.A.* 28, 6083[3]) give erroneous results as compared with the directly detd. absorption; the Si 18.5 alloy cannot be decompd. by this method. In contrast to pure Fe, all Fe-Si alloys evolve N_2 on freezing. From the combined equil. equations it follows that with increasing Si, Fe_4N decreases and SiN increases; the dissocn. tensions of the nitrides decrease. At high Si contents, the amt. of SiN reaches its insignificant; that of SiN becomes hence, alloys with over 20% Si do not absorb N_2 at all. The max. of soly. at about 1% Si is due to formation of both Fe_4N and SiN; further increase of Si depresses the



possible amt. of Fe_4N faster than it raises SiN. The rate of soln. of N_2 in Fe-Si follows the same law as in pure Fe; a is max. and r_{e-s} is min. at Si 1.07; at 1700–1750°, for Si 0, 1.07, 2.70, 6.50%, a = 0.73, 1.59, 1.23, 0.79, r_{e-s} = 1.37, 0.63, 0.81, 1.27 min. N. Thos



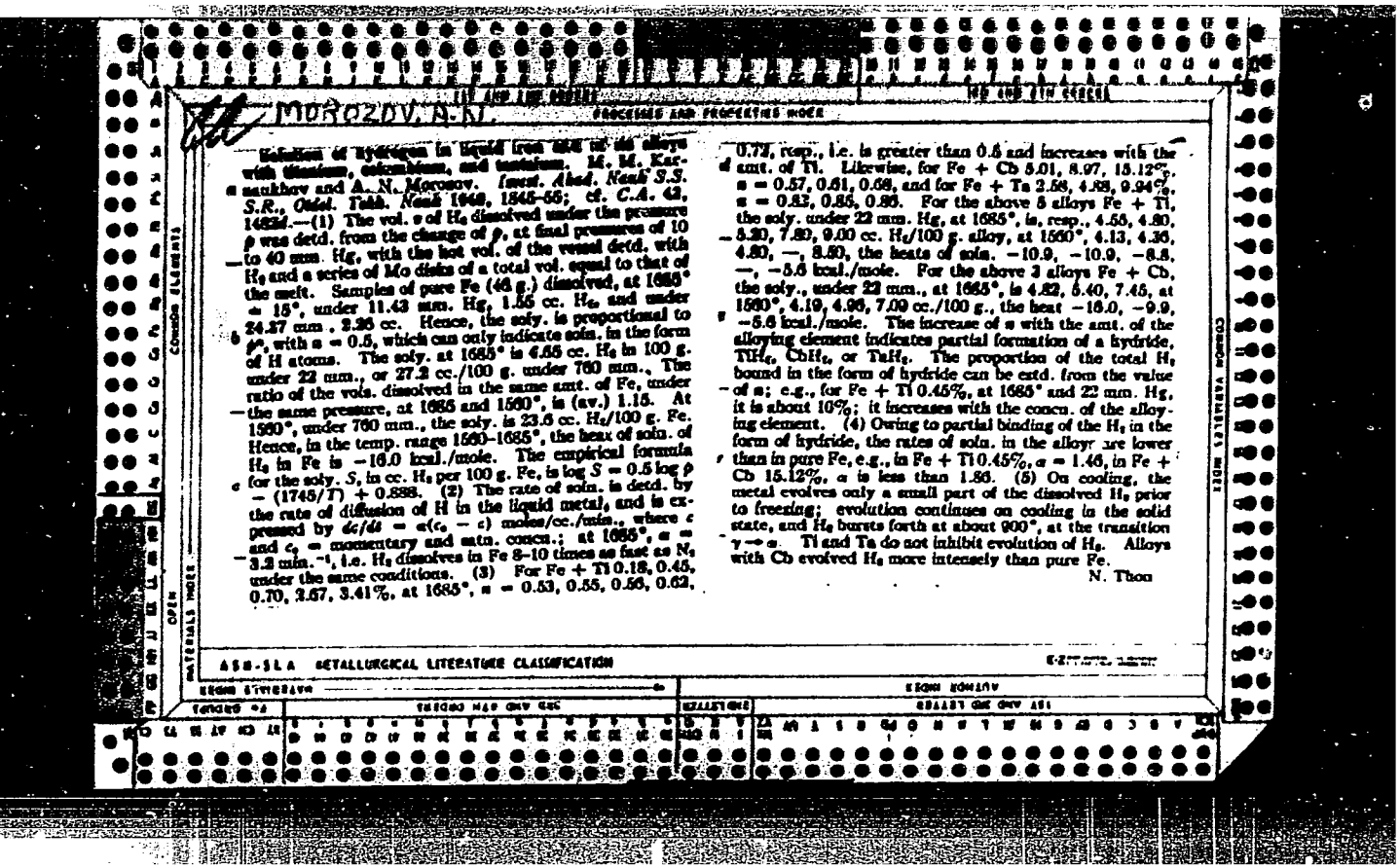
MOROZOV, A.N.

15

Determination of Hydrogen in Steel. A N Morozov. Henry Brutcher (Altadena, Calif.). Translation No 2124, 1948, 7 pages. From *Zavodskaya Laboratoriya* (Factory Laboratory), v. 13, no. 12, 1947, p. 1485-1487.

Describes apparatus used by author. Discusses disadvantages of vacuum extraction of hydrogen from molten steel, and advantages of use of solid samples at a temperature of 600°C., also effect of titanium content on accuracy of results. Suggests further improvements of method.

A1B 1L4 METALLURGICAL LITERATURE CLASSIFICATION



MOROZOV, A. N.

Solution of hydrogen in liquid iron and its alloys with titanium, columbium, and tantalum. M. M. Karnaukhov and A. N. Morozov. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1948, 1845–55; cf. *C.A.* 42, 1482d.—(1) The vol. v of H_2 dissolved under the pressure p was detd. from the change of p, at final pressures of 10 to 40 mm. Hg, with the hot vol. of the vessel detd. with H_2 and a series of Mo disks of a total vol. equal to that of the melt. Samples of pure Fe (46 g.) dissolved, at 1685° ± 15°, under 11.43 mm. Hg, 1.55 cc. H_2, and under 24.27 mm., 2.26 cc. Hence, the soly. is proportional to p^n, with $n = 0.5$, which can only indicate soln. in the form of H atoms. The soly. at 1685° is 6.55 cc. H_2 in 100 g. under 22 mm., or 27.2 cc./100 g. under 760 mm. The ratio of the vols. dissolved in the same amt. of Fe, under the same pressure, at 1685 and 1560°, is (av.) 1.15. At 1560°, under 760 mm., the soly. is 23.6 cc. H_2/100 g. Fe. Hence, in the temp. range 1560–1685°, the heat of soln. of H_2 in Fe is −16.0 kcal./mole. The empirical formula for the soly. S, in cc. H_2 per 100 g. Fe, is $\log S = 0.5 \log p - (1745/T) + 0.888$. (2) The rate of soln. is detd. by the rate of diffusion of H in the liquid metal, and is expressed by $dc/dt = \alpha(c_0 - c)$ moles/cc./min., where c and c_0 = momentary and satn. concn.; at 1685°, α = 3.2 min.$^{-1}$, i.e. H_2 dissolves in Fe 8–10 times as fast as N_2 under the same conditions. (3) For Fe + Ti 0.18, 0.45, 0.70, 2.67, 3.41%, at 1685°, n = 0.53, 0.55, 0.56, 0.62, 0.77, resp., i.e. is greater than 0.5 and increases with the amt. of Ti. Likewise, for Fe + Cb 5.01, 8.97, 15.12%, n = 0.57, 0.61, 0.68, and for Fe + Ta 2.58, 4.83, 9.94%, n = 0.52, 0.55, 0.56. For the above 5 alloys Fe + Ti, the soly. under 22 mm. Hg, at 1685°, is, resp., 4.55, 4.80, 5.20, 7.80, 9.00 cc. H_2/100 g. alloy, at 1560°, 4.13, 4.36, 4.80, —, 8.50, the heats of soln. −10.9, −10.9, −8.8, —, −5.6 kcal./mole. For the above 3 alloys Fe + Cb, the soly., under 22 mm., at 1685°, is 4.82, 5.40, 7.45, at 1560°, 4.19, 4.96, 7.09 cc./100 g., the heat −16.0, −9.9, −5.6 kcal./mole. The increase of n with the amt. of the alloying element indicates partial formation of a hydride, TiH_4, CbH_4, or TaH_4. The proportion of the total H_2 bound in the form of hydride can be estd. from the value of n; e.g., for Fe + Ti 0.45%, at 1685° and 22 mm. Hg, it is about 10%; it increases with the concn. of the alloying element. (4) Owing to partial binding of the H_2 in the form of hydride, the rates of soln. in the alloys are lower than in pure Fe, e.g., in Fe + Ti 0.45%, α = 1.46, in Fe + Cb 15.12%, α is less than 1.86. (5) On cooling, the metal evolves only a small part of the dissolved H_2 prior to freezing; evolution continues on cooling in the solid state, and H_2 bursts forth at about 900°, at the transition $\gamma \rightarrow \alpha$. Ti and Ta do not inhibit evolution of H_2. Alloys with Cb evolved H_2 more intensely than pure Fe.

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ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

MOROZOV, A. N.

Morozov, A. N. and Chuchmarev, S. K. - "The equilibrium between hydrogen and oxygen in melted iron," Sbornik nauch. -tekhn. rabot (Vsesoyuz. nauch. inzh.-tekhn. o-vo metallurgov, Leningr. otd-niya), Issue 1, 1949, p. 32-39, - Bibliog: 5 items

SO: U-5240, 17, Dec. 53, (Letopis 'Zhurnal 'nykh Statey, No. 25, 1949

MOROZOV, A. N.

PHASE X TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 440 - X
[Supercedes AID 440-1]

BOOK Call No.: TN731.M59

Author: MOROZOV, A. N.
Full Title: HYDROGEN AND NITROGEN IN STEEL
Transliterated Title: Vodorod i azot v stali

PUBLISHING DATA

Originating Agency: None
Publishing House: State Scientific and Technical Publishing House of Literature on Ferrous and Nonferrous Metallurgy
Date: 1950 No. pp.: 222 No. of copies: 4,000
Editorial Staff

The author expresses his thanks to M. M. Karnaukhov, Corresponding Member of the Academy of Sciences, D. N. Shoykhet and A. S. Andreyev.

PURPOSE AND EVALUATION: The book is intended for scientific personnel and engineers working in the field of metallurgy. It might be helpful to laboratory workers in metallurgical plants. The book is well written, the language is clear, and the information can be easily located. It contains useful data, particularly interesting because they refer chiefly to important modern Soviet investigations, which are frequently compared with those of American, English or German scientists. Many of the methods described are partly based on the author's own experience.

Vodorod i azot v stali AID 440 - X

TEXT DATA

Coverage: This book analyzes the theory of the interaction of hydrogen and nitrogen with solid and liquid steel and iron and its alloys. It deals chiefly with the less-investigated absorption processes, referring only briefly to adsorption phenomena which are well enough described in the extensive literature. The following problems are discussed in part I and II: solubility of gases, including measuring methods and instruments, giving the author's method and device (illus. 5, 6) for the analysis of the thermodynamics and kinetics of the processes of solution of gases in liquid metals; hydrogen solution in iron and iron alloys, with a description of the author's investigation (jointly with S. Chuchmarev) of the solubility of hydrogen in pure iron with oxygen content, and of the device used (illus. 31); separation of hydrogen from steel during the crystallization of the ingot, during the cooling phase, and at room temperature; the effect of the hydrogen content on the mechanical properties of iron and steel, as it causes decrease of plasticity, the formation of flakes and flaky fractures. Special attention is given to various smelting processes in basic and acid open-hearth furnaces, converters, and electric-arc and vacuum induction furnaces, and to their effect on the changes in the hydrogen content of steel. The protective properties, as well as

the penetrability of slags, are explained. Part III discusses the solubility of nitrogen in solid and liquid steel and iron and its alloys, and the effect on nitrogen of carbon, phosphorus, manganese, silicon, chromium, vanadium, aluminum and titanium. According to the author, Braun in Germany and Chizhevskiy in Russia (at the beginning of this century) were the first to demonstrate that steel's resistance to deformation increases with its nitrogen content. The book deals further with investigations of nitrogen content in slags, in open-hearth steel and in electric steels processed in arc furnaces, particularly in a 100 kg. electric furnace with a revolving arc of the Yevreinov and Tel'nyy system, as well as in side-blown converters and converters with basic and acid lining. The last part of the book is devoted to problems of the determination of hydrogen and nitrogen in liquid and solid steels. Various test methods, mainly of Soviet origin, are presented with detailed descriptions and sketches of the instruments used, e.g., A. Samarin's device (illus. 84), now widely used in Russia for determining the gas saturation of steel. This device, according to the author, compares favorably with American instruments of the same type because of its lighter weight and easier handling. Other examples are N. Chuyko's chill mold for determining the total hydrogen content in liquid steel (illus. 85) and the author's

device for the same purpose (illus. 86), V. Yavoyskiy's method for the fixation of hydrogen by quick cooling, and the author's process for cooling liquid samples in a special cast-iron mold (illus. 87). Many test methods and devices for determining the hydrogen content of solid steels are also described at length, e.g.: the method and device for melting in vacuum used by the Laboratory of Steel Metallurgy, Leningrad Polytechnic Institute (illus. 88, 89), the oxidation method; the method and device for the extraction of hydrogen in vacuum at 600-800° (illus. 90). The separation of hydrogen from solid assays analyzed in the Laboratory of Steel Metallurgy, Leningrad Polytechnic Institute, is represented on diagrs. 91, 92. In discussing the determination of nitrogen in steel, the author gives an account of his own and M. Karnaukhov's investigations, as well as of those of other Soviet scientists in this field. The selection of samples, the dissolving methods (particularly that used by the Laboratory of Steel Metallurgy, Leningrad Polytechnic Institute), the method of vacuum melting and the alloying process are described. The determination of the hydrogen and nitrogen dissolved in slags is analyzed. The size of the book did not allow the author to give equal attention to all problems under consideration. The questions directly related to the production of steel are discussed in most detail. The book is provided with formulas, 93 illus. and diagrs., and 48 tables.

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No. of References: The major part of 146 references are Russian (1926-1950)

Facilities: Names of Soviet scientists are scattered through the book (see "Coverage"). Molotov Plant, Leningrad; Nevskiy Plant im. Lenin; Dnieprovskiy Plant im. Dzerzhinskiy; Leningrad Polytechnic Institute, Department of Steel Metallurgy, are mentioned.

: Morozov, A.N.

TN740.M56 TREASURE ISLAND BOOK REVIEW AID 778 - M

MOROZOV, A. N., A. I. STROGANOV
RASKISLENIYE MARTENOVSKOY STALI (Deoxidation of open-hearth steel). Metallurgizdat, 1955. 256 p., charts, tables. 4,000 copies printed.

This book is intended for engineers and technical workers in metallurgical plants and for research analysts in scientific research institutes. It is a comprehensive review of Russian and other literature dealing with the theory and practice of deoxidation of open-hearth steel and with current methods and practical techniques in deoxidizing rimmed and killed steel. It does not discuss the first two stages of the open-hearth process, i.e., melting and refining, but concentrates on the last stage of deoxidation, which properly conducted determines to a greater extent the quality of steel. The subject of deoxidation of open-hearth steel is widely discussed in periodical literature and can be found in some chapters of monographs dealing with the whole open-hearth process, but a separate monograph dedicated exclusively to this subject was not available. The author of this book therefore considered it important to compile in a single volume all the information gathered from an extensive literature, Russian and non-Russian,

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periodical and monograph.

The first chapter discusses the state of the open-hearth bath before deoxidation. The main attention is given to the problem of oxygen content in the bath and of the content of ferro-oxides in the slag, which play an important role in the progress of the deoxidation process. In the second chapter, the main problems of the theory of deoxidation are presented, the general properties required from deoxidizers are outlined and the affinity of the elements to oxygen, nitrogen and sulphur are discussed.

The third chapter analyses the properties of the specific deoxidizers mostly used, namely: manganese, silicon, aluminum, titanium, vanadium, zirconium, calcium, boron and some others. Their deoxidizing characteristics are compared and the final products obtained after deoxidation are described. Subsequent chapters outline and analyse practical techniques applied for deoxidation of rimmed, semikilled and killed steel. The most advanced deoxidation methods are discussed and a critical survey made of more controversial problems.

MOROZOV, A. N., A. I. STROGANOV, Raskisleniye . . . AID 778 - 4

A voluminous literature is listed, a total of 211 titles, 35 non-Russian and 176 Russian (1926-1953). 50 tables and 51 charts supplement the text.

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MOROZOV, A. N.

Improving the Technology of Open-Hearth Smelting Working the Scrap-Ore Process. Ya. A. Shneerov and A. N. Morozov. (*Stal'*, 1955, (4), 312-328). [In Russian]. The present article deals with new instructions on the production of quality steels in basic O.H. and is based on co-operative work by research and works staffs in the U.S.S.R. The high incidence of incorrectly proportioned charges at some works is attributed to lack of standardization of pig-iron and scrap composition and to fluctuation in ore composition. Examples of present fettling practice and of defective organization of this work are briefly considered. This is followed by a more detailed discussion of charging, including the relation of the temperature of the solids to time and the duration of melting down of the whole charge to the duration of charging of the metallic part of the charge. Changes in slag composition with time, the desulphurization and dephosphorization reactions and flushing practice are dealt with. The article concludes with consideration of finishing practice including slag flushing, the oxygen content of the metal during the boil, the presence of non-metallic inclusions, changes in the hydrogen content of the metal, the behaviour of manganese, the iron oxide content of the slag and deoxidation.—S. K.

Morozov AN

M6 Improving open-hearth practice. Ya. A. Sineerov and A. N. Morozov. *Stal'* 15, 312-28(1955).—The open-heart practice of the country follows official instruction issued for the last time in 1947. During 1951-53, the actual practice and the methods for improving it were studied both by scientific institutions and plant personnel resulting in a new set of instructions minutely covering every step of open-hearth operations and analyzing conditions to be met. The present paper surveys these instructions. When statistical methods could provide the necessary data, they were used, otherwise systematic series of heats were run in 80–350-ton-capacity furnaces. Better thermal effect of basic roofs is shown. The O-C ratio in the bath as a function of capacity is given. Independence of the degree of bath oxidation from Mn concn., rate of C removal, etc., is shown in diagrams. Slagging SiO_2 by MnO for cleaning the steel is challenged. Factors leading to an increased H content are at not all clear, but oreing drops it, boiling increases, while lowering lime addn. during boiling keeps it down. An increase of H on deoxodizing with FeSi and FeMn cannot be directly connected with the gas content of addns. Reversing the order of deoxidation with FeMn and FeSi does not affect inclusions in steel, though the practice saves Mn. Oxidation achieved with their use corresponds to the limits defined by each of them. Factors investigated are illustrated with 20 diagrams. J. D. Gat

2/0

IVANOV, Nikolay Vasil'yevich; MALYUTIN, Nikolay Kuz'mich; FLEYSHMAN, Abram L'vovich; BURSHTEYN, I.I., retsenzent; LOBODIN, P.V., retsenzent; MOROZOV, A.N., retsenzent; LYUBOVICH, Yu.O., kandidat ekonomicheskikh nauk, redaktor; TEMKIN, A.V., tedaktor izdatel'stva; UVAROVA, A.F., tekhnicheskiy redaktor.

[Supply of materials and equipment in machinery manufacturing] Material'no-tekhnicheskoe snabzhenie v mashinostroenii. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1956. 275 p. (MLRA 10:4)
(Machinery industry)

MORozov, A.N.

4E2c

Operation of Open-Hearth Furnaces with Additional Air Feed into the Gas Port. B. N. Bolgov, A. A. Dobrokhotov, and A. N. Morozov. (*Stal'*, 1956, (7), 597-601). (In Russian). In the method described supplementary air is injected into the gas stream entering the O.H. furnace through a Venturi port and burns part of the gas. This was found to increase the productivity of a furnace working on mixed gas by 5–7% and reduce fuel consumption by enabling the quantity of blast-furnace gas to be decreased without appreciable increase in coke-oven gas consumption per ton of steel. Work with models showed the improvements to be due to increased gas velocity, leading to better combustion and increased flame temperature.—S. K.

MOROZOV, A.N., doktor tekhnicheskikh nauk, professor; STROGANOV, A.I., kandidat tekhnicheskikh nauk.

On N.N.Dobrokhotov's and B.K.Khan's review of A.N.Morozov's and A.I. Stroganov's book "Deoxidation of open-hearth steel." Stal' 16 no.8:766-767 Ag '56. (Open-hearth process) (MLRA 9:10)

Морозов, А.А.

Open-hearth furnaces' operation with the addition into gas ports. S. N. Bystrov, A. A. Dobrokhotov, and A. N. Morozov (Met. Plant, Chelyabinsk). *Stal'* 16, 597-601 (1956). An air injector installed in the gas ports of an open-hearth furnace, the design and functioning of which are well detailed, leads to a higher flame temp., a greater heat input, and an increase in steel production of 5-7%. Coke-oven gas consumption per ton remained about the same.

I. D. Gat

MOROZOV, A.N.; POVOLOTSKIY, D.Ya.; ISAYEV, V.F.

Taking specimens for determining the hydrogen content of steel manufactures. Zav.lab. 22 no.7:867-869 '56 (MLRA 9:12)

L. Chelyabinskiy politekhnicheskiy institut.
(Steel--Analysis) (Hydrogen--Analysis)

MOROZOV, A.N.

Automatic devices on machines manufacturing wood fiber boards.
Bum.prom. 31 no.5:17-19 My '56. (MLRA 9:8)

1. Nachal'nik laboratorii kontrol'no-izmeritel'nykh priborov Visherskogo tsellyulozno-bumashnogo kombinata.
(Paperboard) (Vishera Valley--Papermaking machinery)

MOROZOV, A.N., KOLOSOV, M.I., POVOLOTSKIY, D.Ya., KOSSOVSKIY, L.D., STROGANOV, A.I., VAYNSHTEYN, D.Ya.,

"Behaviour of Hydrogen in Steel During its Production and Remelting," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-4, 1957

MOROZOV, A.N.,

"Analysis of Processes of Desulphurization and Oxidation of Metal During in Open-Hearth Furnaces,"
lecture given at the Fourth Conference on Steelmaking, A.A. BAikov Institute of Metallurgy, Moscow, July 1-4, 1957.

MOROZOV, A.N., KOLOSOV, M.I., STRAGARCV, A.I., KELS, N.V., VAYNSHTEYN, E.Y.

"Rate and Sequence of Killed Steel Ingot Crystallisation,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

MOROZOV, A.N., KOLOSOV, M.I., STROGANOV, A.I., KEYIS, N.V., VAYNSHTEYN, O.Ya.,

"Influence of Blast Humidity on the Cast-Iron Hydrogen Content and the Quality of Steel,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-4, 1957

Morozov, A.N.

PHASE I BOOK EXPLOITATION 268

Shneyerov, Ya. A., Morozov, A.N. Chapters I-III and paragraph 1 of Chapter VI, written in collaboration with Rabinovich, A.G.

Tekhnologiya martenovskoy plavki; obobshcheniye peredovogo opyta (Technology of the Open-hearth Process; Experience of Leading Steel Mills) Moscow, Metallurgizdat, 1957. 219 p. 4,500 copies printed.

Sponsoring agencies: Ukrainskiy institut metallov and Chelyabinskiy politekhnicheskiy institut.

Ed.: Korolev, M.I.; Ed. of Publishing House: Rozentsveyg, Ya.D.; Tech. Ed.: Evenson, I.M.

PURPOSE: This book is intended for steel-foundry engineers, workers in scientific research institutes and planning organizations. It may also be useful to vuz and technical school students.

COVERAGE: The book presents the findings of leading steel mills obtained from 1951 to 1955 on increasing production of open-hearth

Card 1/5

foundries and improving smelting by the scrap process. The book discusses time required for charging, heating, smelting, finishing and the open-hearth-furnace heating regime. Personalities mentioned include: Ya. A. Shneyerov, who was responsible for the research done at the Ukrainskiy institut metallov (Ukrainian Institute of Metals); A.N, Morozov, Doctor of Technical Sciences, who directed the research done by the Leningrad and Chelyabinsk Polytechnical Institutes; M.M. Karnaukhov, Academician, general director of research and consultant. The following are mentioned in connection with research done at the Ukrainian Institute of Metals: A.G. Rabinovich, A.G. Derfel', V.S. Terekhova, A.G. Kotin, M.D. Logovinskiy, S.D. Loshchilov, Ye. G. Goykhman, V.G. Podoynitsyn. Scientific contributors from the Steel Metallurgy Department of the Leningrad Polytechnical Institute are: B.V Frontinskiy; A.Kh. Urazgil'deyev; S.D. Karpov, Engineer; D.G. Maksimchuk; and O.K. Sadovnik. Scientific contributors from the Steel Metallurgy Department of the Chelyabinsk Polytechnical Institue are: E.I. Kasperovich, A.I. Stroganov, V.F. Isayev, and I. V. Markov.

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Technology of the Open-hearth Process (Cont.) 268

Research done by the Ukrainian Institute of Metals and the Chelyabinsk Polytechnical Institute during 1954-1955 is also included in the book.

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AVAILABLE: Library of Congress

GO/ksv
May 29, 1958

Card 5/5

SOV/137-58-8-16552

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 46 (USSR)

AUTHORS: Kolosov, M.I., Morozov, A.N., Stroganov, A.I., Isayev, V.F., Kuys, N.V., Vaynshteyn, O.Ya.

TITLE: The Rate and Sequence of Crystallization in Ingots of Killed Steel (Skorost' i posledovatel'nost' kristallizatsii slitkov spokoynoy stali)

PERIODICAL: V sb., Primeneniye radioaktivn. izotopov v chernoy metallurgii. Chelyabinsk, Knigoizdat, 1957, pp 95-105

ABSTRACT: Radioactive Fe^{59} (introduced in the form of Fe oxide) was employed in conjunction with the method of overturning of molds in order to investigate crystallization processes in ingots of steel ShKh15SG (2.65 t) and of steels 10 and 45 (6.2-t ingots). The radioactivity of various zones of the ingot was determined from the radiation intensity of 3.5-g specimens of metal drilled out on different levels of a longitudinal templet of the ingot. As the crystallization progresses, the two-phase region on the sides of the ingot amounts to 30-50 mm. After the formation of a zone of columnar crystals, a two-phase region fed with liquid metal from the central part is formed in the lower part

Card 1/2

The Rate and Sequence of Crystallization in Ingots of Killed Steel

of the ingot. In a 6.2-ton ingot, the height of this zone extends to 850 mm. Up to a certain time (approximately 80 min in the case of the 6.2-t ingot) the thickness of the crystallized layer (including the two-phase region) taken in a horizontal section of the ingot is proportional to the square root of the crystallization time. Deviations from this relationship, which occur toward the end of the crystallization period, are attributable to a more rapid formation of a two-phase region at the center of the ingot. Extension risers, employed in production of high-quality steel ingots, may be removed only after the crystallization of the ingot has been completed. Bibliography: 19 references.

Ya.L.

[illegible]

Morozov, A.N.

137-1958-1-337

Translation from Referativnyy zhurnal Metallurgiya, 1958 Nr 1 p 52 (USSR)

AUTHORS Morozov A.N., Stroganov A.I., Vaynshteyn O.Ya., Isayev V.F.

TITLE Rate of Solution of Scrap Iron in Open Hearth Furnaces After Charging of Pig Iron (Skorost' rastvoreniya zheleznogo loma v martenovskikh pechakh posle zalivki chuguna)

PERIODICAL V sb Primeneniye radioaktivn izotopov v chernoy metallurgii Chelyabinsk, Knigoizdat, 1957, pp 135-144

ABSTRACT The radioactive isotopes P^{32} introduced into the furnace with the ore and Co^{60} introduced into the pig iron ladle when pig iron from the mixer is poured into it were used to study the rate of fusion of the scrap in 380-t open hearth furnaces operating on scrap and ore. Samples of metal for measurement of radioactivity were taken during the heat, the amount of scrap fusing being established by the change in the intensity of radiation by the metal specimens relative to the intensity of radiation of the pig iron. Curves showing the radioactivity of the metal during the heat and curves of the change in its composition are presented. A specimen calculation of the rate of fusion of scrap iron on the basis of radioactivity measurement is presented. It is remarked

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137-1958-1-337

Rate of Solution of Scrap Iron (cont.)

that fusion of the scrap iron does not proceed uniformly. 60-70 % is dissolved rapidly in the pig, whereas the remainder follows more slowly. The rate of carbon elimination during the heat is determined

M.Kh

1. Open hearth furnaces--Performance--Test results 2. Ores--Melting rate--Determination 3. Iron--Melting rate--Determination 4. Carbon --Elimination 5. Phosphorus isotopes (Radioactive)--Applications 6. Cobalt isotopes (Radioactive)--Applications 7. Liquid metals --Sampling

Card 2/2

SOV/137-59-1-353

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 44 (USSR)

AUTHORS: Morozov, A. N., Pototskiy, D. Ya., Keys, N. V.

TITLE: A Study of the Kinetics of the Process of Desulfurization of Steel in Electric Arc Furnaces (Izucheniye kinetiki protsessa obessernivaniya stali v elektricheskikh dugovykh pechakh)

PERIODICAL: V sb.. Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 112-123. Diskuss., pp 160-187

ABSTRACT: Experimental smeltings of ball-bearing steel were conducted in electric arc furnaces with capacities of 30-40 tons. The radioactive isotope (RI) S^{35} in the form of an iron sulfide was introduced into the metal after the charge had melted, as well as in the beginning of the reduction period. It was established that in the course of the oxidation period the RI is distributed throughout the volume of the metal and the slag within 15 minutes, whereas the ratio (I %S)/[I%S] attained a constant value in 10 - 20 minutes. The constancy of relative concentration of the RI in the metal [I/%S] was preserved during the oxidation period only when the content of the S amounted to 0.022 - 0.032%; at a lower S content it was reduced owing to the fact

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A Study of the Kinetics of the Process of Desulfurization of Steel (cont.)

that a certain amount of S was carried into the furnace by the slag-forming substances. In the course of the reduction period, the distribution of the RI between the metal and the slag was completed within a period of 10 - 20 minutes following its introduction. A reduction of the relative concentration of the RI in the metal and in the slag observed subsequently is also attributable to quantities of S being carried into the furnace by the slag-forming components. It was established that, in contrast with radioactive S, ordinary S distributes itself between the metal and the slag at a significantly slower rate; this is explained by the fact that the rate of isotope exchange between the S^{35} ions and ions of ordinary S exceeds the rate of desulfurization of the metal. It is concluded that the rate of desulfurization in an electric furnace is determined by the rate of the chemical reaction occurring on the phase boundary, the concept of the chemical reaction being thought of as including the process of the transition of the S from one phase into another.

A. Sh.

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Morozov, A. N.

137-1958-1-334

Translation from Referativnyy zhurnal Metallurgiya 1958 No 1 p 31 (USSR)

AUTHORS Morozov, A. N., Shneyerov, Ya. A.

TITLE Slag Formation During Fusion in Basic Open Hearth Furnaces (Shlakoobrazovaniye vo vremya plavleniya v osnovnykh martenovskikh pechakh)

PERIODICAL V sb: Fiz. khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 132-142. Diskus. pp 160-187

ABSTRACT Theoretical concepts and experimental and industrial data from the plants in the east and south of our country are employed to examine problems of the formation of primary slag and the drossing of S and P during melts in open hearths working on scrap and ore. It is established that slagging off of the maximum amount of slag per heat makes for good drossing of P. The (S)/[S] ratio attains a maximum 15 to 20 minutes after the iron has been charged into the furnace. The maximum depends primarily upon the (MnO) in the slag, and varies from 1.0-2.0 at 9% MnO, to 4-5 at 23% (MnO). The order in which the free-flowing materials are charged has a major effect upon the process of primary slag formation, particularly upon (FeO). Analysis of charging methods [illegible] shown

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137 1958 1-334

Slag Formation During Fusion in Basic Open Hearth Furnaces

that the most efficient sequence is Fe ore - limestone - Fe ore since this sequence facilitates satisfactory slag precipitation long hearth life, and good deprosphorization. Top charging of limestone is permissible only when charging of iron is delayed to prevent the ore from fusing

A.S.

1. Slags--Formation--Analysis 2. Open hearth furnaces--Charging --Analysis

Card 2/2

MOROZOV, A.N

24-8-14/34

AUTHORS: Malinovskiy, Ye. I. and Morozov, A.N. (Chelyabinsk).

TITLE: Sources of contamination of steel by oxide inclusions during tapping casting. (Istochniki zagryazneniya stali oksidnymi vklyucheniyami po khodu vypuska i razlivki).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.8, pp. 102-108 (U.S.S.R.)

ABSTRACT: The authors investigated from 1954 onwards the origin of non-metallic inclusions detected in the finished steel under shop conditions by means of radio-active isotopes. The steel was produced in 40 ton electric arc furnaces and cast into ingots weighing 2.65 tons by the syphon method. In the first part of the experiments the influence of the refractory materials of the ladle and the syphon was investigated by introducing Ca^{45} in accordance with the method developed by Samarin, A.M. and his team (1) and (2). The authors of this paper obtained results which differed from those of Samarin and his team; they have no explanation for this divergence except for the suggestion that the differences may be due to the differences in the dimensions of the ingots. In the second part of their experiments the authors investigated the influence of secondary oxidation

Card 1/3

Sources of contamination of steel by oxide inclusions during tapping casting. (Cont.)

using Zr^{95} and Ta^{182} for this purpose. As regards secondary oxidation the behaviour of Zr^{95} characterises sufficiently accurately the behaviour of aluminium, particularly since both form high melting point oxidation products which are difficult to remove from the metal. A total of seven melts of the ball bearing steel ШХ-15 were investigated in the experiments; in three of these Zr^{95} was used as an isotope, whilst in the remaining four Ta^{182} was used. The results differ somewhat from those published by Yedneral, F.P. (3). It was found that the products of a decomposition of the refractories of the ladle and the syphon do not remain in the finished steel and, therefore, do not determine the content of oxide inclusions in the steel. The oxidation products, including high melting point inclusions which form as a result of oxidation of the steel during tapping into the ladle are removed adequately from the metal in the ladle. The contamination of the steel with oxide inclusions is due predominantly to oxidation of the powerful deoxiding agents during the process of casting and crystallisation of the steel. The contamination of the metal can be reduced by reducing the dissolved oxygen

Sources of contamination of steel by oxide inclusions during tapping casting. (Cont.)

content of the metal in the ladle, by means of an additional powerful deoxiding agent, and eliminating secondary oxidation by casting in vacuum or in an atmosphere of a neutral gas (argon or possibly nitrogen).
There are 6 figures, 4 tables and 3 Slavic references.

SUBMITTED: December 18, 1956.

AVAILABLE: Library of Congress

Card 3/3

137-58-6-11831

Translation from Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 42 (USSR)

AUTHOR Morozov, A.N.

TITLE Technical and Economic Indices for Top and Bottom Pouring of Steel (Tekhniko-ekonomicheskiye pokazateli razlivki stali sverkhu i sifonom)

PERIODICAL Tr. Nauchno-tekhn. o-va chernoy metallurgii, 1957 Vol 18, pp 387-395

ABSTRACT Preliminary results are presented resulting from a comparison of indices for quality of production and for labor productivity in the mold yards (MY) engaged in operations preparatory to pouring (P) and in the conditioning shops of the rolling departments of the Kuznetsk and Chelyabinsk works, the first of which engages in top and the second in bottom pouring. Comparison is made of rimming and killed grades of steel poured in 6-7-t ingots and rolled to identical sections (medium grade). The quality of the steel and consumption of metal per ton of rolled product in the I and II conversions does not depend upon the mode of P. Losses of P are 1% greater in bottom P of steel. Total labor (man-hours per ton) in the MY and the

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137-58-6-11631

Technical and Economic Indices for Top and Bottom Pouring of Steel

conditioning departments is considerably greater after the I and II conversions in bottom P of steel.

A.M

Steel--Metallurgy 2. Steel--Processing 3. Steel--Economic aspects

Card 2/2

DANIKHELKA, A., doktor, inzh.; MIKHAYLOV, O.A., kand. tekhn. nauk; GONCHARENKO, N.I.; KLIMASENKO, L.S.; OYKS, G.N., prof., doktor tekhn. nauk; SEMENENKO, P.P.; MOROZOV, A.N., prof., doktor tekhn. nauk; GLINKOV, M.A., prof., doktor tekhn. nauk; KAZANTSEV, I.G., prof., doktor tekhn. nauk; KOCHO, V.S., prof., doktor tekhn. nauk; ENEKESH, Sh., kand. tekhn. nauk; MOROZENSKIY, L.I., kand. tekhn. nauk; GURSKIY, G.V.; SPERANSKIY, V.G.; NOVIK, L.M., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; SHNEYEROV, Ya.A., kand. tekhn. nauk; PAPUSH, A.G., kand. tekhn. nauk; MAZOV, V.F.; SAMARIN, A.M.

Discussions. Biul. TSNIICHM no.18/19:17-35 '57. (MIRA 11:4)

1. Glavnyy staleplavil'shchik Ministerstva metallurgicheskoy promyshlennosti i rudnikov Chekhoslovatskoy respubliki (for Danikhelka). 2. Direktor TSentral'nogo instituta informatsii chernoy metallurgii (for Mikhaylov). 3. Direktor Ukrainskogo instituta metallov (for Goncharenko). 4. Glavnyy staleplavil'shchik Kuznetskogo metallurgicheskogo kombinata (for Klimasenko). 5. Zaveduyushchiy kafedroy metallurgii stali Moskovskogo instituta stali (for Oyks). 6. Zamestitel' glavnogo inzhenera zavoda im. Serova (for Semenenko). 7. Zaveduyushchiy kafedroy metallurgii stali Chelyabinskogo politekhnicheskogo instituta (for Morozov). 8. Zaveduyushchiy kafedroy metallurgicheskikh pechey Moskovskogo instituta stali (for Glinkov). 9. Zaveduyushchiy kafedroy metallurgii stali Zhdanovskogo metallurgicheskogo instituta (for Kazantsev). 10. Zaveduyushchiy kafedroy metallurgii stali Kiyevskogo politekhnicheskogo instituta (for Kocho). (Continued on next card)

DANIKHELKA, A.---(continued) Card 2.

11. Nachal'nik tekhnicheskogo otdela Ministerstva chernoy metallurgii Vengerskoy Narodnoy Respubliki (for Ennekesh). 12. Zamestitel' direktora Novotul'skogo metallurgicheskogo zavoda (for Gurskiy). 13. Nachal'nik tekhnicheskogo otdela zavoda "Dneprospetsstal'" (for Speranskiy). 14. Institut metallurgii im. Baykova AN SSSR (for Novik). 15. Nachal'nik staleplavil'noy laboratorii Ukrainskogo instituta metallov (for Shneyerov). 16. Nachal'nik laboratorii po nepreryvnoy razlivke stali Zhdanovskogo filiala TSentral'nogo nauchno-issledovatel'skogo instituta Ministerstva stroitel'noy promyshlennosti (for Papush). 17. Nachal'nik martenovskogo tsekha zavoda "Zaporozhstal'" (for Mazov). 18. Zamestitel' direktora Instituta metallurgii im. Baykova AN SSSR, chlen-korrespondent AN SSSR (for Samarin).

(Steel--Metallurgy)

KOROLEV, A.I.; BLINOV, S.T.; LUBENETS, I.A.; KOBURNEYEV, I.M.; TURUBINER, A.L.; VASIL'YEV, S.V.; CHERNENKO, M.A.; BELOV, I.V.; TELESOV, S.A.; MAZOV, V.F.; MEDVEDEV, V.A.; MAL'KOV, V.G.; BUL'SKIY, M.T.; TRUBETSKOV, K.M.; SHNEYEROV, Ya.A.; SLADKOSHTEYEV, V.T.; PALANT, V.I.; KUROCHKIN, B.N.; ZHDANOV , A.M.; BELIKOV, K.N.; SABIYEV, M.P.; GARBUZ, G.A.; PODGORETSKIY, A.A.; ALFEROV, K.S.; NOVOLODSKIY, P.I.; MOROZOV, A.N.; VASIL'YEV, A.N.; MARAKHOVSKIY, I.S.; MALAKH, A.V.; VERKHOVTSEV, E.V.; AGAPOV, V.F.; VECHER, N.A.; PASTUKHOV, A.I.; BORODULIN, A.I.; VAYNSHTEYN, O.Ya.; ZHIGULIN, V.I.; DIKSHTEYN, Ye.I.; KLIMASENKO, L.S.; KOTIN, A.S.; MOLOTKOV, N.A.; SIVERSKIY, M.V.; ZHIDETSKIY, D.P.; MIKHAYLETS, N.S.; SLEPKANEV, P.N.; ZAVODCHIKOV, N.G.; GUDEMCHUK, V.A.; NAZAROV, P.M.; SAVOS'KIN, M.Ye.; NIKOLAYEV, A.S.

Reports (brief annotations). Bul. TSNIICHM no.18/19:36-39 '57.
(MIRA 11:4)

1. Magnitogorskiy metallurgicheskiy kombinat (for Korolev, Belikov, Agapov, Dikshteyn). 2. Kuznetskiy metallurgicheskiy kombinat (for Blinov, Vasil'yev, A.N., Borodulin, Klimasenko). 3. Chelyabinskiy metallurgicheskiy zavod (for Lubenets, Vaynshteyn). 4. Zavod im. Dzherzhinskogo (for Koburneyev). 5. Zavod "Zaporozhstal'" (for Turubiner, Mazov, Podgoretskiy, Marakhovskiy, Savos'kin). 6. Makeyevskiy metallurgicheskiy zavod (for Vasil'yev, S.V., Mal'kov, Zhidetskiy, Al'ferov). 7. Stal'proyekt (for Chernenko, Zhdanov, Zavodchikov). 8. VNIIT (for Belov). 9. Stalinskiy metallurgicheskiy zavod (for Telesov, Malakh).

(Continued on next card)

KORCLEV, A.I.---(continued) Card 2.

10. Nizhne-Tagil'skiy metallurgicheskiy kombinat (for Medvedev, Novolodskiy, Vecher). 11. Zavod "Azovstal'" (for Bul'skiy, Slepkanev). 12. TSentral'nyy nauchno-issledovatel'skiy institit chernoy metallurgii (for Trubetskov). 13. Ukrainskiy institut metallov (for Shneyerov, Sladkoshteyev, Kotin). 14. Zavod "Krasnyy Oktyabr'" (for Palant). 15. Vsesoyuznyy nauchno-issledovatel'skiy institut metallurgicheskoy teplotekhniki (for Kurochkin). 16. Zavod im. Voroshilova (for Sabiyev). 17. Chelyabinskiy politekhnicheskiy institut (for Morozov). 18. Giprostal' (for Garbuz). 19. Ural'skiy institut chernykh metallov (for Pastukhov). 20. Zavod im. Petrovskogo (for Zhigulin). 21. Ministerstvo chernoy metallurgii USSR (for Molochkov, Siverskiy). 22. Glavspetsstal' Ministerstva chernoy metallurgii SSSR (for Nikolayev).

(Open-hearth process)

SOV/137-59-5-9962

18.3200

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 5, p [illegible]

AUTHORS: Kolosov, M.I., Morozov, A.N., Stroganov, A.I., Isayev, V.P., Keys, N.V., Vaynsteyn, O.Ya.

TITLE: The Rate and Sequence of Crystallization in Killed Steel Ingots

PERIODICAL: V sb.: Metallurgiya i metallovedeniye, Moscow, AS USSR, 1958, pp 133 - 137

ABSTRACT: The authors investigated the crystallization in "ShKh15SG" steel ingots of 2.65 t weight and in syphon-cast "10" and "45" grade steel ingots of 6.2 ton weight. The location of the crystallization front was determined at various moments by a consecutive multiple introduction of a thermic mixture of radioactive iron and Al-powder into the non-solidified section of each ingot. Subsequently, the concentration of the radioactive iron over the cross-section and the length of the solidified ingot was determined by radiometric means. Moreover, the non-solidified sections of "10" steel ingots were tapped at time intervals corresponding to the moments [illegible]

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The Rate and Sequence of Crystallization in Killed Steel Ingots

introducing the radioactive iron. The thickness of the solidified layer on the section of the ingot body (ostov) was measured Results obtained by the described methods were compared and it was revealed that the cavity in the body of an overturned ingot was wider and deeper than the area of expansion of the radioactive iron introduced at the same moment. This discrepancy is explained by the presence of a two-phase zone located between the border of the radioactive iron expansion and the solidified layer The two-phase zone consists of suspended (partially intergrown) crystals and liquid metal. The width of the two-phase zone at the lateral crystallization fronts does not exceed 30 - 50 mm; however, its expansion along the height in the lower axial section of the solidified ingot attains 850 mm. It is assumed that the two-phase zone is developed periodically during interrupted crystallization (in particular, at the moment of the completed growth of columnar crystals) The development of a two-phase zone in the lower axial section of the ingot is connected with the fact that crystals originating at the lateral crystallization fronts, are carried away by the descending flows of cooled-off metal and are accumulated in the bottom section of the solidified ingot This ex...

Card 2/3

The Rate and Sequence of Crystallization in Killed Steel Ingots

also the formation of the cone of setting. An attempt is made to explain the mechanism of the formation of "whiskers", on the basis of the described notions and by investigating possible ways of the emersion of H bubbles H is being liberated during the crystallization of steel. The development of a V-shaped segregation is explained by the periodic penetration of liquates into the axial zone of the ingot which previously emerged into its upper section. Data, characterizing the progress of the crystallization front were compared to known formulae. It was established that the value of the coefficient of solidification in the law of the square root of the crystallization rate fluctuated between 21 - 29 mm/min$^{0.5}$ for carbon steel (during the first 80 minutes of the solidification of the ingot). It decreased with a reduced [illegible] amount in the steel.

I.G

SOV/137-58-9-18676

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 75 (USSR)

AUTHORS: Morozov, A.N., Kolosov, M.I., Stroganov, A.I., Isayev, V.F., Keys, N.V., Vaynshteyn, O.Ya.

TITLE: A Nucleonic Study of the Rate and Sequence of Steel-ingot Crystallization (Izucheniye skorosti i posledovatel'nosti kristallizatsii stal'nykh slitkov pri pomoshchi radioaktivnykh indikatorov)

PERIODICAL: V sb.: Staleplavil'n. proiz-vo. Moscow, Metallurgizdat, 1958, pp 203-217

ABSTRACT: Radioactive tracers were used to investigate the crystallization of 2.65-t ingots of ShKh15SG and 6.2-t ingots of Nrs-10 and 45 steels, bottom poured. 3-5 batches of Fe^{59} (4.5-14.5 millicuries per t steel) were introduced as Fe_2O_3 mixed with Al powder. The tops of the ingots were held in the liquid state by periodic additions of lunkerite pipe eliminator. At the same time, crystallization of Nr-10 steel was also studied by overturning three ingots on single stool at different time intervals after pouring. The isotope was introduced at the moments when the residual liquid metal from each of these ingots was poured

Card 1/3

A Nucleonic Study of the Rate and Sequence of Steel-ingot Crystallization

into a fourth on the same stool. The thickness of the frozen layer as determined by radiography was greater than when determined by pouring out the liquid residue of the metal. This is explained by the fact that the zones of isotope distribution describe the region of the ingot occupied by liquid metal, whereas the thickness of the crystallized layer determined by pouring out defines the region of solid metal phase alone. The difference between them is the magnitude of the region in which two phases exist. The length of that region along the sides of the ingot in the course of crystallization does not exceed 30-40 mm. At the conclusion of the formation of the zone of columnar crystals in the bottom of the 6.2-t ingot there arises a two-phase region attaining 850 mm in height. This region comes into being as the result of the accumulation of equiaxed crystals that have torn away after formation on the interface between the solid and liquid phases. The crystallization of the two-phase region is intermittent in nature. The development of V-segregation and axial porosity are dependent upon the taper of the ingot and the conditions under which the two-phase zone is fed liquid metal from the upper portion of the ingot. In the making of high-quality steel, the hot top should be removed only after the body of the ingot has completely hardened. Within given time limits, the thickness of the crystallized layer is proportional to the square root of the crystallization time; the proportionality factor therein.

Card 2/3

SOV/137-58-9-18676

A Nucleonic Study of the Rate and Sequence of Steel-ingot Crystallization

which is 21-29 mm/min$^{0.5}$ for carbon steels, declines with reduction in the [C] of the steel.

L.K.

1. Steel--Processing 2. Steel--Crystallization 3. Radioisotopes--Performance

Card 3/3

SOV/137-59-5-9855

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 5, p 55 (USSR)

AUTHORS: Morozov, A.N., Stroganov, A.I., Vaynshteyn, G.Ya.

TITLE: Preliminary Deoxidation[18] of Low Carbon Open-Hearth Steel[18]

PERIODICAL: Metallurg. Yuzhn. Urala (Sovnarkhoz Chelyab. adm. r-na), 1958, Nr 1 (2), pp 11 - 17

ABSTRACT: Experimental smelts were carried out by the scrap-ore process with a cast-iron content in the charge of 65 - 70% and 100- and 180-ton furnaces (at the Chelyabinsk Metallurgical Plant) and in 185- and 380-ton furnaces at the MMK. The "10 tr" steel grade was investigated at the ChMZ and steels with 0.10 - 0.20%C were examined at MMK. Of 45 experimental smelts, 23 smelts were deoxidized in the furnace by the blast furnace Fe-Si, introduced into the furnace in order to obtain metal with 0.18 - 0.20 Si (ChMZ) or 0.10 - 0.15% Si (MMK). In the ladle the metal was deoxidized by 45% Fe-Si and a constant Al amount. Moreover, data of industrial control were used, obtained from "10 tr" steel smelts, deoxidized and not deoxidized by the blast furnace Fe-Si

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Preliminary Deoxidation of Low Carbon Open-Hearth Steel

in the furnace (ChMZ) and also from smelts deoxidized by the blast furnace Fe-Si and Si-Mn (MMK). It was stated that the duration of smelts deoxidized in the furnace by the blast furnace Fe-Si was longer by 20 minutes than smelts deoxidized by Fe-Mn or Si-Mn only. The use of the blast furnace Fe-Si reduces the consumption of more expensive deoxidizers (Fe-Mn by 20%, 45% Fe-Si by 10 - 30%). Deoxidation of the metal in the furnace by Fe-Mn only impairs steel smelting with a prescribed [C] and [MN] content. [O] in the ladle was 0.006 to 0.012%, independent of the deoxidation variant. The content of non-metallic impurities and Al_2O_3 content is higher, if the metal is deoxidized in the furnace by Fe-Mn only; this has no substantial effect on the quality of killed carbon steel. The macrostructure and mechanical properties do not depend on the deoxidation variant. If the metal is deoxidized in the furnace by Fe-Mn only, the cost price of 1 ton of steel is by 2.44 (ChMZ) and 2.87 rubles (MMK) lower than in deoxidation by blast-furnace . In low carbon killed steel smelting any of the described methods of preliminary deoxidation may be used, from the point of view of steel quality.

V.G.

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133-1-7/24

AUTHORS: Kolosov, M.I., Engineer, Morozov, A.N., Doctor of Technical Sciences, Stroganov, A.I., Candidate of Technical Sciences, Popov, Yu.A., Engineer, Vaynshteyn, O.Ya., and Keys, N.V.

TITLE: The Quality of Steel from Pig Iron Produced with a Constant Moisture Blast (Kachestvo stali iz chuguna, vyplavlennogo na dut'ye postoyannoy vlazhnosti)

PERIODICAL: Stal', 1958, No.1, pp. 24 - 27 (USSR).

ABSTRACT: The influence of moisture content of blast on the hydrogen content in pig iron and the influence of hydrogen content of pig iron on the hydrogen content of steel as well as flake sensitivity of steel on the hydrogen content in the liquid metal were investigated. Nos. 1 and 3 blast furnaces on the above works were transferred to operation with a constant moisture blast (15-20 g/m^3). This resulted in the smoother operation, higher blast temperatures 750 - 800 °C (against previous 450 - 500 °C), increase in output (No.1 - 3%; No.3 - 1.3%) and a decrease in the coke rate (No.1 - 6.5%; No.3 - 1.3%). As the works produce quality steel it was considered necessary to check the possible effect of higher moisture in blast on the steel quality. It was found that with increasing moisture content in blast, the hydrogen content of pig iron increases but not proportionally. However, the mean content of hydrogen in the

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The Quality of Steel from Pig Iron Produced with a Constant Moisture Blast

open-hearth bath after melting and on teeming was found to be practically independent of the hydrogen content of pig or moisture content in the blast (Fig.1), The final hydrogen content of steel on teeming was not correlated to its content in the corresponding pig (Table 1, Fig.2). The comparison of hydrogen content in pig, steel and rolled products of various levels of moisture content in blast is shown in Table 2; the comparison of the degree of flaking in semis and their hydrogen content and the mechanical properties of finished steel at various levels of moisture in blast - Tables 3 and 4, respectively. It is concluded that the hydrogen content of pig iron has no influence on the hydrogen content of quality steel after melting and on teeming. The direct relationship between the flake sensitivity and hydrogen content of liquid metal was not established. The methods of heating and cooling flake-sensitive steels used on the works secure the absence of flakes in finished products at any level of moisture in the blast. The macro-structure of rolled semis is independent from the moisture content of the blast. There are 4 tables, 2 figures and 6 Russian references.

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The Quality of Steel from Pig Iron Produced with a Constant Moisture Blast

ASSOCIATION: Chelyabinsk Metallurgical Works (Chelyabinskiy metallurgicheskiy zavod)

AVAILABLE: Library of Congress

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MOROZOV, A.N., doktor tekhn.nauk, prof.

Modern slag and steel-smelting process theories. Izv.vys. ucheb.zav.; chern.met. no.6:75-86 Je '58. (MIRA 12:8)

1. Chelyabinskiy politekhnicheskiy institut. Rekomendovano kafedroy metallurgii stali Chelyabinskogo politekhnicheskogo instituta.
(Steel--Metallurgy) (Slag)

MOROZOV, A. N.

СЛИТОК И СВОЙСТВА СТАЛИ

Д.Ф.Чернега	Исследование влияния электрошлакового обогрева прибыльной части слитков [illegible] электродами на [illegible] металла.
К.С.Просвирин Л.И.Крупман	Распределение неметаллических включений в слитках кипящей стали.
Ю.А.Нехендзи Н.Г.Гиршович В.Я.Вейнс	Кинетика затвердевания железо-углеродистых сплавов в песчаных, металлических и водоохлаждаемых формах.
В.Г.Грузин	Структурообразование в зависимости от температурного поля [illegible] стали.
С.А.Медовский В.К.Неверский А.С.Лебедев	Влияние толщины стенки изложницы на качество слитков [illegible].
В.Г.Куклев С.М.Гаучев	Поведение [illegible] включений в слитке спокойной стали.
В.М.Тагеев Ю.Д.Смирнов	О связи дендритной и зональной химической неоднородности слитков и отливок в процессе кристаллизации стали.
В.М.Тагеев Ю.Д.Смирнов	Влияние выделения газов при кристаллизации стали на химическую неоднородность слитков и отливок.
А.Н.Морозов В.С.[illegible]	Механизм образования сотовых пузырей в слитках кипящей стали.
Ю.А.Нехендзи В.П.[illegible]	Перемещение водорода в отливке при заполнении литейной формы.

report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow-- 30 Jun 1959.

MOROZOV, A.N.

STROGANOV, A.I.; MOROZOV, A.N.

Povedenie khroma v vanne osnovnoy martenovskoy pechi.

report submitted for the 5th Physical Chemical Conference on Steel Production.

MOSCOW 30 JAN 59

MOROZOV A.N.

POVOLOTSKIY, D. Ye.; LUBENETS, I. A.; KOLOSOV, M. I.; FAYKSHTEYN, O. Ya.; MOROZOV, A. N.

Obeskremnivanie martenovskogo chuguna kislorodom.

report submitted for the 5th Physical Chemical Conference on Steel Production, 30 Jun 1959, Moscow.

MOROZOV, A. N.

18(7) PHASE I BOOK EXPLOITATION SOV/3004

Povolotskiy, David Yakovlevich, and Aleksandr Nikolayevich Morozov

Vodorod i flokeny v stali (Hydrogen and Flakes in Steel) Moscow, Metallurgizdat, 1959. 184 p. Errata slip inserted. 2,800 copies printed.

Ed.: K. M. Trubetskov; Ed. of Publishing House: L. F. Petrusha; Tech. Ed.: P. S. Islent'yeva.

PURPOSE: This book is intended for scientific and technical personnel in the metallurgical and machine-building industries.

COVERAGE: The book deals with the effect of dissolved hydrogen on the properties of steel and on flake formation. Specific questions discussed are the behavior of hydrogen during the steelmaking process and subsequent ingot-reduction and the effect of heat treatment on hydrogen content and flake formation. The author also discusses current methods of dealing with the flake problem and the mechanism of flake formation in steel. No personali-

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ties are mentioned. There are 136 references: 95 Soviet, 22 English, 9 German, 4 French, 1 Swedish, and 1 Chinese.

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18(3)

AUTHORS: Povolotskiy, D. Ya., Morozov, [illegible] SOV/163-59-1- 59

TITLE: Hydrogen Content and the Formation of Internal Cracks in Semi-finished Products With a Heavy Profile (Soderzhaniye vodoroda i obrazovaniye flokenov v zagotovkakh krupnogo profilya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959. Nr 1. pp 37-41 (USSR)

ABSTRACT: In this investigation the billets were bored through in the center of one side face by means of a core bit. The core extracted by the core bit had a diameter of 10-12 mm whereas its length was equal to the width of the billet. Previous to the analysis the sample was crushed and then the hydrogen content was determined (Ref 4). 130 roughed billets and rolled blooms from 30 different steel melts exhibiting pearlite, pearlite-martensite, and martensite structures, were investigated. It appeared that the hydrogen is distributed inhomogeneously through the cross sectional area of the billets cooled in air, whereby the hydrogen concentration decreases from the axis toward the exterior zones of the billet. A heat treatment (annealing at 660-700° through 30-40 hours) did hardly reduce the overall hydrogen content in the metal and

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modify the character of hydrogen distribution through the cross sectional area of the billet. Annealing extended over even longer periods, however, results in a decrease of the non-uniformity of hydrogen distribution in the central and exterior zones. The non-uniform hydrogen distribution through the billet cross section is a consequence of the inhomogeneous hydrogen distribution occurring in the ingots. This is proved right by the experiments described in this paper. A rolling to a thinner profile (down to 127x127 mm) does not modify the nature of hydrogen distribution. In order to immunize the steel against the formation of internal cracks, the hydrogen content must be reduced to a value of 1.5-2 cm³/100 g. This can be achieved by exposing the molten metal to a vacuum or by a protracted annealing of the semifinished steel products at 660-700° after the first working. In order to reduce the hydrogen content in semifinished steel products with a cross sectional area of 250x250 mm to a value of 2 cm³/100 g the annealing process must be continued to 90-120 hours. By this treatment the metal becomes insensitive to crack formation. This fact was revealed in the course of special investigations