

18(3)

AUTHORS:

Kleytn, A. L., Umrikhin, P. V.

SOV/163-58-4-10/47

TITLE:

Evaluation of Limestone as a Fluxing Agent in the Siemens-Martin-Process (Otsenka izvestnyaka kak flyusa v martenovskom protsesse)

PERIODICAL:

Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 4, pp 59-62 (USSR)

ABSTRACT:

The splitting-up of limestone on heating is taken into account for the evaluation of the quality of limestone. The causes of its splitting-up when heated are: 1) Separation of hygroscopic moisture and crystallization moisture, 2) great difference of the linear factors of expansion of calcite crystals which are determined in parallel and vertical position to their optical axes, 3) separation of CO<sub>2</sub> on dissociation, 4) the effect of these three factors is increased with a significant rise of temperature. The authors have worked out a method of comparing the limestones according to the degree of splitting-up under the influence of all the factors mentioned above. The paper describes this method and the results of the investigation of several varieties of limestone. 1) Since the acceleration of slag formation depends also on the expansion of the reaction.

Card 1/2

Evaluation of Limestone as a Fluxing Agent in the  
Siemens-Martin-Process

SOV/163-58-4-10/47

surface between the slag and the fluxing agent, the splitting-up  
i. e. the crushing of the fluxing agent during its assimilation  
by the slag melt must be taken into account. 2) If crude  
limestone is used as a fluxing agent an additional  
characteristics for evaluating limestone has been suggested in  
the form of a splitting-up-index. 3) The method of evaluating  
the splitting-up-index for limestone has been worked out in  
principle and can be improved in order to adjust it to  
working-conditions. There are 2 figures, 2 tables, and  
5 references, 4 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskii institut (Ural Polytechnical  
Institute)

SUBMITTED: March 11, 1958

Card 2/2

KLEYN, A.L., inzh.; UMRIKHIN, P.V., doktor tekhn.nauk, prof.

Interaction of basic liquid slag and limestone. Izv. vys. ucheb.  
zav.; chern.met. no.5:13-20 My '58. (MIRA 11:7)

1.Ural'skiy politekhnicheskii institut.  
(Open-hearth process) (Flux (Metallurgy))

ROMANOV, A.A., inzh.; UMRIKHIN, P.V., doktor tekhn.nauk, prof.

Improvement of ingot structure by vibrating steel in the course  
of solidification. Izv. vys. ucheb. zav.; chern. met. no.7:  
37-43 J1 '58. (MIRA 11:10)

(Steel ingots--Vibration) (Solidification)

BOGATENKOV, V.F., inzh.; KUROCHKIN, K.T., dots., kand.tekhn.nauk;  
UMRIKHIN, P.V., prof., doktor tekhn.nauk

Water permeability of basic slags. Izv.vys.uчеб.sov.; chern.met.  
no.8:13-20 Ag '58. (MIRA 11:11)

1. Ural'skiy politekhnicheskiy institut.  
(Slag--Permeability) (Steel--Hydrogen content)

SOKOLOV, V.Ye., inzh.; D'YACHKOV, V.I., kand. tekhn. nauk; UMRIKHIN, P.V.,  
dokter tekhn. nauk, prof.

Bottom pouring of killed low-carbon steel. Izv. vys. ucheb.  
zav.; chern. met. no.12:9-16 D '58. (MIRA 12:3)

1.Ural'skiy politekhnicheskii institut.  
(Steel ingots)

*Ural'skiy, P. 6.*

D'YACHKOV, V.I., kand. tekhn. nauk; UMRIKHIN, P.V., prof., doktor tekhn. nauk; SLESAREV, S.G., inzh.; PADEYEV, I.G., inzh.

Improved technology of melting and pouring high-chromium nickel-molybdenum steel [with summary in English]. Stal' 18 no.2:120-126 P. '58. (MIRA 11:3)

1. Ural'skiy politekhnicheskij institut i zavod im. A.K. Serova. (Nickel-chromium-molybdenum alloys--Metallurgy)

AUTHORS: Kleyn, A. L., Umrikhin, P. V. SCV/32-24-7-29, '65

TITLE: On the Determination Methods of the Rupture Quality of Limestones From Different Sites (K metodike opredeleniya pokazatelya rastreskivaniya izvestnyakov raznykh mestorozhdeniy)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 7, pp. 843 - 844 (USSR)

ABSTRACT: Limestone exhibits different properties of friability at heating. This is important in its application in metallurgy and in blast furnaces. Therefore a special method of determination of this quality was worked out. The limestone is ground and is then sieved in three fractions: 10-7, 7-5 and 5-2 mm. The testing equipment consists in principle of a crucible furnace which is adjusted to a temperature of 1000°. The limestone fractions are placed in a corundum crucible and are heated for five minutes. After this time ruptures, but no noticeable decomposition of the limestone should be found. After cooling, the samples are sieved again. The granulometric composition is determined and from it the rupture quality is computed, taking

Card 1/2



On the Determination Methods of the Rupture Quality  
of Limestones From Different Sites

SOV/32-14-7-29/65

into account the mean percentage of particles with a size below 2 mm. In order to obtain a true value, several determinations must be carried out, their number depending upon the bulk of limestone to be investigated. A table containing the values of three sorts of limestone is given. The true specific weight is determined pycnometrically and the apparent specific weight by hydrostatic weighing, a special method being used for this. From the results may be seen, that a tendency prevails of increasing friability as the content of magnesium oxide is reduced and the porosity is increased. There are 1 figure, and 2 tables.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M.Kirova (Ural Poly-technical Institute imeni S.M.Kirov)

Card 2/2

19 (5)

AUTHORS:

Kleyn, A. L., Umrikhin, P. V.,  
Startsev, V. A.

SOV/163-59-2-5/48

TITLE:

Assimilation of Lime and Slag-forming Mixtures by Basic  
Chromic Slags (Assimilyatsiya izvesti i shlakobrazuyushchikh  
smesey osnovnym khromsoderzhashchim shlakom)

PERIODICAL:

Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959,  
Nr 2, pp 27-31 (USSR)

ABSTRACT:

The influence of ferrous oxide (FeO) on the solubility of  
lime during the melting process of slag in the <sup>open-hearth</sup> furnace  
was investigated and the results are given in figure 1. A  
positive influence was confirmed. At the beginning of the  
melting process the basicity in the slag is reduced with the  
increase of the aluminum oxide content (Fig 2, Curve 1). The  
aluminum content in the slag rises in the middle and at the  
end of the melting period from 9-12 %. Thus the solubility of  
lime in the slag melt is increased (Fig 2, Curves 2 and 3).  
The basicity is reduced in the case of a further increase of  
the aluminum oxide content in the slag and the assimilation  
of chalk in the liquid slag is reduced. The lime assimilation  
is improved by the increase of the chromium content in the

Card 1/2

Assimilation of Lime and Slag-forming Mixtures by 207/163-59-2-5/48  
Basic Chromic Slags

slag under the formation of scarcely meltable chromium spinels. The microstructure of the slag with purest lime and of mixtures with bauxite was taken and is given in figure 3 (a - g). There are 3 figures, 1 table, and 6 references, 5 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskii institut (Ural Polytechnic Institute)

SUBMITTED: September 16, 1958

Card 2/2

18.3200

77135  
SOV/148-59-9-5/22

**AUTHORS:** Startsev, V. A. (Engineer), Umrikhin, P. V. (Doctor of Technical Sciences, Professor)

**TITLE:** The Interaction of Carbon of Metal Bath With the Hearth of the Basic Open-Hearth Furnace

**PERIODICAL:** Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, 1959, Nr 9, pp 53-59 (USSR)

**ABSTRACT:** The purpose of this study is to find out the part played by the hearth in the process of decarbonization of metal and also to find out to what extent this process determines the chemical wear of the hearth or its durability. The possibility of the hearth's participation in metallurgical reactions was previously mentioned by V. A. Dement'yev (Dement'yev, V. A., Increase of Durability of the Hearth in Open-Hearth Furnaces, Metallurgizdat, 1950) and A. M. Levin (Levin, A. M., Collection of Papers of Dnepropetrovsk Metallurgical Institute, Nr 28, 1952). The test melts were performed by the scrap process in 100-ton mazut-(residue of petroleum)-fired furnaces and by the scrap-ore process in a 220-ton furnace fired by blast furnace

Card 1/8

The Interaction of Carbon of Metal Bath  
With the Hearth of the Basic Open-Hearth  
Furnace

77135  
SOV/148-59-9-5/22

gas and mazut. The results of 4,500 melts conducted in 100-ton and 220-ton furnaces, covering a period of time during which 200 preventive repairs of the hearth took place, were subject to statistical processing. The results are given in Figures 1 and 2, where each point represents 400-500 melts.

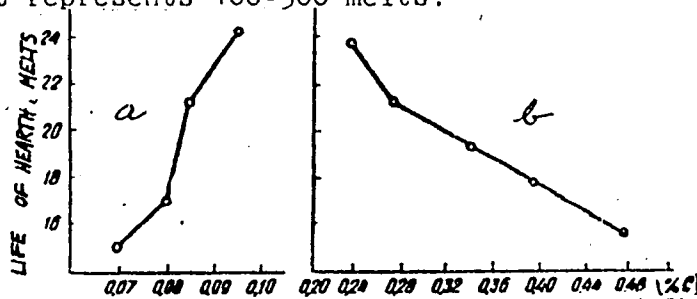


Figure 1. Dependence of life of furnace bottom on average carbon content in metal during period of time between repairs.

Card 2/8

The Interaction of Carbon of Metal Bath With the Hearth of the Basic Open-Hearth Furnace

77135  
SOV/148-59-9-5/22

A drastic decrease of life of burned-in bottom corresponds to the furnace work when producing steel with either raised carbon content (Fig. 1b), or very low carbon content (Fig. 1a).

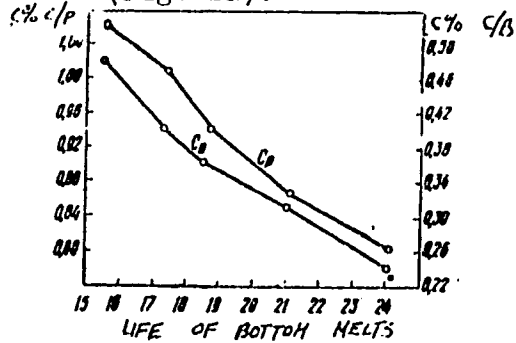


Fig. 2. Dependence of life of furnace bottom on carbon content in metal during smelting process. C<sub>p</sub> = carbon content in metal after tapping; C<sub>B</sub> = carbon content in metal before steel tapping.

Card 3/8

The Interaction of Carbon of Metal  
Bath With the Hearth of the Basic  
Open-Hearth Furnace

77135  
SOV/148-59-9-5/22

Altogether, about 250 samples of burned-in bottom were tested. It was established that carbon content in metal under the slag and along the depth of the bath varies. Study of the chemical composition of the bottom showed that, during the period from the end of tapping to the beginning of charging, the concentration of iron oxides in the surface layer of the bottom increases, and during melting it decreases. The petrographic study shows that the surface layer of the burned-in bottom, being subjected to oxidizing action, consists of large and fine grains of periclase (magnesium oxide), having deep brown or totally black coloring, due to the iron oxides dissolved in them. The cementing phase consists of crystal whiskers of ferrimonticellite  $(CaO \cdot MgO \cdot SiO_2) \cdot FeO$ , which grew in interspace between the grains of periclase, and the opaque glass. The oxidizing effect of the furnace gass on the surface layer of the burned-in bottom apparently decreased considerably as soon as the bottom was covered by the charge materials. The process of

Card 4/8

The Interaction of Carbon of Metal  
Bath With the Hearth of the Basic  
Open-Hearth Furnace

77135  
SOV/148-59-9-5/22

interaction of iron oxides in the surface layer of the bottom with carbon of the metal bath begins in the second half of the melting period, closer to the complete melting of the bath. This process lowers the wear resistance of the burned-in bottom, due to disruption of solidity between the separate grains of periclase, caused by the reduction of iron oxides to the metal. It was established that in the course of melting the content of iron oxides in the surface layer of burned-in bottom decreased. It always happened when carbon content in metal before tapping was over 0.10%. It was also established that the content of iron oxides in the burned-in bottom decreases more during melting of high-carbon steel than during smelting of low-carbon steel. A petrographic investigation of the burned-in bottom showed that during finishing of the melt the grains of periclase (toward the end of the period) are refined, and their color changes to light-yellow, indicating the decrease of dissolved iron oxides. It was discovered that metallic beads of not more than 1 mm

Card 5/8



The Interaction of Carbon of Metal  
Bath With the Hearth of the Basic  
Open-Hearth Furnace

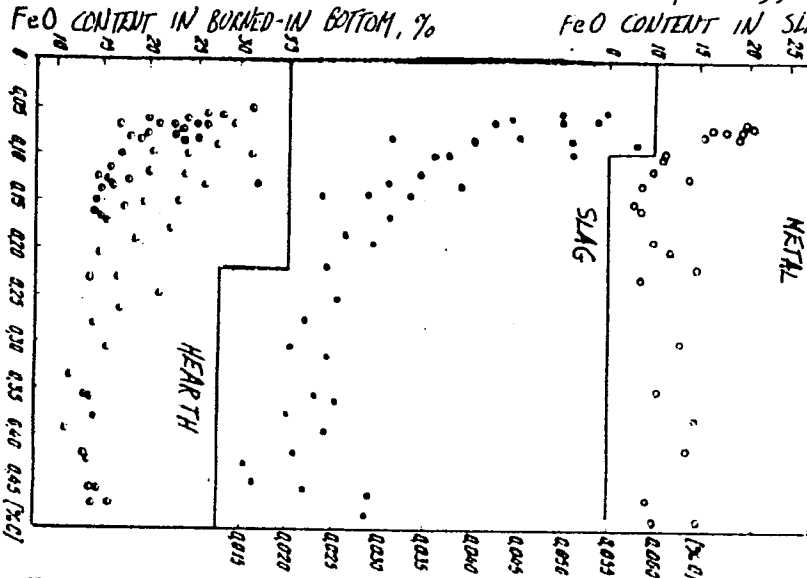
77135  
SOV/148-59-9-5/22

in size are formed along the working surface of the hearth; at a depth of 10-15 mm, they are of 0.15 to 0.25 mm in size. These beads are the product of reduction of iron oxides by the carbon of metal. The wear resistance of the hearth, when producing steel with carbon content under 0.10%, decreases mainly at the end of the melt (see Fig. 3).

Card 6/8

The Interaction of Carbon of Metal Bath With the Hearth of the Basic Open-Hearth Furnace

77135  
SOV/148-5)-9-5/22



Card 7/8

Fig. 3. Relationship between oxygen content in metal and FeO content in slag and the burned-in bottom.

The Interaction of Carbon of Metal  
Bath With the Hearth of the Basic  
Open-Hearth Furnance

77135  
SOV/148-59-9-5/22

To minimize the interaction of the surface layer of the hearth with the metal of the bath, the following measures are recommended: (1) a forced oxidation of carbon in the metal bath in the course of the melt; (2) alternating of high-carbon and low-carbon steel melts; (3) accelerated repairs of the hearth by the burned-in bottom of thick layer of magnesite powder with scale (100-300 mm). There are 5 figures; 3 tables; and 5 Soviet references.

ASSOCIATION: Ural Polytechnic Institute (Ural'skiy politekhnicheskiy institut)

SUBMITTED: June 15, 1959.

Card 8/8

UMRIKHIN, P.V., doktor tekhn.nauk prof.; KUROCHKIN, K.T., kand.tekhn.nauk,  
dots.; NIZHEL'SKIY, P.Ye., kand.tekhn.nauk

Effect of early slag formation on hydrogen content in the  
metal during the open-hearth process. Trudy Ural.politekh.  
inst. no.75:7-19 '59. (MIRA 13:4)  
(Steel--Hydrogen content) (Open-hearth process) (Slag)

SOKOLOV, V.Ye.; UMRIKHIN, P.V.

Effect of manganese, silicon, and aluminum on the formation and  
floating of iron deoxidation products. Trudy Ural. politekh.  
inst. no.93:123-137 '59. (MIRA 15:3)  
(Iron--Metallurgy)

ROMANOV, A.A.; UMRIKHIN, P.V.

Improvement of steel structure during the vibration of steel  
being crystallized. Trudy Ural. politekh. inst. no.93:138-  
151 '59. (MIRA 15:3)  
(Steel ingots) (Crystallization)

BOGATENKOV, V.F., inzh.; UMRIKHIN, P.V., doktor tekhn.nauk prof.;  
KUROCHKIN, K.T., kand.tekhn.nauk

Water permeability of liquid basic slags. Trudy Ural.politekh.  
inst. no.75:20-25 '59. (MIRA 13:4)  
(Slag) (Steel--Hydrogen content)

KUROCHKIN, K.T., kand.tekhn.nauk, dots.; UMRIKHIN, P.V., doktor tekhn.  
nauk, prof.; BOGATENKOV, V.F., inzh.; BUTAKOV, D.K., kand.  
tekhn.nauk, dots.; BAUM, B.A., inzh.

Answer to N.S.Mikhailets. Izv.vys.ucheb.zav.; chern.met.  
2 no.7:147-151 J1 '59. (MIRA 13:2)

1. Ural'skiy politekhnicheskiy institut.  
(Metals--Hydrogen content)



KLEYN, A.L., inzh.; STARTSEV, V.A., inzh.; UMRIKHIN, P.V., doktor  
tekhn.nauk prof.

Certain characteristics of chromium-bearing slags produced  
during the melting stage of the open-hearth process. Izv.  
vys.ucheb.zav.; chern.met. 2 no.8:45-53 Ag '59.  
(MIRA 13:4)

1. Ural'skiy politekhnicheskiy institut. Rekomendovana kafedroy  
metallurgii stali Ural'skogo politekhnicheskogo instituta.  
(Open-hearth process) (Slag--Analysis)  
(Chromium--Analysis)

LUPEYKO, V.M., inzh.; UMRIKHIN, P.V., doktor tekhn.nauk, prof.

Acceleration of steel smelting processes by injecting into  
the open-hearth furnace bath ground slag-forming materials.  
Izv.vys.ucheb.sav.; chern.met. 2 no.10:29-41 0 '59.  
(MIRA 13:3)

1. Institut metallurgii Ural'skogo filiala AN SSSR. Re-  
komendovano kafedroy metallurgii stali Ural'skogo politekhn-  
icheskogo instituta.  
(Steel--Metallurgy) (Open-hearth furnaces)

STARTSEV, V.A., aspirant; UMLIKHIN, P.V., prof., doktor tekhn.nauk

Investigating the interaction of carbon in the metal with a basic  
open-hearth furnace hearth bottom. Trudy Ural. politekh.inst. no.91:  
12-27 '60. (MIRA 14:2)

(Steel--Metallurgy)

(Open-hearth furnaces)

KLEYN, A.L., inzh.; UMNIKHIN, P.V., prof., doktor tekhn.nauk

Assimilation of a complex flux by liquid slags in conditions of  
laboratory and industrial testing. Trudy Ural. politekh.inst.  
no.91:37-46 '60. (MIRA 14:2)  
(Flux (Metallurgy)—Testing) (Slag—Testing)

UMRIKHIN, I. V.

PHASE I BOOK EXPLOITATION

SOV/5556

85

Moscow. Institut stali.

Novoye v teorii i praktike proizvodstva martenovskoy stali (New [Developments] in the Theory and Practice of Open-Hearth Steelmaking) Moscow, Metallurgizdat, 1961. 439 p. (Series: Trudy Mezhvuzovskogo nauchnogo soveshchaniya) 2,150 copies printed.

Sponsoring Agency: Ministerstvo vysshego i srednego spetsial'nogo obrazovaniya RSFSR. Moskovskiy institut stali imeni I. V. Stalina.

Eds.: M. A. Glinkov, Professor, Doctor of Technical Sciences, V. V. Kondakov, Professor, Doctor of Technical Sciences, V. A. Kudrin, Docent, Candidate of Technical Sciences, G. N. Oyks, Professor, Doctor of Technical Sciences, and V. I. Yavoyskiy, Professor, Doctor of Technical Sciences; Ed.: Ye. A. Borko; Ed. of Publishing House: N. D. Gromov; Tech. Ed.: A. I. Karasev.

PURPOSE: This collection of articles is intended for members of scientific institutions, faculty members of schools of higher education, engineers concerned with metallurgical processes and physical chemistry, and students specializing in these fields.

Card 1/1 7

85

New [Developments] in the Theory (Cont.)

80V/5556

**COVERAGE:** The collection contains papers reviewing the development of open-hearth steelmaking theory and practice. The papers, written by staff members of schools of higher education, scientific research institutes, and main laboratories of metallurgical plants, were presented and discussed at the Scientific Conference of Schools of Higher Education. The following topics are considered: the kinetics and mechanism of carbon oxidation; the process of slag formation in open-hearth furnaces using in the charge either ore-lime briquets or composite flux (the product of calcining the mixture of lime with bauxite); the behavior of hydrogen in the open-hearth bath; metal desulfurization processes; the control of the open-hearth thermal melting regime and its automation; heat-engineering problems in large-capacity furnaces; aerodynamic properties of fuel gases and their flow in the furnace combustion chamber; and the improvement of high-alloy steel quality through the utilization of vacuum and natural gases. The following persons took part in the discussion of the papers at the Conference: S.I. Filippov, V.A. Kudrin, M.A. Glinkov, R.P. Nam, V.I. Yavoyskiy, G.N. Oyks and Ye. V. Chelishchev (Moscow Steel Institute); Ye. A. Kazachkov and A. S. Kharitonov (Zhdanov Metallurgical Institute); N.S. Mikhaylets (Institute of Chemical Metallurgy of the Siberian Branch of the Academy of Sciences USSR); A.I. Stroganov and D. Ya. Povolotskiy (Chelyabinsk Polytechnic Institute); P.V. Umrikhin (Ural Polytechnic Institute); I.I. Fomin (the Moscow "Serp i molot" Metallurgical Plant); V.A. Fuklev (Central Asian Polytechnic Institute)

Card 2/14

New [Developments] in the Theory (Cont.)

84  
80V/5556

and M.I. Beylinov (Night School of the Dneprodzerzhinsk Metallurgical Institute).  
References follow some of the articles. There are 268 references, mostly Soviet.

TABLE OF CONTENTS:

Foreword	5
Yavoyakiy, V. I. [Moskovskiy institut stali - Moscow Steel Institute]. Principal Trends in the Development of Scientific Research in Steel Manufacturing	7
Filippov, S. I. [Professor, Doctor of Technical Sciences, Moscow Steel Institute]. Regularity Patterns of the Kinetics of Carbon Oxidation in Metals With Low Carbon Content [V. I. Antonenko participated in the experiments.]	15
Levin, S. L. [Professor, Doctor of Technical Sciences, Dnepropetrovskiy metallurgicheskii institut - Dnepropetrovsk Metallurgical Institute].	

Card 5/14

New [Developments] in the Theory (Cont.)

80V/5556

On the Theory of Carbon Oxidation in the Open-Hearth Bath

22

Chelishchev, Ye. V. [Docent, Candidate of Technical Sciences, Moscow Steel Institute]. Special Features of Carbon Oxidation in the Open-Hearth Bath

31

Mikhaylets, N. S. [Candidate of Technical Sciences, Khimiko-metallurgicheskiy institut Sibirskogo otdeleniya AN SSSR - Institute of Chemical Metallurgy of the Siberian Branch of the Academy of Sciences, USSR]. Carbon Oxidation in the Baths of Open-Hearth Furnaces of Various Sizes

44

Startsov, V. A. [Engineer], and P. V. Umrikhin [Professor, Doctor of Technical Sciences, Ural'skiy politekhnicheskiy institut - Ural Polytechnic Institute]. Interaction Between the Metal-Bath Carbon and the Hearth of the Basic Open-Hearth Furnace During the Scrap and Ore-Scrap Processes

53

Stroganov, A. I. [Docent, Candidate of Technical Sciences, Chelyabinskiy politekhnicheskiy institut - Chelyabinsk Polytechnic Institute]. Carbon Oxidation in the Open-Hearth Bath

61

Card 4/14



New [Developments] in the Theory (Cont.)	SOV/5556	4
Rybakov, L. S. [Docent, Candidate of Technical Sciences, Ural Polytechnic Institute]. Carbon Oxidation During the Melting Period in the Basic Open-Hearth Scrap and Scrap-Ore Processes		69
Discussion of Papers		79
Rybakov, L. S. Investigating the Slag Formation in the Basic Open-Hearth Scrap and Scrap-Ore Processes		89
Rybakov, L.S. Slag Formation in the Basic Open-Hearth Furnace During the Introduction of Oxygen Into the Flame		102
<u>Umrikhin, P.V., V.A. Startsev, and A.L. Kleyn [Engineer, Ural Polytechnic Institute]. Slag Formation During the Melting Period in Processing the Chrome-Containing Charge</u> [P. Ye. Nizhel'skiy, Candidate of Technical Sciences, and V.P. Krysov, Engineer, participated in the research work]		111

Card 5/14

New [Developments] in the Theory (Cont.)

BOV/5556

10

Kleyn, A.L., and P.V. Umrikhin [Ural Polytechnic Institute]. Slag Formation When Using Composite Flux Produced by Calcination of Lime-Bauxite Mixture

117

Ushakov, Ye. N. [Candidate of Technical Sciences], Ye. V. Abrosimov, [Docent, Candidate of Technical Sciences], V.I. Kozlov, V.A. Shcherbakov [Engineers], A.G. Kotin [Candidate of Technical Sciences], and M.P. Sabiyev [Engineer], [Moscow Steel Institute, Ukrainskiy nauchno-issledovatel'skiy institut metallov - Ukrainian Scientific Research Institute of Metals, Alchevskiy metallurgicheskiy zavod - Alchevsk Metallurgical Plant]. Improving the Steelmaking Process in Large-Capacity Open-Hearth Furnaces

125

Voloshina, N.M. [Engineer]. Using Ore-Lime Briquets Instead of Ore and Lime in the Open-Hearth Process

133

[D.I. Sapiro, P.I. Kovalev, S.I. Zhmak, G. Ye. Kravtsov, Engineers, and I.M. Tkachenko, A.P. Poletayev, Technicians participated in the research work]

Ofengenden, A.M. [Engineer]. Accelerating the Slag Formation and Desulfurisation in the Open-Hearth Process

140

Card 6/14

New [Developments] in the Theory (Cont.)	SOV/5556	7
Kondrat'yev, A.I., and V.A. Chernyakov. [Engineers, Moscow Steel Institute]. Intensification of the Steel Desulfurization Process		147
Kiselov, A.A. [Engineer, Zavod "Krasnyy Oktyabr'" - Krasnyy Oktyabr'" Plant]. Some Problems of the Slag-Formation Process in Open-Hearth Furnaces		156
Lupeyko, V.M. [Engineer], and P.V. Umrikhin [Institut metallurgii Ural'skogo filiala AN SSSR - Institute of Metallurgy of the Ural Branch of the Academy of Sciences USSR]. Intensifying Steelmaking Processes by Blowing the Powdered-Slag Formers Into the Open-Hearth Bath		161
[V.F. Isupov, I.G. Fadeyev, and others participated in the research work]		
Sobolev, S.K. [Engineer], and G.N. Oyka, [Moscow Steel Institute]. Off-Furnace Desulfurization of Cast Iron by Blowing Lime and Aluminum Suspensions		173

Card 7/14

UMORIKH, P.V.

115

PHASE I BOOK EXPLOITATION

SOV/5411

Konferentsiya po fiziko-khimicheskim osnovam proizvodstva stali. 5th, Moscow, 1959.

Fiziko-khimicheskiye osnovy proizvodstva stali; trudy konferentsii (Physicochemical Bases of Steel Making; Transactions of the Fifth Conference on the Physicochemical Bases of Steelmaking) Moscow, Metallurgizdat, 1961. 512 p. Errata slip inserted. 3,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova.

Responsible Ed.: A. M. Samarin, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: Ya. D. Rozentaveyg. Tech. Ed.: V. V. Mikhaylova.

Card 1/3

115

Physicochemical Bases of (Cont.)

SOV/5411

**PURPOSE:** This collection of articles is intended for engineers and technicians of metallurgical and machine-building plants, senior students of schools of higher education, staff members of design bureaus and planning institutes, and scientific research workers.

**COVERAGE:** The collection contains reports presented at the fifth annual convention devoted to the review of the physicochemical bases of the steelmaking process. These reports deal with problems of the mechanism and kinetics of reactions taking place in the molten metal in steelmaking furnaces. The following are also discussed: problems involved in the production of alloyed steel, the structure of the ingot, the mechanism of solidification, and the converter steelmaking process. The articles contain conclusions drawn from the results of experimental studies, and are accompanied by references of which most are Soviet.

Card 2/16

· Physicochemical Bases of (Cont.)	SOV/5411	
Bogatenkov, V. F., K. T. Kurochkin, and P. V. Umrikhin. Investigating the Permeability of Basic Open-Hearth Slag to Hydrogen		195
Grigor'yev, V. P., A. F. Vishkarev, B. G. Korolev, Ye. V. Abrosimov, and V. I. Yavoyskiy. Effect of Phosphorus and Manganese on the Surface Tension of Ferrocarbon Alloys		204
Khitrik, S. I., and Ye. I. Kadinov. Reducing Chromium Losses in Making Stainless Steel With the Use of Oxygen [Blast]		213
[The following persons participated in the research work: A. V. Rabinovich, Yu. V. Chepelenko, V. P. Frantsov, I. P. Zabaluyev, V. F. Smolyakov, P. V. Demidov, M. M. Dovgiy, T. M. Bobkov, Ye. I. Moshkevich, A. M. Neygovzen, T. F. Olenich, K. P. Gunaza, B. I. Zlatkina, and Yu. A. Nefedov.]		

PART II. CONVERTER PROCESSES

Baptizmanskiy, V. I. Certain Problems of the Mechanism and

Card 9/16

YERSHOV, G.S.; UMRIKHIN, P.V.; KUROCHKIN, K.T.

Water permeability of acid open-hearth furnace slags. Izv.  
vys. ucheb. zav.; Chern. met. no. 1:65-72 '61. (MIRA 14:2)

1. Ural'skiy politekhnicheskii institut.  
(Open-hearth furnaces--Equipment and supplies)  
(Slag--Permeability)

S/148/61/000/002/001/011  
A161/A133

**AUTHORS:** Baum, B. A., Kurochkin, K. T., Umrikhin, P. V.

**TITLE:** The process of hydrogen liberation from liquid steel in gas blowing

**PERIODICAL:** Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 2, 1961, 22 - 31

**TEXT:** The results of an experimental investigation are discussed with references to data of nineteen works partly confirming the authors' conclusions and partly illustrating that the existing opinions on the process are different. Three alloys were melted in the subject experiments: a) Fe - C (0.8 - 1.0% C, 0.10 Mn, 0.01 Si, 0.015 P, 0.004 S, 0.1 - 0.3 Al); b) Fe - S (0.02 C, 0.10 Mn, 0.01 Si, 0.015 P, 0.07 - 0.09 S, 0.1 - 0.3 Al); c) Fe - C - S (0.8 - 1.0 C, 0.10 Mn, 0.01 Si, 0.015 P, 0.07 - 0.09 S, 0.1 - 0.3 Al). The test conditions were the following: 30 - 35 kg of the metal was melted in a laboratory induction furnace; blowing and mixing was effected at a reduced current of 10 - 15 kw; the bath depth was 160 - 180 mm; deoxidization was carried out with aluminum, the gas was blown through one iron pipe with magnesite cylindrical nozzle with closed bottom and four side holes 4 or 6 mm in diameter; the metal was saturated with hydrogen after melting by

Card 1/3



The process of hydrogen liberation from liquid steel ... S/148/61/000/002/001/011  
A161/A133

means of bubbling with mixed 10% propane and 90% butane; blowing pure argon and helium (with not more than 0.13% N<sub>2</sub> and 0.006% O<sub>2</sub>), nitrogen (N99.0%) and chlorine, at 0.04 - 0.1 atm pressure; the effect of mixing was also studied. The mixing of metal by blowing and stirring did not exceed the usual rixing in shop furnaces. The experimental results are illustrated in graphs and a table. Gas neutral to hydrogen had no effect on its elimination; nitrogen caused an abrupt increase of the hydrogen concentration in the metal; chlorine raised the dehydrogenation rate not only by the  $[H]_{\text{surface}} + [H]_{\text{surface}} - [H_2]_{\text{surf}}$  reaction, but by the formation of HCl as well that was stable under the test conditions. The obtained data as well as observations in other works made previously indicated pulsations and an unsteady motion of the raising gas bubbles in the metal. It is apparent that no resistant laminal films exist on the boundary between the metal and gas bubbles, the liquid metal layer on the boundary with the gas bubble is being permanently renewed, and the rate of element transfer from the volume to the free surface depends on the rate of turbulent diffusion. Hence if an element liberates from the surface layer into the gaseous phase through a chemical reaction at a limited rate, it is very probable that just this reaction will be limiting the process rate. It may therefore be concluded that the hydrogen liberation process from liquid steel during

Card 2/3

S/148/61/000/002/001/011

A161/A133

The process of hydrogen liberation from liquid steel ...

rimming in furnaces and during blowing in ladles is kinetic. The stage limiting the process is the stage of hydrogen recombination in the surface layer with simultaneous desorption of the molecule into gaseous phase. Conclusions: 1) The rate of hydrogen elimination in blowing through the induction furnace crucible is limited by the rate of recombination (with simultaneous molecule desorption) on the metal-gas boundary. 2) The factors having the strongest effect on the rate of the process are - the blown gas consumption, the depth to which the blowing pipe is submerged in metal, the metal temperature, and the pipe nozzle holes diameter. Neither the chemical composition of the metal nor the nature of gas being blown (if it does not react with hydrogen) do have any noticeable effect on the rate of hydrogen elimination. 3) The laboratory test results and a comparison of mixing effect lead to the conclusion that the hydrogen elimination process is also kinetic at the rimming of metal in industrial furnaces and during the blowing in ladles. There are 4 figures, 1 table and 19 references: 14 Soviet-bloc and 5 non-Soviet-bloc. The two references to English-language publications read as follows: C. E. Sims. Electric Furnace Steel Conference Proceedings, v. 7, 1949, 302 - 313; L. F. Barnhardt. Electr. Furnace Steel Conf. Proceedings, v. 13, 1955, 58 - 69.

ASSOCIATION: Ural'skiy politekhnicheskii institut (Ural Polytechnic Institute)

SUBMITTED: June 8, 1960

Card 3/3

BAUM, B.A. (Sverdlovsk); KUROCHKIN, K.T. (Sverdlovsk); UMRIKHIN, P.V.  
(Sverdlovsk)

Effect of hydrogen on the surface tension of iron and its alloys.  
Izv. AN. SSSR. Otd. tekhn. nauk. Met. i topl. no.3:82-89 My-Je '61.  
(MIRA 14:7)

(Iron--Hydrogen content) (Surface tension)

KLEYN, A. L.; UMRIKHIN, P. V.

Interaction of basic liquid slag and lime. Trudy Ural. politekh.  
inst. no.116:5-9 '61. (MIRA 16:6)  
(Open-hearth process) (Surface chemistry)

UMRIKHIN, P.V.

Quality of high-grade steel ingots. Trudy Ural. politekh. inst.  
no.116:76-88 '61. (MIRA 16:6)  
(Iron and steel plants--Quality control) (Steel ingots)

UMRIKHIN, P.V., prof., doktor tekhn. nauk

Improving the steel smelting process. Sbor. nauch. trud. Ural.  
politekh. inst. no.122:191-201 '61. (MIRA 17:12)

YERSHOV, G.S.; KUROCHKIN, K.T.; UMRIKHIN, P.V.

Kinetics of the passage of hydrogen in the gaseous phase through  
slag into the metal. Izv.vys.ueheb.zav.; chern.met. 4 no.6:34-41  
'61. (MIRA 14:6)

1. Ural'skiy politekhnicheskiy institut.  
(Steel—Hydrogen content)

BAUM, B.A.; KUROCHKIN, K.T.; UMRIKHIN, P.V.

Surface activity of hydrogen in liquid iron. Fiz. met. i  
metalloved. 11 no.6:960-961 Je '61. (MIRA 14:6)

1. Ural'skiy politekhnicheskii institut imeni S. M. Kirova.  
(Surface tension)  
(Iron—Hydrogen content)



YERSHOV, G.S.; KUROCHKIN, K.T.; UMRIKHIN, P.V.

Effect of slag conditions on hydrogen behavior in the metal  
of an acid open-hearth furnace. Izv. vys. ucheb. zav.; chern.  
met. 5 no.5:56-62 '62. (MIRA 15:6)

1. Ural'skiy politekhnicheskiy institut.  
(Open-hearth furnaces) (Steel—Hydrogen content)

S/032/62/028/012/023/G23  
B104/B186

AUTHORS: Levin, Ye. S., Kurochkin, K. T., and Umrikhin, P. V.

TITLE: A device for hydrogen sampling of liquid metal samples by vacuum treatment

PERIODICAL: Zavodskaya laboratoriya, v.28, no. 12, 1962, 1530-1531

TEXT: With the device shown in the figure, liquid metal is sampled in the following way: the tap (3) is opened and the rod (1) is pushed down until the mouthpiece of the ampoule (15) is immersed in the metal. After the ampoule is filled the rod is pulled out. The ampoule is not completely inside the body (2). The tap (3) is then closed, and the body (2) together with the rod is shifted into its topmost position and fixed by the collar (8). The rod is then lowered, the ampoule with the metal sleeve is taken out and immersed in cold water. After the ampoule has been replaced the device is restored to its initial position. There is 1 figure.

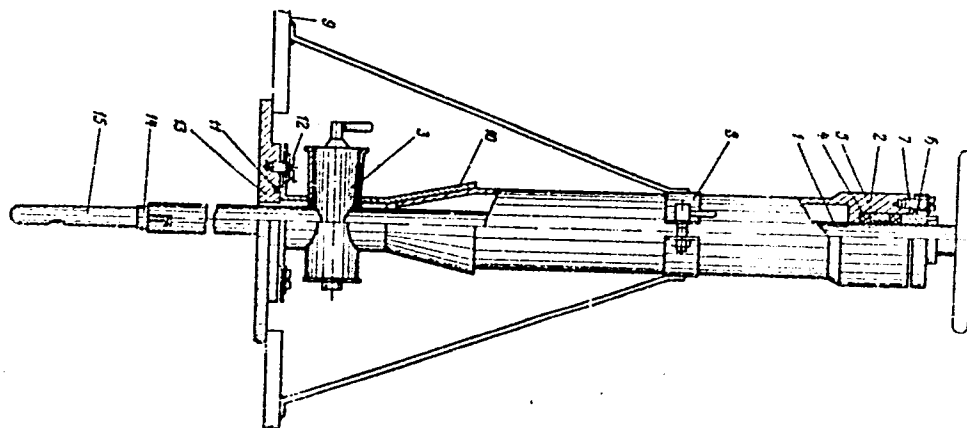
ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute) ✓

Card 1/2

A device for hydrogen sampling...

S/032/62/028/012/023/023  
B104/B186

Fig. Diagram of the device. Legend: (4)-(7) sealing, (9) cover of a vacuum induction furnace, (13) flange.



Card 2/2

ARZAMASTSEV, Ye.I.; UMRIKHIN, P.Y.

Melting process in basic open-hearth furnaces with use of  
low-grade manganese ore. Izv. vys. ucheb. zav.; chern.  
met. 6 no.2:58-67 '63. (MIRA 16:3)

1. Ural'skiy politekhnicheskiy institut.  
(Open-hearth process)  
(Manganese ores)

ARZAMASTSEV, Ye.I.; UMRKHIN, P.V.

Role of manganese oxides in the slag formation process in a basic open-hearth furnace. Izv. vys. ucheb. zav.; Chern. met. 6 no.6: 35-42 '63. (MIRA 16:8)

1. Ural'skiy politekhnicheskiy institut.  
(Open-hearth furnaces) (Slag) (Manganese oxide)

L 13347-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD

ACCESSION NR: AP3002899

S/0148/63/000/006/0058/0067

AUTHOR: Lavin, Ye. S.; Kurochkin, K. T.; Umrikhin, P. V.

TITLE: The kinetics of hydrogen removal during vacuuming of molten steel

SOURCE: IVUZ. Chernaya metallurgiya, no. 6, 1963, 58-67

TOPIC TAGS: steel degasification, induction vacuum furnace, VG 50/2500 motor generator, C, Mn, Si, P, S, residual pressure

ABSTRACT: Authors studied the mechanism of steel degasification during its vacuuming. A type MGP - 52V semi-industrial induction vacuum furnace with a VG 50/2500 motor generator was used for the tests. The metal was commercial iron composed of C, Mn, Si, P and S. The metal was melted down and then saturated with hydrogen, after which the slag was cleaned off from the surface and samples were taken for determining the hydrogen content. Test temperatures and holding time were varied. Authors conclude that degasification of a metal during vacuuming occurs under kinetic conditions initially, then in proportion to the decrease of the hydrogen concentration in the mixed and diffusion conditions. Hydrogen content in the metal after degasification was proportional to the square root of the residual pressure in the chamber for all conditions. A change in the hydrogen concentration and

Card 1/2

L 13347-63

ACCESSION NR: AP3002899

degasification rate with a given period of time as is inversely proportional to the square root of the residual pressure in the chamber. In the kinetic region of the degassing process, a reduction in the amount of residual pressure in the chamber is accompanied by a large rise in the degassing rate. It is not too large in the mixed region and very small in the diffusion region. In the case of a prolonged vacuuming, the hydrogen content in steel is practically identical for all amounts of residual chamber pressure. Orig. art. has: 6 figures and 13 formulas.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: 21Feb62

DATE ACQ: 24Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 006

OTHER: 004

Card 2/2

VLASOV, N.N.; UMRIKHIN, P.V.

Addition of chromium to steel before deoxidation by a preliminary  
increase of chromium oxide in the slag. *Izv. vys. ucheb. zav.;*  
*chern. met.* 6 no.10:32-36 '63. (MIRA 16:12)

1. Ural'skiy politekhnicheskii institut.



LEVIN, Ye.S.; KUROCHKIN, K.T.; UMRIKHIN, P.V.

Effect of certain factors on the kinetics of hydrogen removal from liquid steel during its vacuuming. Izv. vys. ucheb. zav.; Chern. met. 6 no.10:43-51 '63. (MIRA 16:12)

1. Ural'skiy politekhnicheskiy institut.

LEVIN, Ye.S.; KUROCHKIN, K.T.; UMRIKHIN, P.V.

Kinetics of the gas removal process during the inert-gas  
blowing of metals and simultaneous vacuuming. Izv. vys. ucheb.  
zav.; chern. met. 6 no.12:38-44 '63. (MIRA 17:1)

1. Ural'skiy politekhnicheskiy institut.

L 16820-63 EMP(q)/EMI(m)/BDS AFFIC/ASD JD  
ACCESSION NR: AP3004209 S/0193/63/000/006/0010/0011

AUTHOR: Levin, Ye. S.; Kurochkin, K. T.; Umrikhin, P. V. 58

TITLE: Device for sampling molten metal during the vacuum process without disturbing the vacuum system 16

SOURCE: Byulleten' tekhniko-ekonomicheskoy informatsii, no. 6, 1963, 10-11 vol. 11/1

TOPIC TAGS: vacuum process, metallurgy, sampling, inspection, analysis, molten metal

ABSTRACT: The Ural Polytechnical Institute has developed a sampler for determining the oxygen, hydrogen, nitrogen, and nonmetallic inclusion contents in metal being processed in a vacuum induction furnace. The device is a steel body with a movable rod passing through a brass vacuum cock into the furnace. The cock is attached to a flange which is welded to the top of the furnace. A quartz test tube is fastened by a metal bushing to the lower end of the rod. The quartz tube has a side opening for spontaneous filling with metal. An aluminum wire is placed into the tube to thicken the sample (approximately 0.5-1.0% aluminum is introduced). To take a sample, the rod  
Card 1/2

L 16820-63

ACCESSION NR: AP3004209

is lowered into the metal to fill the tube. Then the tube is raised, removed together with the bushing, and another tube and bushing are attached in their place for the next sampling. The interval between samplings is no more than 30 secs. This sampler has proven reliable and easy to maintain when used on a vacuum induction furnace of the MGP-52V type. Sampling for quick analysis makes it possible to control the vacuum process during operation. Original art. has: 1 figure.

ASSOCIATION: None

SUBMITTED: 00

DATE ACQ: 02Aug63

ENCL: 00

SUB CODE: ML

NO REF SOV: 000

OTHER: 000

Card 2/2

VECHER, N.A.; UMRIKHIN, P.V.; PANFILOV, M.I.; PASTUKHOV, A.I.; TSEKHANSKIY,  
M.I.; ARONOVICH, M.S.; POSYSAYEV, A.A., inzh.; GARCHENKO, V.T.;  
ORMAN, M.Ye.

Review of D.A.Smoliarenko's book "Quality of carbon steel."  
Stal' 23 no.9:800-804 3 '63. (MIRA 16:10)

YERSHOV, G.S.; UMRIKHIN, P.V.

Effect of slag conditions on the behavior of gases and non-metallic inclusions in acid electric furnace metal. Izv. vys. ucheb. zav.; Chern. met. 7 no.8:50-55 '64.

(MIRA 17:9)

1. Ural'skiy politekhnicheskiy Institut.

LUPEYKO, V.M.; YERSHOV, G.S.; UMRIKHIN, P.V.; MIKHAYLIKOV, S.V.

Improving the method of metal refining by synthetic slags.  
Izv. vys. ucheb. zav.; chern. met. 7 no.3:57-65 '64.

(MIRA 17:4)

1. Ural'skiy politekhnicheskii institut.

VOLKOV, S.S.; UMRIKHIN, P.V.

Desulfuration of the metal in the oxygen-blown converter process  
at the condition of preliminary desiliconization of cast iron.  
Izv. vys. ucheb. zav.; chern. met. 8 no.2:58 '65. (MIRA 18:2)

1. Ural'skiy politekhnicheskii institut.



VOLKOV, S.S.; UMRIKHIN, P.V.; ARZAMASTSEV, Ye.I.; LUPEYKO, V.

Using manganese limestone in oxygen blowing. Izv. vye. ucheb.  
zav.; chern. met. 8 no.10:52-58 '65. (MLRA 18:9)

1. Ural'skiy politekhnicheskiy institut.

LEVIN, Ye.S.; UMRIKHIN, P.V.

Reducing the temperature of liquid steel in the ladle during  
vacuum treatment. Stal' 25 no.2:125-126 F '65. (MIRA 18:3)

1. Ural'skiy politekhnicheskiy institut.

VLASOV, N. I.; ~~MAKHAN, P. V.~~; GUBAYDULLIN, I. N.

Losses of chromium in the alloying of steel in open-hearth  
furnaces. Stal' 25 no.3:221-223 Mr '65. (MIRA 18 4

YAVOYSKIY, V.I., otv. red.; BIGEYEV, A.M., red.; BORKO, Ye.A., red.; GLINKOV, M.A., red.; ZARVIN, Ye.Ya., red.; KAPUSTIN, Ye.A., red.; KOCHO, V.S., red.; KUDRIIN, V.A., red.; LAPITSKIY, V.I., red.; LEVIN, S.L., red.; OYKS, G.N., red.; ROMENETS, V.A., red.; UMRIKHIN, P.V., red.; FILIPPOV, S.I., red.

[Theory and practice of the intensification of processes in converters and open-hearth furnaces; transactions]  
Teoriia i praktika intensifikatsii protsessov v konferte-  
rakh i martenovskikh pechakh; trudy. Moskva, Metallurgiya,  
(MIRA 18:10)  
1965. 552p.

1. Mezhvuzovskoye nauchnoye soveshchaniye po teorii i praktike intensifikatsii protsessov v konverterakh i martenovskikh pechakh. 2. Moskovskiy institut stali i splavov (for Filippov). 3. Zhdanovskiy metallurgicheskiy institut (for Kapustin). 4. Ural'skiy politekhnicheskiy institut (for Umrikhin).

**KRASHOVSKIY, A.A., UMRICHINA, A.V.**

Formation of free radicals in the photochemical reduction of  
chlorophyll and of its analogs. Dokl. AN SSSR 104 no.6:882-885  
0 '55. (MLRA 9:3)

1. Institut biokhimii imeni A.N. Bakha Akademii nauk SSSR.  
Predstavleno akademikom A.N. Tereninym.  
(RADICALS (CHEMISTRY)) (CHLOROPHYLL)

KRASNOVSKIY, A.A., UMRIKHINA, A.V.

Studying the formation of free radicals during photoreduction of chlorophyll and its analogues by the method of initiated chain polymerization. Biofizika 3 no.5:547-557 '58 (MIRA 11:10)

1. Institut biologicheskoy khimii imeni A.N. Bakha AN SSSR, Moskva.  
(CHLOROPHYLL,  
free radical form, in photosynthesis by chain  
polymerization method (Rus))

17(3)

AUTHORS:

Krasnovskiy, A. A., Umrikhina, A. V., SOV/20-122-6-29/49

TITLE:

Application of the Compounds of Bivalent Iron and Ascorbic Acid as Electron Source in Photochemical Reactions of Porphyrins and Chlorophyll in Aqueous Media (Ispol'zovaniye soyedineniy dvukhvalentnogo zheleza i askorbinovoy kisloty v kachestve donorov elektrona pri fotokhimicheskikh reaktsiyakh porfirinov i khlorofilla v vodnykh sredakh)

PERIODICAL:

Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 6, pp 1061-1064 (USSR)

ABSTRACT:

The photochemical reduction of chlorophyll is observed most distinctly when using ascorbic acid as electron source ( $E'_o = +0.05$  V), while the separation of oxygen of water in photosynthesis corresponds to the value  $E'_o = +0.8$  V.

Therefore it is necessary to determine the limits of the redox potential of the source systems of the electron, which systems are capable of a photochemical interaction with chlorophyll and its analogs. In the investigation of the photo-sensitized polymerization of the methyl methacrylate (Ref 1), the authors have ascertained that the chlorophyll

Card 1/4

Application of the Compounds of Bivalent Iron and SOV/20-122-6-29/49  
Ascorbic Acid as Electron Source in Photochemical Reactions of  
Porphyrins and Chlorophyll in Aqueous Media

compounds system of bivalent iron under illumination with red light initiates the polymerization. This indicates the possibility of an elementary "photoreduction" - the electron transition from  $Fe^{2+}$  to the excited chlorophyll molecule with formation of an ion radical (of the reduced chlorophyll form). By the work of the laboratory of the authors it was demonstrated that the oxidized and reduced cytochrome ( $E' = +0.26$  V) are capable of the redox transformations sensitized by chlorophyll (Ref 2). Previously it was shown that porphyrins are capable of a reversible "photoreduction" (Ref 3). But the capability of these pigments of being reduced by ascorbic acid in aqueous media had to be checked. The experiments have shown that in aqueous solutions of sulfuric acid a reduced form with an absorption maximum at  $500\text{ m}\mu$  is formed. But the initial porphyrin has two absorption maxima in this medium and in the range of  $450-600\text{ m}\mu$  has: at  $590$  and at  $545\text{ m}\mu$  (Fig 1 a). The reverse reaction takes place slowly in the presence of air and in the dark. From the results obtained the authors come to the

Card 2/4



Application of the Compounds of Bivalent Iron and                   SOV/20-122-6-29/49  
Ascorbic Acid as Electron Source in Photochemical Reactions of  
Porphyrins and Chlorophyll in Aqueous Media

following conclusion: porphyrins are capable of a reversible "photoreduction" in aqueous acid solutions. They took part in photo-sensitized transfer reactions of the electron from iron ions and from the ions of ascorbic acid to the azo-dye methyl red; finally it was demonstrated that chlorophyll took part in reactions of this type. A. N. Terenin, Academician, followed these investigations with interest. There are 4 figures and 9 references, 7 of which are Soviet.

ASSOCIATION:   Institut biokhimii im. A. N. Bakha Akademii nauk SSSR  
                  (Institute of Biochemistry imeni A. N. Bakh of the Academy  
                  of Sciences, USSR)

Card 3/4

UMRIKHINA, A. V. Cand Biol Sci -- (diss) "The formation of free radicals in photochemical reactions of chlorophyll and its analogues." Moscow, 1960, 23 pp, (Moscow State Univ im M. V. Lomonosov. Faculty of Soil Biology. Inst Biochemistry im A. N. Bakl, Acad Sci, USSR), 130 copies, (KL, 31-60, 141)

BUBNOV, N.N.; KRASNOVSKIY, A.A.; UMRIKHINA, A.V.; TSEPALOV, V.E.;  
SHLYAPINOTOKH, V.Ya.

Electron paramagnetic resonance spectra observable during the  
illumination of plant leaves and photoreduction of chlorophyll  
and its analogues. Biofizika 5 no. 2:122-126 '60. (MIRA 14:4)

1. Institut khimicheskoy fiziki AN SSSR i Institut biokhimii im.  
A.N. Bakha AN SSSR, Moskva.

(CHLOROPHYLL)  
(PARAMAGNETIC RESONANCE AND RELAXATION)

UMRIKHINA, A. V., BRIN, G. F., TOROBYEVA, L. M., DEOZDOVA, M. N.,  
YEROKHIN, M. YE., KRATNOVSKY, A. A., PAKHINA, YE. V. (USSR)

"Different Forms of Chlorophyll and its Analogues and their  
Role in Processes of Photochemical Electron (or Hydrogen)  
Transfer."

Report presented at the 5th International Biochemistry Congress,  
Moscow, 10-16 August 1961

ACCESSION NR: AP4042475

S/0217/64/009/004/0423/0427

AUTHOR: Umrikhina, A. V.; Golubev, I. N.; Kayushin, L. P.;  
Krasnovskiy, A. A.

TITLE: A study of the paramagnetic properties of chlorophyll and  
its analogs

SOURCE: Biofizika, v. 9, no. 4, 1964, 423-427

TOPIC TAGS: tetrapyrrol pigment, chlorophyll, ethyl chlorophyllide,  
pheophytin, phthalocyanin, magnesium phthalocyanin, EPR signal,  
paramagnetic property, light effect, chlorophyll aggregation, EPR  
signal temperature dependence, protoporphyrin, hematoporphyrin

ABSTRACT: The article describes a study of the EPR signals of chloro-  
phyll and some of its structurally different analogs, namely,  
pheophytin, ethyl chlorophyllide, hemo- and protoporphyrin, and  
phthalocyanin and Mg-phthalocyanin. The pigments were examined  
in the form of solid crystalline samples in glass ampuls, either  
evacuated or in the presence of air. All the pigments gave a similar

Card 1/3

ACCESSION NR: AP4042475

EPR signal in the dark; the signal was a singlet with a g-factor close to that of a free electron; different pigments displayed small variations in signal width. This observation led to the conclusion that the presence of the unpaired electrons producing the signal is the result of the system of conjugated double bonds of the porphyrin ring, and not the presence or absence of such structural elements as a phytol group, a cyclopentanone ring, or side radicals. In addition, the effect of light on the EPR signal was studied for all the pigments and the effect of temperature and oxygen for chlorophyll a + b only. It was found that all solid pigments produced an increased signal in vacuum which attained its maximum in about 5-10 min. In air the signal (for chlorophyll a + b) increased more than in vacuum. Experiments with films and solutions of chlorophyll a + b indicated that the degree of the pigment aggregation has a significant effect on the signal. The effect of light on phthalocyanin and Mg-phthalocyanin was somewhat different, resulting in an initial increase, then a subsequent decrease of the signal. The temperature dependence of the chlorophyll a + b signal has a maximum at approximately 40C. The nature of the photoinduced signal was not investigated more closely; it is believed that this signal is caused by unpaired

Card 2/3

ACCESSION NR: AP4042475

electrons which arise as a result of an interaction of the excited molecules of chlorophyll with oxygen molecules. It is concluded that the unpaired electrons are dislocated in the conjugated double-bond system or in "active centers" and defects of the crystal lattice of the pigments. The study is considered qualitative, and an evaluation of the quantum yield of the formation of unpaired electrons is suggested. Orig. art. has: 6 figures.

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR, Moscow (Biophysics Institute, AN SSSR); Institut biokhimi im. A. N. Bakha, AN SSSR, Moscow (Biochemistry Institute, AN SSSR)

SUBMITTED: 10Jun62

ATD PRESS: 3073

ENCL: 00

SUB CODE: OC, EM

NO REF SOV: 003

OTHER: 001

Card 3/3

ACCESSION NR: AP4025118

S/0020/64/155/003/0691/0693

AUTHOR: Krasnovskiy, A. A. (Corresponding member, AN USSR); Umrikhina, A. V.

TITLE: On the abiogenic formation of porphine and the participation of the latter in processes of photochemical electron transfer

SOURCE: AN SSSR. Doklady\*, v. 155, no. 3, 1964, 691-693

TOPIC TAGS: Abiogenic synthesis, life origin, porphine, porphine compounds, energy transfer, electron transfer, photosensitization, porphine synthesis

ABSTRACT: This study was prompted by the A. I. Oparin's concept of the formation of primary organic substances on Earth from simple inorganic compounds (abiogenic synthesis) under the influence of UV solar radiation, ionizing radiation, or glow discharge. The study consisted in tracing the fluorescence of porphine formed from pyrrole and formaldehyde in sealed glass or quartz ampuls. For evacuated ampuls, 8-10-hr heating in a steam bath was required to obtain the distinct red fluorescence of porphine, while in the presence of air

Card 1/2



ACCESSION NR: AP4025118

oxygen a considerable amount, of porphine was formed within an hour. The presence of water or some oxides, such as oxides of silicon, aluminum, titanium, zinc etc., seemed to promote the formation of porphine in the above described reaction. UV radiation was found to be inactive. The purified porphine formed photosensitized the electron transfer from ascorbic acid in the presence of ferrous salts to the final electron acceptor, which was methyl red in the experiments described. The results confirm the possibility of the abiogenic synthesis of porphine, which could function as a photosensitizer in photochemical electron-transfer reactions in which ferrous salts are electron donors. It is noted that ferrous salts probably occurred very widely in the primordial ocean. Gratitude is expressed to Academician A. I. Oparin for his continuous interest in the work. The work was completed at the Institute of Biochemistry, AN SSSR.

ASSOCIATION: Institut biokhimii im. A. N. Bakha Akademii nauk SSSR  
(Institute of Biochemistry, Academy of Sciences SSSR)

SUBMITTED: 24Dec63

DATE ACQ: 17Apr64

ENCL: 00

SUB CODE: CH

NOI REF SDV: 005

OTHER: 001

Card 2/2

ACCESSION NR: AP4030791  
AUTHOR: Umrikhina, A. V. (Corr. member, ANSSSR); Krasnovskiy, A. A.  
(Corr. member, ANSSSR) S/0020/64/155/004/0904/0907

TITLE: Initiation of methyl methacrylate polymerization by reduced forms of chlorophyll and hematoporphyrin

SOURCE: AN SSSR. Doklady\*, v. 155, no. 4, 1964, 904-907

TOPIC TAGS: chlorophyll, hematoporphyrin, tetrapyrrol pigment, reduced chlorophyll, reduced hematoporphyrin, photoreduction, zinc amalgam reduction, chlorophyll ion radical, hematoporphyrin ion radical, free radical, electron donor, polymerization initiation, methyl methacrylate, chlorophyll analog

ABSTRACT: An attempt was made at the Institute of Biochemistry, Academy of Sciences SSSR, to verify the formation of free radicals in reduction reaction of chlorophyll and its analogs with zinc. Zinc was selected as the reducing agent in order to exclude the presence of electron donor radicals from the liquid phase of the system. The reduction was conducted in Tunberg tubes [sketch shown in the article].

ACCESSION NR: AP4030791

in the upper part of which chlorophyll (or hematoporphyrin) was reduced in the dark in pyridine solution with zinc amalgam. The reduction was carried out either in the presence of a small amount of glacial acetic acid or without it. The reduced pigment was transferred into the lower part of the tube for spectroscopic study or for chemical tests for the presence of free radicals. The spectral investigation indicated that chlorophyll is reduced to a compound with an absorption peak of 520 m, either with or without glacial acetic acid. Hematoporphyrin without the acid was reduced to a form with an absorption peak of 460 m, and with the acid, to a form with a 670-680-m peak. The reduced forms are very unstable. The reduced chlorophyll form reverts to the initial form within 5-6 min in vacuum; conversion takes place instantaneously on the admission of air into the tube. The hematoporphyrin product is somewhat stabler, but the same conversions also take place. The difference between two reduced forms of the pigments — the photoreduced (e.g., with ascorbic acid) and zinc amalgam-reduced in the dark — is pointed out. The photoreduced form of chlorophyll shows no EPR signal, does not initiate polymerization, and is stable, although its spectrum is similar to that

Card 2/3

ACCESSION NR: AP4030791

of the unstable and very reactive zinc amalgam-reduced form. It is assumed that the photoreduced form is not a free radical, but a product with saturated valences. The presence of free radicals in the zinc amalgam-reduced form was verified by the initiation of the polymerization of methyl methacrylate in the same Tunberg tubes. No polymerization took place in the control tests without pigment. The admission of air to the reduced pigment either inhibited the polymerization entirely (as in the case of chlorophyll without acetic acid) or considerably reduced it. On the basis of the above data, the formation of ion-radicals of the pigments by electron transfer from zinc is assumed. The spectral similarity of the photoreduced and zinc amalgam-reduced (in the dark) forms should be taken into account in spectroscopic studies. Orig. art. has: three figures and 1 table.

ASSOCIATION: Institut biokhimii im. A. N. Bakha Akademii nauk SSSR (Institute of Biochemistry, Academy of Sciences SSSR)

SUBMITTED: 24Dec63

DATE ACQ: 30Apr64

ENCL: 00

SUB CODE: CH

NO REF SOV: 010

OTHER: 002

Card 3/3

L 1375d-65 EWT(m) Ph-4/Pa-4 ASD(a)-5/SSD/AS(m)-2/AFNL/RAEM(c)/RAEM(a)/ESD/RS/1/  
ACCESSION NR: AP4049143 ESD(t) RV S/0020/64/159/001/0196/0197

AUTHOR: Rikhteva, G. T.; Gribova, Z. P.; Kayushin, L. P.; Barikhina,  
A. V.; Krasnovskiy, A. A. (Corresponding member AN SSSR)

TITLE: Observation of the electron paramagnetic resonance of the tri-  
plet state of chlorophyll

SOURCE: AN SSSR. Doklady\*, v. 159, no. 1, 1964, 196-197

TOPIC TAGS: chlorophyll, chlorophyll free radical, chlorophyll  
triplet state, EPR, porphyrin triplet state, electron transfer, photo-  
reduction, photooxidation

ABSTRACT: A study was conducted for the purpose of establishing the  
existence of the triplet state of chlorophyll under illumination.  
Frozen (at 77K) chromatographically pure chlorophyll solutions in  
methanol (10<sup>-3</sup> M) were investigated. Chlorophyll a, b, and c  
were used. A DRSh-1000 mercury quartz lamp with B-8 light filter  
(transmittance over 370 nm), or a BKSh-1000 xenon lamp with B-10 filter  
(transmittance over 580 nm) were used as light sources. Heat was

Card 1/2

L 13764-65

ACCESSION NR: AP4049143

eliminated by a water filter. The light intensity was regulated by metal wire-screen filters. Formation of the triplet state of chlorophyll was established in both cases, i.e., illumination in the entire visible range of the spectrum (BS-8 filter), and in red light only (BS-10 filter). The triplet state was indicated by the appearance of a singlet band in the EPR spectrum. The signal was produced by chlorophyll b; chlorophyll a produced no signal under similar conditions. The dependence of the yield of free radicals on the intensity of illumination was fairly closely expressed by a square function. It was assumed that the pigment produced free radicals as a result of either photooxidation (by residual oxygen) or photoreduction. Orig. art. has: 2 figures.

ASSOCIATION: Institut biologicheskoy fiziki Akademii nauk SSSR (Institute of Biophysics, Academy of Sciences, SSSR); Institut biokhimii im. A. N. Bakha Akademii nauk SSSR (Institute of Biochemistry, Academy of Sciences, SSSR)

SUBMITTED: 14 Jul 64

ENCL: 00

SUB CODE: LS, NP

NO REF SOV: 005

OTHER: 001

ATD PRESS: 3132

Card 2/2

POGLAZOV, Boris Fedorovich; SHPIKHTER, V.G., doktor biol. nauk,  
otv. red.; UMRIKHINA, A.V., red.

[Structure and functions of contractile proteins] Struktura  
i funktsii sokratitel'nykh belkov. Moskva, Nauka, 1965.  
222 p. (MIRA 18:9)

ZAYTSEVA, Galina Nikolayevna; BELOZERSKIY, A.N., akademik,  
otv. red.; UMRIKHINA, A.V., red.

[Biochemistry of Azotofacter] Biokhimiia azotobaktera.  
Moskva, Nauka, 1965. 302 p. (MIRA 18:6)



RIKHIREVA, G.T.; UMRIKHINA, A.V.; KAYUSHIN, L.P.; KRASNOVSKIY, A.A.

Formation of triplet and radical states of porphyrin and its derivatives.  
Dokl. AN SSSR 163 no.2:491-494 J1 '65. (MIRA 18:7)

1. Institut biologicheskoy fiziki AN SSSR i Institut biokhimii im.  
A.N.Bakha AN SSSR. 2. Chlen-korrespondent AN SSSR (for Krasnovskiy).

POGLAZOV, Boris Fedorovich; SHPIKITER, V.O., doktor biol. nauk,  
otv. red.; UMRIKHINA, A.V., red.

[Structure and functions of contractile proteins] Struk-  
tura i funktsii sokratitel'nykh belkov. Moskva, Nauka,  
1965. 222 p. (MIRA 18:7)

VLADIMIROV, Yuriy Andreyevich; FRANK, G.M., otv. red.; UMRIKHINA,  
A.V., red.

[Photochemistry and luminescence of proteins] Fotokhimiia  
i liuminestsentsiia belkov. Moskva, Nauka, 1965. 231 p.  
(MIRA 19:1)

UMRIKHINA, G. S.

Seasonal phenomena in the life of some birds of the Chu Valley.  
Izv. AN Kir. SSR. Ser. biol. nauk 4 no.1:89-101 '62.  
(MIRA 15:10)

(Chu Valley—Birds)

BLAZHEVICH, V.A.; UMRIKHINA, Ye.N.

[Handbook on the use of FR-12 resorcinol-formaldehyde resin for exclusion work in oil and injection wells]  
Rukovodstvo po primeneniю rezortsino-formal'mal'degidnoi smoly FR-12 dlia izoliatsionnykh rabot v neftianykh i magnetatel'nykh skvazh'nakh. Sost. V.A.Blazhevich, E.N.Umrikhina. Ufa, 1963. 24 p. (MIRA 17:8)

1. Ufa. Neftyanoy nauchno-issledovatel'skiy institut.

BLAZHEVICH, V.A.; UMRIKHINA, Ye.N.; MAKHMUTOV, N.R.

Use of FR-12 synthetic resin for exclusion operations in oil wells. Nefteprom. delo no.10:24-27 '63. (MIRA 17:6)

1. Ufimskiy neftyanoy nauchno-issledovatel'skiy institut.

UMRIKHINA, Ye.N.; BLAZHEVICH, V.A.; STAL'NOVA, M.A.; RAYEVSKAYA, V.I.;  
BRODSKIY, G.S.; RABINOVICH, A.B.

Use of plastics in the sealing off of the flow of stratial  
waters in oil wells. Plast. massy no.8:36-40 '64.

(MIRA 17:12)

UMRIKHINA, Z.A., klinicheskiy ordinator

Mixed tumor of the parapharyngeal space simulating a neoplasm  
of the tonsil. Zdrav.Bel. no.3:62-63 '62. (MIRA 15:5)

1. Kafedra bolezney ukha, gorla i nosa Vitebskogo meditsinskogo  
instituta (zaveduyushchiy - dotsent G.M. Smerlov).  
(SALIVARY GLANDS---TUMORS)



POSPELOV, N.; UMRILOV, Ya.

"Every Sunday is a sports day. Za rul. 18 no.6:2-3 Je '60.

1. Predsedatel' soveta Sverdlovskogo avtomotokluba (for  
Pospelov). 2. Nachal'nik Sverdlovskogo avtomotokluba (for  
Umrilov). (MIRA 13:8)

(Sverdlovsk--Motorcycle racing)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

117

Polyphosphoric acid compounds in yeast cells and in skeletal muscle. B. Umsharov and K. Gibayko. *Acta Biol. Exptl. (Warsaw)* 11, 124-6 (1937); cf. C. A. 31, 4719d. —An unidentified polyphosphoric acid salt is pptd. by  $Pb(NO_3)_2$  from yeast exts. at pH 1.0. B. C. P. A.

ASME-SLA METALLURGICAL LITERATURE CLASSIFICATION

SEARCHED INDEXED SERIALIZED FILED

APR 1968

1ST AND 2ND ORDERS												3RD AND 4TH ORDERS											
PROCESSES AND PROPERTIES INDEX																							
Common Element												Common Element											
Materials Note												Materials Note											
<p>F 768. ACCURACY OF ABSOLUTE VISCOSITY MEASUREMENTS. Umstätter, H. (Technik, July 1950, vol. 5, 354-358; abstr in Index Aeronaut., Mar. 1951, vol. 6, 8).          An analysis of the possible sources of error in measurements of viscosity with the capillary viscometer is given. These are summarized in a list of 20 items, together with the means of reducing or eliminating them. It is concluded that the total error cannot be reduced below 0.2% without considerable expenditure on apparatus, especially thermostats. A "free-flow" viscometer is described in which the liquid flows from a set of small bulbs (1,2,5 c.c.) in series vertically through a capillary and then straight into a Dewar flask used as a receiver. The capillary and bulb are enclosed in a sealed glass jacket through which water</p>												<p>T</p>											
ASS-51A METALLURGICAL LITERATURE CLASSIFICATION												<p>(Over)</p>											
SEARCHED												SERIALIZED											
INDEXED												FILED											
MAY 1951												MAY 1951											
FBI - NEW YORK												FBI - NEW YORK											

circulates. The water is controlled by a thermostat and its temperature is measured by a thermometer sealed in the jacket.