"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

Pechkovskiy, V. V.

Thermochemical decomposition of sulfates in the presence of copper. II. Experimental part. V. V. Pechkovskii. *Nauch. Trudy, Novocherkassk. Politekh. Inst. im. S. Ordzhonikidze* 1955, No. 20, 202-8; cf. *C.A.* 51, 11001f.—The rate of reaction and the products formed by the thermal decompn. of $CuSO_4$, $ZnSO_4$, $MnSO_4$, and $MgSO_4$ in the presence of Cu were investigated. Expts. showed that Cu was oxidized with gaseous O formed by the dissocn. of sulfates. T. Durbak

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V V

4

Reaction of sulfides with metal oxides. M. E. Pozin, A. M. Ginstling, and V. V. Pechkovskii. *J. Appl. Chem. U.S.S.R.* 28, 511-15(1955)(Engl. translation).—See *C.A.* 50, 40i.

B. M. R.

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(2)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AID P - 2276

Subject : USSR/Chemistry

Card 1/1 Pub. 152 - 2/21

Author : Pechkovskiy, V. V.

Title : Study of the thermal decomposition of manganese sulfate

Periodical: Zhur. prikl. khim., 28, no.3, 237-244, 1955

Abstract : The mechanism of the decomposition of both pure manganese sulfate and a mixture of manganese sulfate with carbon has been studied. Almost pure Mn_3O_4 was obtained by conducting the decomposition of $MnSO_4$ at 800°C. Six tables, 4 diagrams, 9 references (7 Russian: 1937-52).

Institution: Novocherkassk Polytechnic Institute (im. Sergo Ordzhonikidze)

Submitted : 0 19, 1953

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AID P - 3722

Subject : USSR/Chemistry

Card 1/1 Pub. 152 - 2/16

Author : Pechkovskiy, V. V.

Title : Study of conditions of sulfating roasting of copper sulfide in order to obtain copper sulfate

Periodical : Zhur. prikl. khim. 28, 8, 802-806, 1955

Abstract : Addition of cupric oxide to copper sulfide accelerates the formation of sulfate from sulfide. At 500°C, 26% sulfide was converted to sulfate without addition of cupric acid (in 60 min.). In the presence of 25% CuO, 39% $CuSO_4$, and in the presence of 50%, 47.5% $CuSO_4$ were obtained resp. under identical reaction conditions. Three tables, 3 diagrams, 3 references, all Russian (1938-1949).

Institution : Novocherkassk Polytechnic Institute im. Sergo Ordzhonikidze

Submitted : Dec. 18, 1954

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

Recovery of potassium and magnesium sulfate by thermal decomposition of langbeinite. V. V. Pechkovskii and S. A. Iakhskova (Polytech. Inst., Novocherkassk). Zhur. Prikl. Khim. 29, 1168-80(1956). — Mixts. of langbeinite (NaCl free) with C were heated in a current of air. The percentage of total S (based on K_2SO_4) passing into the gaseous phase increased linearly with the temp. and increased with the C content in the mixt. The percentage of SO_2, k', in the gaseous phase increased linearly with the temp. up to 68% at 900° and then decreased to 66.5% at 950°; simultaneously, the percentage of elemental S, k'', increased continuously to 32.7% at 950°. k' and k'' are functions of the temp. and the C content as follows: at 750, 800, 850, 900, and 950° in mixts. contg. 15% C, k' = 22.6, 42.6, 57.8, 68.0, and 66.2 and k'' = 1.1, 2.8, 5.2, 12.5, and 32.7%; with 20% C, k' = 27.0, 41.0, 59.2, 62.1, and 70.6 and k'' = 1.5, 3.0, 9.0, 27.8, and 78.6%; with 25% C, k' = 35.0, 55.7, 61.2, 68.1, —, and k'' = 1.8, 3.4, 24.6, 41.0, — %. k'' increased rapidly during the 1st 10 min. and tended to become const.

I. Benowitz

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

5

Chem

3

Oxidation of sulphides and sulphide ores. M. E. Vazin, A. M. Glushing and V. V. Pechkovskii (*Zh. prikl. Khim.*, 1955, 28, 1249—1254).—The temp. at which intensive evolution of SO_2 begins when air is passed over FeS, ZnS and CdS rises by this order, and is very close to that for sulphate-sulphide mixtures in a stream of N_2. This suggests that after initial oxidation of surface sulphide the velocity of the reaction between sulphide and sulphate determines the rate of SO_2 evolution, and is itself controlled by the velocity of diffusion of O_2 and SO_2 through the surface layer. At a given temp. production of SO_2 from mixtures of sulphides exceeds that found with each sulphide taken separately. This effect is related to differences in the relative rates of oxidation of the sulphides and of decomp. of the resulting sulphates, as a result of which the sulphide of one metal is able to react with the sulphate of another. R. Truscott.

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V. V.

PECHKOVSKIY, V.V., dots., kand. khim. nauk.

Interaction between molybdenum trioxide and some metal oxides. Trudy NPI 27:167-171 '56. (MIRA 10:12)

1. Kafedra tekhnologii neorganicheskikh veshchestv Novocherkasskogo politekhnicheskogo instituta.
(Metallic oxides)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V. V.

6

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Reactions of sulfur dioxide with metal oxides in the presence of carbon. V. Pechkovskii (A. M. Gorkii State Univ., Molotov). Zhur. Prikl. Khim. 30, 825-32(1957); cf. C.A. 49, 11871b; 50, 16200b.—Metal oxides with and without C were heated in a current (3 l./hr.) of 100% SO_2 gas for 15 min. The exptl. results were correlated with thermodynamic data from partial pressures of the gaseous products. Without C the rate of sulfate formation K with Fe_2O_3, Co_2O_3, and Mn_2O_3 increased with the temp. and passed through a max. at 400, 500, and 600°, resp. In the same temp. range (500-700°) with MgO K increased continuously. The results supported the reaction mechanism: $MO + SO_2 = MSO_3$; $MSO_3 + \frac{1}{2}O_2 = MSO_4$; and $MSO_4 = 2MO + \frac{1}{2}O_2$. In mixts. with C the values of K increased with the temp. and mol. ratio $C/MO = M$. For the same values of M the values of K, for different oxides, increased in the following order: Al_2O_3, MgO, Fe_2O_3, ZnO, Mn_2O_3, Co_2O_3, and CuO. Apparently the reaction of SO_2 with MO in the presence of C is controlled either by the rate of reduction of MO or by the rate of MS formation. The absorption of S by C increased with the temp. and was held so tenaciously that it could not be extd. with CS_2.

I. Bencowitz

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

[illegible], V.[illegible], [illegible], N.[illegible]

Apparatus for the complex study of the properties of precision cast ceramic molds. Sav. lab. 30 no.5:623-625 '64. (MIRA 17:5)

1. Permskiy [illegible] technicheskiy institut.

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

ACCESSION NR: AP4034578 S/0076/64/038/004/0916/0920

AUTHOR: Amirova, S. A. (Perm'); Pechkovskiy, V. V. (Perm'); Prokhorova, V. G. (Perm'); Ostrovskaya, T. V. (Perm'); Lezhneva, A. A. (Perm')

TITLE: Oxidation of iron-vanadium spinel by oxygen.

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 4, 1964, 916-920

TOPIC TAGS: iron vanadium spinel, oxidation, thermogram, iron orthovanadate containing system, vanadium pentoxide containing system, iron orthovanadate, solid subtraction solution, vanadium hematite solution, fusion temperature, solubility, alkali additive, oxidation acceleration

ABSTRACT: This investigation of the oxidation of iron-vanadium spinel by oxygen included a study of the composition and properties of the phases formed, and the effect of small amounts of alkali additives on the oxidation process. Thermograms for the iron-vanadium spinel system, for iron orthovanadate and for the iron orthovanadate-vanadium pentoxide system were constructed. In the oxidation of the spinel the formation of a solid subtraction solution (exotherm at 236-336C, spinel crystal structure is retained but the cell parameters decreased) proceeds

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ACCESSION NR: AP4034578

decomposition of the spinel. Three phases are formed by the oxidation of the spinel (exotherm at 462-573C): vanadium pentoxide, iron orthovanadate and the phase R_2O_3 which represents a solid solution of vanadium in hematite. The endotherms 619-641 and 790-850C correspond to the fusion of the eutectic of vanadium pentoxide and iron orthovanadate and the pure $FeVO_4$. The solubility of iron orthovanadate in 10% H_2SO_4 was determined. The addition of 0.5% KCl to the spinel greatly accelerates its oxidation but does not affect the oxidation products. Orig. art. has: 2 tables and 4 figures.

ASSOCIATION: Permskiy politekhnicheskiy institut (Permsk Polytechnical Institute)

SUBMITTED: 28Apr63 ENCL: 00

SUB CODE: MM, GC NO REF SOV: 003 OTHER: 001

Card 2/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V. V.

Thermochemical decomposition of aluminum sulfate. V. V. Pechkovskii and A. N. Ketov (A. M. Gorki State Univ., Molotov). *Zhur. Prikład. Khim.* 30, 1506-10 (1957).—The percentage decompn. (α) of $Al_2(SO_4)_3$ was detd. by the loss in wt., and the total S in the gases was detd. as SO_2 by preliminary reduction of all the gases formed with CO at 350-750°. α increased with the temp. and duration (15-60 min.). The values of α (30 min.) in dry air at 750, 800, 850, and 900° were 6.8, 12.0, 32.1, and 87.4%, resp. The addn. of 5% Fe_2O_3, Cr_2O_3, or TiO_2 increased these values to 8.7, 9.1, and 7.1% at 750°; to 18.6, 20.8, and 11.1% at 800°; and to 7.1, 83.0, and 30.0% at 850°. Increasing the proportion of added oxides from 5 to 10% did not affect α. At 800° in a current of CO in 15 min., $Al_2(SO_4)_3$ was decompd. to the extent of 78.4% with formation of Al_2O_3 and a gas contg. 70.3% SO_2 and 8.1% of COS + CS_2 + S_2. L. Zenowitz

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

Pechkovskiy, V. V.

Reaction of sulfur dioxide with metal oxides in an oxidizing atmosphere. V. V. Pechkovskii (A. M. Gorki State Univ., Perm), *Zhur. Prikl. Khim.* 30, 1579-83(1957); *cf. C.A.* 51, 10067*h*.—Powd. metal oxides were heated in a current of dry 2.5-20.0% SO_2. The degree of conversion q to sulfate of Fe_2O_3 and CuO passed through a max. at 600° and of Co_2O_3 at 800°, whereas q of Mn_2O_3, MgO, and CaO increased continuously with the temp. (1000°). q increased with the concn. of SO_2. The presence of (9%) Cr_2O_3, Fe_2O_3, CuO, Co_2O_3, or Mn_2O_3 catalyzed the conversion of MgO. In these mixts. sulfates of Fe and Cu were not formed, whereas sulfates of Co and Mn were present with that of MgO. A relation between q and the degree of "likeness" of a given oxide to SO_2, i.e. the thermal stability of the sulfate, was noted. Thus in the order of increasing q the following series are arranged: ZnO < MgO < CaO and Fe_2O_3 < CuO < Co_2O_3 < Mn_2O_3. The catalytic effect on q of MgO is in the decreasing order Cr_2O_3 > Fe_2O_3 > CuO. I. Bencowitz

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APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

Pechkovskiy, V. V.

USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria, Physical-Chemical Analysis, Phase Transitions. B-8

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3753.

Author : V.V. Pechkovskiy.
Inst :
Title : Thermochemical Dissociation of Zinc Sulfate.

Orig Pub: Zn. neorgan. khimii, 1957, 2, No 7, 1467-1470.

Abstract: The speed of the thermal dissociation of ZnSO and the composition of solid and gaseous calcination products depending on the temperature, experiment duration and O concentration in gas flowing over the heated sulfate were investigated. The $ZnSO_4$ dissociation in a flow of air proceeds at a noticeable speed even at 750° with formation of ZnO, SO_3, SO_2 and O_2. With an increase of temperature and experiment duration and a decrease of O_2 concentration, the SO_3 content in the calcination gas is dropping (especially at 850 to 900°), but it always re-

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

Sulfating manganese compounds with sulfur dioxide. Zhur. prikl. khim. 29 no.7:977-980 Jl '57. (MIRA 10:10)

Perm

1. Moskovskiy gosudarstvennyy universitet im. A.M. Gor'kogo.
(Manganese compounds) (Sulfur dioxide)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

AMIROVA, S.A.; PECHKOVSKIY, V.V.; PARKACHEVA, V.V.

Studying the roasting of carbonaceous pyrite. Zhur.prikl.khim. 30 no.12:1735-1740 D '57. (MIRA 11:1)

1.Permskiy gosudarstvennyy universitet imeni A.M. Gor"kogo.
(Pyrites)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/156-58-3-49/[illegible]

AUTHORS: Pechkovskiy, V. V., Amirova, S. A., Parkacheva, T. T.

TITLE: The Investigation of the Sulfatization by the Combustion of the Cobalt Concentrates in a Pseudo-Boiling Charge (Issledovaniye sul'fatizirugushchego obzhiga kobal'tovogo kontsentrata v psevdoozhizhennom sloye)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 3, pp. 592-594 (USSR)

ABSTRACT: In the present paper the sulfatization of cobalt concentrate in combustion in the laboratory was investigated. The degree of sulfatization of the cobalt; the sulfur combustion; the smoke separation and its dependence on the temperature; and the composition of the concentrate and the granular size of the particles in the concentrate were determined. It was found that the smoke separation in the combustion of cobalt concentrates in the boiling charge of the laboratory furnace depends on the air velocity, the physical and chemical properties of the material, the temperature, and the granular state of the material. At 450°C the smoke separation amounts to 2 - 3 %, at 600-700°C to 16 - 20 %. Also, the separation

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/156-58-3-49/52

The Investigation of the Sulfatization by the Combustion of the Cobalt Concentrates in a Pseudo-Boiling Charge

of sulfur in the combustion of cobalt concentrate is dependent on the temperature and the duration of the combustion, the thickness of the charge of the material to be burned, the chemical composition and the granulation. The degree of sulfatization of the cobalt also depends on these same factors. Above 550° the sulfatization of cobalt decreases. The formation of cobalt sulfate is increased when a great part of the sulfidic sulfur of the material has already been burned. According to the material collected experimentally the sulfatization process takes place in two stages:

1) The oxidation of sulfides.
2) The formation of sulfates.

There are 1 figure, 1 table, and 6 references, 5 of which are Soviet.

Card 2/3

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/156-58-3-4[illegible]

The Investigation of the Sulfatization by the Combustion of the Cobalt Concentrate in a Pseudo-Boiling Charge

ASSOCIATION: Kafedra [illegible]nologii neorganicheskikh veshchestv [illegible]nogo universiteta im. [illegible] (Chair for [illegible]nnology of Inorganic [illegible] State University imeni A. M. Gor'kiy)

SUBMITTED: January 24, 1958

Card 3/3

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AUTHORS: Ketov, A. N., Pechkovskiy, V. V. SOV/156-58-4-14/49

TITLE: On the Mechanism of the Thermal Decomposition of the Sulfites of Calcium, Strontium and Barium (O mekhanizme termicheskogo razlozheniya sul'fitov kal'tsiya, strontsiya i bariya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1958, Nr 4, pp 667-671 (USSR)

ABSTRACT: In the present paper investigations were carried out concerning the thermal decomposition of the sulfites of calcium, strontium and barium. This was done to explain the mechanism of this thermal decomposition. The composition of the solid and gaseous products of the above-mentioned sulfites were determined, as well as the decomposition in dependence on temperature, time of stay and the type of atmosphere. The investigations were carried out with specially synthesized and purified anhydrous sulfites. SO_2 and elementary sulfur were determined in the gaseous phase. In the solid phase sulfur was determined in the form of sulfite, sulfide, thiosulfate and sulfate. Within the temperature range of from 600° to 800°C no melting of the sulfites and their decomposition products occurs. The process

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/156-58-4-14/49

On the Mechanism of the Thermal Decomposition of the Sulfites of Calcium, Strontium and Barium

of thermal decomposition of sulfites of calcium, strontium and barium can be expressed by the following equation:

$$2MeSO_3 = 2MeO + 2SO_2,$$

$$6MeSO_3 + 3SO_2 = 6MeSO_4 + 1\ 1/2\ S_2$$

$$2MeO + 1\ 1/2\ S_2 = 2MeS + SO_3$$

$$4MeSO_3 = MeS + 3MeSO_4.$$

The formation of the sulfites and sulfates takes place under direct action of the gaseous phase. The density of sulfates formed in the decomposition exerts a decisive influence upon the rate of thermal decomposition of the sulfites of calcium, strontium and barium. The dependence of thermal decomposition upon the time of stay in nitrogen current at 700° after 5, 10 and 15 minutes was investigated, and it was found that the strontium sulfite is decomposed most easily.
There are 3 tables and 5 references, 4 of which are Soviet.

ASSOCIATION: Kafedra tekhnologii neorganicheskikh veshchestv Permskogo gosudarstvennogo universiteta im. A. M. Gor'kogo (Chair of the

Card 2/3

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/156-58-4-14/49

On the Mechanism of the Thermal Decomposition of the Sulfites of Calcium, Strontium and Barium

Technology of Inorganic Substances at the Perm' State University imeni A. M. Gorkiy)

SUBMITTED: May 24, 1958

Card 3/3

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AUTHOR: Pechkovskiy, V.V. SOV/ 78-3-7-3/44

TITLE: On the Thermodynamic Decomposition of Zinc Sulfate in the Presence of Oxides of Iron, Chromium, Copper, and Aluminum (O termicheskom razlozhenii sul'fata tsinka v prisutstvii okislov zheleza, khroma, medi i alyuminiya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 7, pp 1483-1486 (USSR)

ABSTRACT: The velocity of the thermal decomposition of zinc sulfate in the presence of some metal oxides such as iron-, chromium-, copper-, and aluminum oxide was investigated. It follows from the experiments carried out that the thermal decomposition of zinc sulfate is only little accelerated by the addition of Al_2O_3, but that, by the addition of Cr_2O_3, CuO, Fe_2O_3, i.e. in the case of such additions in which metals show a change of valence, the thermal decomposition of zinc sulfate is accelerated. The thermal decomposition of zinc sulfate in the presence of metal oxides develops according to the following equations:

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

On the Thermodynamic Decomposition of Zinc Sulfate in the Presence of Oxides of Iron, Chromium, Copper, and Aluminum SOV/ 78-3-7-3/44

$$ZnSO_4 \rightleftarrows ZnO + SO_3$$
$$SO_3 \rightleftarrows SO_2 + 1/2\ O_2$$
$$nZnO + mMeO \rightarrow nZnO.mMeO$$

The acceleration of the thermal decomposition of zinc sulfate by the addition of Cr_2O_3, Fe_2O_3 and CuO is based upon the catalytic action brought to bear upon zinc sulfate by these oxides. The best catalytic effect is produced by Cr_2O_3, while that of CuO and Fe_2O_3 is not so strong. There are 3 figures, 3 tables, and 5 references, which are Soviet.

SUBMITTED: June 26, 1957

1. Zinc sulfate--Decomposition 2. Zinc sulfate--Thermal effects 3. Aluminum oxide--Chemical reactions 4. Copper oxides--Chemical reactions 5. Iron oxides--Chemical reactions

Card 2/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

Decomposition of zinc and cobalt sulfates in a stream of sulfur dioxide - air mixture. Zhur. prikl. khim. 31 no.8:1139-1143 Ag '58. (MIRA 11:10)

1. Permskiy gosudarstvennyy universitet imeni A.M. Gor'kogo.
(Zinc sulfate) (Cobalt sulfate)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; PARKACHEVA, V.V.

Obtaining valuable components from flotation pyrite by sulfating roasting. Zhur. prikl. khim. 31 no.10:1466-1471 O '58. (MIRA 12:1)

1. Permskiy gosudarstvennyy universitet imeni A.M. Gor'kogo.
(Pyrites) (Metallurgy)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

KETOV, A.N.; PECHKOVSKIY, V.V.

Reaction of sulfur dioxide with calcium oxide and calcium carbonate. Zhur.prikl.khim. 31 no.12:1783-1787 D '58. (MIRA 12:2)

1. Permskiy gosudarstvennyy universitet imeni A.M. Gor'kogo.
(Sulfur dioxide) (Calcium oxides) (Calcium carbonates)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/156-59-2-46/48

15(2)

AUTHORS: Amirova, S. A., Pechkovskiy, V. V., Prokhorova, Z. G., M. I. Polotnyanshchikova

TITLE: The Examination of the Oxidizing and Chlorinating Burning of Vanadium-Slag (Izucheniye okislitel'nogo i khlorirujushchego obzhiga vanadiyevogo shlaka)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1959, Nr 2, pp 398-401 (USSR)

ABSTRACT: The production of vanadium from converter-slag by oxidizing burning with sylvinite, potassium-, or sodiumchlorite or by treatment with dry chlorine gas is investigated. Finely crushed slag was mixed with various admixtures and burned in a laboratory furnace under a stream of air or chlorine. The portion of soluble vanadinates which had formed after the burning, was analytically determined. When treated with chlorine, the waste gas was condensated, and the content of V, Fe, and Ti was determined in the condensate. The results are shown in (Tables 1-3). The best yield of vanadium is obtained at temperatures of from 800 to 850 degrees. Higher temperatures caused overbaking and thereby reduced the yield. The use of sylvinite, potassium-, or sodiumchloride made no differences

Card 1/2

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

The Examination of the Oxidizing and Chlorinating Burning of Vanadium-Slag

SOV/156-59-2-46/48

in the yield, but the reaction develops faster with the two potassiumsalts. Fine-grain crushing of the slags results in higher yields. The yield of vanadium and iron by chlorinating the slags is shown in table 4. The ironchlorides condensate much easier than the vanadium chlorides. The mixture of iron- and vanadium-chlorides could therefore be separated by distillation. The addition of carbon increases the yield of chlorides, but leads to the forming of volatile titanium-chlorides, which pass into the condensate. There are 4 tables and 9 Soviet references.

PRESENTED BY: Kafedra tekhnologii neorganicheskikh veshchestv Permskogo gosudarstvennogo universiteta im. A. M. Gor'kogo (Chair for Technology of Inorganic Materials Perm' State University imeni A. M. Gor'kiy)

SUBMITTED: December 29, 1958

Card 2/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

Sulfidizing process during the reduction of calcium sulfate. Izv.vys.ucheb.zav.; tsvet.met. 2 no.4:54-58 '59. (MIRA 13:1)

1. Permskiy gosudarstvennyy universitet. Kafedra tekhnologii neorganicheskikh veshchestv.
(Nickel--Metallurgy) (Calcium sulfate)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/78-4-2-5/40

5(4)

AUTHORS: Ketov, A. N., Pochkovskiy, V. V.

TITLE: Investigation of the Thermal Decomposition of Magnesium Sulfite (Izucheniye termicheskogo razlozheniya sul'fita magniya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 2, pp 272-276 (USSR)

ABSTRACT: The velocity of the thermal decomposition of magnesium sulfite depending on the temperature, the type of the gaseous reducing agent, and on various additions as SiO_2, Fe_2O_3, Cr_2O_3, and ferriferous bauxite, were investigated. Sulfur dioxide, sulfur, magnesium thiosulfate, and magnesium sulfate are formed in nitrogen atmosphere in the temperature range of 300-500°. At temperatures > 500°C only sulfur dioxide, elementary sulfur and magnesium sulfate are formed. The formation of sulfur dioxide during the thermal dissociation of magnesium sulfite proceeds according to the following reaction:

$$MgSO_3 \rightleftharpoons MgO + SO_2 \qquad (1)$$

The formation of elementary sulfur and of magnesium sulfate proceeds according to the following reaction:

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

Investigation of the Thermal Decomposition of Magnesium Sulfite

$$2MgSO_3 + SO_2 = 2MgSO_4 + 1/2S_2 \quad (2)$$

At temperatures < 500° and in a nitrogen atmosphere magnesium sulfite reacts, during magnesium thiosulfate formation, with the sulfur being formed according to the following equation:

$$MgSO_3 + 1/2S_2 = MgS_2O_3 \quad (3)$$

On a rise of the oxygen concentration in the gaseous phase the formation of magnesium sulfate increases:

$$2MgSO_3 + O_2 = 2MgSO_4 \quad (4)$$

On an addition of iron and chromium oxide at 500° a quicker decomposition of magnesium sulfite takes place. The SO_2 formation decreases because SO_3 is formed under the catalytic influence of the oxides. This SO_3 reacts with magnesium oxide, in connection with the formation of magnesium sulfate, according to the following reaction equation:

$$MgO + SO_3 = MgSO_4 \quad (5)$$

The formation of magnesium sulfate, therefore, is no primary reaction. The influence of a gaseous reducing agent upon the

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SOV/78-4-2-5/40

Investigation of the Thermal Decomposition of Magnesium Sulfite

thermal decomposition of magnesium sulfite does not show a considerable difference from the reaction in nitrogen atmosphere. Upon reduction of gaseous substances sulfuretted hydrogen appears:

$$S_2 + 2H_2 \rightleftharpoons 2H_2S \qquad (6)$$

The formation of elementary sulfur increases in hydrogen atmosphere on the effect of catalyzers, as is shown in the equation:

$$SO_2 + 2H_2 \rightleftharpoons 2H_2O + 1/2S_2 \quad (7)$$

Thus, in the presence of bauxite in the hydrogen current, a large amount of the sulfur of magnesium sulfite turns into elementary sulfur and sulfuretted hydrogen and a small amount only into sulfur dioxide during the decomposition of magnesium sulfite in the temperature range of 400-500°. Therefore no magnesium thiosulfate is formed. The experimental results are of theoretical and practical importance. The method can be used for the production of elementary sulfur. There are 1 figure, 4 tables, and 5 Soviet references.

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APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; KURMAYEV, R.Kh.

Solubility of vanadium trioxide in fused sodium and potassium chlorides. Zhur. neorg. khim. 9 no.5:1229-1231 My '64. (MIRA 17:9)

1. Permskiy politekhnicheskiy institut.

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; MAL'TSEVA, T.G.

Interaction of calcium oxide with sulfur dioxide under reducing conditions. Zhur. prikl. khim. 37 no.2:240-246 F '64. (MIRA 17:9)

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

L 27267-65 EWT(m)/EPF(c)/EWA(d)/T/EWP(t)/EWP(b) Pr-4 IJP(c) JD/JG/WB

ACCESSION NR: AP4011442 S/0076/64/038/001/0108/0114

AUTHORS: Amireva, S.A. (Perm'); Pechkovskiy, V.V. (Perm'); Prokhorova, V.G. (Perm'); Zhubeleva, T.V. (Perm'); Lezhneva, A.A. (Perm')

TITLE: Oxidation of manganese-vanadium spinel by oxygen

SOURCE: Zhurnal fiz. khim. v. 38, no. 1, 1964, 108-114

TOPIC TAGS: manganese vanadium spinel, manganese vanadium spinel oxidation, spinel decomposition, manganese metavanadate, manganese pyro vanadate

ABSTRACT: The oxidative annealing of manganese-vanadium spinel was investigated from 0 to 1000C, using thermographic analysis simultaneously with x-ray, crystallooptic and chemical methods. The first stage of the oxidation is the chemisorption of oxygen on the surface of the spinel grains and the formation of a solid solution. Decomposition of the spinel at both high and low temperatures proceeds according to the following equations: $2MnO \cdot V_2O_3 + 2O_2 = Mn_2V_2O_7 + V_2O_5$; $Mn_2V_2O_7 + V_2O_5 = 2Mn(VO_3)_2$. The

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L 27267-65

ACCESSION NR: AP4011442

products are acid soluble and almost insoluble in water. The melting points of manganese metavanadate and pyrovanadate are given as 805 and 1023C respectively. Small additions of potassium chloride intensify the rate of oxidation. Orig. art. has: 2 equations, 10 figures and 1 table.

ASSOCIATION: Permskiy politekhnicheskiy institut (Perm Polytechnical Institute)

SUBMITTED: 05Mar63 ENCL: 00

SUB CODE: MM NR REF SOV: 005 OTHER: 004

Card 2/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

26039
S/137/61/000/007/006/072
A060/A101

18.3200

AUTHORS: Pechkovskiy, V. V., Zvezdin, A. G.

TITLE: Study of sulfating cobalt concentrate ash in a fluidized bed

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 7, 1961, 19, abstract 70136 ("Uch. zap. Permsk. un-t", 1959, v. 13, no. 3, 119-123)

TEXT: The rate and completeness of sulfating of an ash Co compound with SO_2 - air mixtures as a function of temperature, SO_2 concentration in the gas, granule size, initial degree of sulfation of the Co and sulfide S concentration in the ash, duration of roasting in the fluidized bed reactor, are studied. Factory ash, obtained by the roasting of Co concentrate from the Pyshminskoye Mine Administration, was used for the investigation. The initial degree of sulfation of Co in the ash constituted 64 and 9.0 percent. The mean total content of Co in the ash was 0.705 percent. The ash was granulated by means of sulfide alkalies. As result of the investigation it is recommended to submit the granulated ash to an additional sulfation by mixtures of SO_2 and O_2 in a fluidized bed furnace. The additional sulfation of Co in the ash proceeds at a remarkable rate at 550°C and attains a maximum at 700°C after which it decreases. An

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

26039
S/137/61/000/007/006/072
A060/A101

Study of sulfating cobalt concentrate ...

increase in SO_2 concentration in the gaseous phase exerts a positive effect on the sulfation process. The sulfation of ash in the fluidized bed proceeds at high intensity during the first 15 - 20 min, after which the rate of the process slows down. The optimal size of ash granules is 1.0 - 2.0 mm. As the sulfide content of the ash increases to S > 8 percent the rate of sulfate formation falls sharply and the maximum Co sulfation is displaced to a lower temperature zone.

N. Pleteneva

[Abstracter's note: Complete translation]

Card 2/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

SOV/80-32-5-5/52

5(2)

AUTHOR: Pechkovskiy, V.V.

TITLE: The Study of the Factors Affecting the Process of Sulfide Formation of Metal Oxides by Sulfur Dioxide

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol 32, Nr 5, pp 966-969 (USSR)

ABSTRACT: The sulfide formation of metal oxides by sulfur dioxide in a reducing atmosphere is studied here. The method of the experiment and the characteristics of the used substances are given in Ref. 5. The sulfurous anhydride was diluted by dry, pure nitrogen. As carbon-containing materials blood coal, semi-coke, coals from various layers birch charcoal, etc. were used. The particle size of the metal oxides and the carbon-containing materials was less than 0.078 mm. If the concentration of the sulfurous anhydride decreases from 100 to 20%, the degree of sulfidation is gradually reduced. At a decrease from 20 to 5% the sulfidation is reduced sharply. At less than 5% the sulfide formation is slow and incomplete. At 850°C and a gas concentration of 20% the used carbon-containing materials may be arranged according to their effect in the following decreasing series: charcoal, blood coal, semi-coke, Kuznetsk coal, coke. The sulfide formation is decreased by a

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SOV/80-32-5-5/52

The Study of the Factor Affecting the Process of Sulfide Formation of Metal Oxides by Sulfur Dioxide

dense crystal structure and a surface of low reactivity. An addition of manganese oxide Mn_2O_3 increases the sulfide formation, ferrous bauxite reduces it. If cobalt and zinc oxides are burnt with Kuznetsk coal, sulfide formation decreases, if the coal particles are larger than 0.25 mm. With charcoal the decrease starts with sizes larger than 1 mm. The rate of sulfidation is highest in the first 20-30 min, then slows down sharply.
There are: 6 tables and 5 Soviet references.

ASSOCIATION: Permskiy gosuniversitet imeni A.M. Gor'kogo (Perm' State University imeni A.M. Gor'kiy)

SUBMITTED: March 5, 1958

Card 2/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

5.4220

75661
SOV/80-32-10-10/51

AUTHOR: Pechkovskiy, V. V.

TITLE: Reaction of Barium and Calcium Carbonates With Sulfur Dioxide in the Presence of a Reducing Agent

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol 32, Nr 10, pp 2189-2193 (USSR)

ABSTRACT: This is a study of the effect that temperature, percentage and type of carbon-containing material, and SO_2 concentration in the gas have in the above reaction on the yield of sulfites, sulfates, and sulfides on a $CaCO_3$ and $BaCO_3$ basis. Evidence of the following reactions was found:

$$MeCO_3 \rightleftarrows MeO + CO_2, \quad (1)$$
$$MeO + SO_2 \rightleftarrows MeSO_3, \quad (2)$$
$$4MeSO_3 + 2SO_2 = 4MeSO_4 + S_2, \quad (3)$$
$$SO_2 + C \rightleftarrows {}^1/_2 S_2 + CO_2, \quad (4)$$
$$CO_2 + C \rightleftarrows 2CO, \quad (5)$$
$$2MeO + S_2 + C = 2MeS + CO_2, \quad (6)$$
$$MeS + 2SO_2 = MeSO_4 + S_2. \quad (7)$$

Card 1/4

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

Reaction of Barium and Calcium Carbonates With Sulfur Dioxide in the Presence of a Reducing Agent

75661
SOV/80-32-10-10/51

I. Decomposition of $CaCO_3$. Starting at 700°, with increasing temperature, the yield of CaS increases, and the yield of $CaSO_3$ and $CaSO_4$ decreases; this is because the rate of reactions (1), (4), and (6) increases with temperature, while (2) goes to the left and (4) to the right. Above 900°, provided there is enough C, CaS is the main sulfur-containing product. Substitution of CaO for $CaCO_3$ has little effect on the reaction under study. Within the 650 to 750° range, the yield of CaS, $CaSO_4$, and $CaSO_3$ is greater, all other conditions being equal, than in the case of $CaCO_3$, because reaction (1) limits the rate of formation of CaS, $CaSO_4$ and $CaSO_3$; at $\geqslant$ 750°, (1) is no longer limiting. II. Decomposition of $BaCO_3$. Similarly, the BaS yield increases with temperature, while the curves of temperature vs percentage

Card 2/4

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

Reaction of Barium and Calcium Carbonates With Sulfur Dioxide in the Presence of a Reducing Agent

75661
SOV/80-32-10-10/51

conversion to $BaSO_4$ and to $BaSO_3$ exhibit maxima. Above 1,000°, provided enough C is present, BaS will be the main product. The BaS, and especially the $BaSO_4$ and $BaSO_3$ yields are greater, all other conditions being equal, than the CaS, $CaSO_4$, and $CaSO_3$ yields; also, the percentage conversion peaks of $BaSO_4$ and $BaSO_3$ are shifted in the direction of higher temperatures in comparison with the corresponding Ca compounds. This is due to the greater thermal stability of the Ba compounds. Effect of %C: All other conditions being equal, for both Ba and Ca carbonates, the sulfide yield decreases and the sulfate yield increases with decreasing %C because the rates of (3) and (7) increase, while the rates of (4) and (6) decrease. Effect of type of carbon-containing material: At 900°, coke reactivity is slight, but at $\geqslant$ 1,000°, it approaches the reactivity of charcoal. Effect of SO_2 concentration: Owing to an

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

Reaction of Barium and Calcium Carbonates With Sulfur Dioxide in the Presence of a Reducing Agent

75661
SOV/80-32-10-10/51

increase in the rate of (2) to (4), (6), and (7), an increase in SO_2 concentration will raise the yield of Ca and Ba sulfur-containing compounds; the net percentage of sulfur-containing Ba products increases, largely owing to an increase in $BaSO_4$ concentration, while the BaS percentage actually decreases. There are 4 tables; and 9 Soviet references.

ASSOCIATION: Perm' State University (Permskiy gosudarstvennyy universitet)

SUBMITTED: December 10, 1958

Card 4/4

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; POLTONYANSHCHIKOVA, M.I.

Investigation of preliminary slag roasting on the vanadium recovery process. Izv. vys. ucheb. zav.; tsvet. met. 3 no.3:97-101 '60. (MIRA 14:3)

1. Permskiy gosudarstvennyy universitet, Kafedra tekhnologii neorganicheskikh veshchestv.
(Vanadium—Metallurgy) (Slag)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; PROKHOROVA, V.G.; POLOTNYANSHCHIKOVA, M.I.

Study of the oxidation roasting of converter slags for the extraction of vanadium. Izv.vys.ucheb.zav.; khim.i khim.tekh. 3 no.6:1056-1061 '60. (MIRA 14:4)

1. Permskiy politekhnicheskiy institut, kafedra tekhnologii neorganicheskikh veshchestv.
(Vanadium) (Slag)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; KETOV, A.N.

Reduction of iron, zinc, manganese, magnesium and calcium sulfates by hydrogen and carbon. Uch. zap. Perm. gos. un. 17 no.1:3-14 '60. (MIRA 14:11)

(Reduction, Chemical)
(Sulfates)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; KETOV, A.N.

Thermography in studying topochemical reactions. Uch. zap. Perm. gos. un. 17 no.1:15-34 '60. (MIRA 14:11)
(Thermal analysis)
(Chemical reactions)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; KETOV, A.N.

Intensification of the reduction of sulfates by adding sodium and potassium carbonates. Uch. zap. Perm. gos. un. 17 no.1:45-54 '60. (MIRA 14:11)

(Sulfates)
(Reduction, Chemical)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

LOZHKIN, A.F.; PECHKOVSKIY, V.V.; SUBOCHEVA, N.L.

Effect of additives of some potassium compounds on the reduction process of barites. Uch. zap. Perm. gos. un. 17 no.1:55-60 '60. (MIRA 14:11)

(Barite)
(Potassium compounds)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; KAMEKO, B.S.; STEPANOVA, A.F.

Investigating methods for using pickling solutions. Uch. zap. Perm. gos. un. 17 no.1:61-72 '60. (MIRA 14:11)
(Metals—Pickling)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; KAMEKO, G.F.; POLOTNYANSHCHIKOVA, M.I.

Investigating the granulation and firing of vanadium slag with additives. Uch. zap. Perm. gos. un. 17 no.1:83-90 '60. (MIRA 14:11)

(Vanadium)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

Sulfating cobalt and zinc compounds with sulfur dioxide. Uch. zap. Perm., gos. un. 17 no.1:91-95 '60. (MIRA 14:11)
(Sulfur dioxide)
(Zinc)
(Cobalt)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.

Study of the reduction roasting of zinc and magnesium sulfates. Zhur.prikl.khim. 33 no.5:1025-1030 My '60. (MIRA 13:7)

1. Permskiy gosudarstvennyy universitet imeni A.M. Gor'kogo. (Zinc sulfate) (Magnesium sulfate) (Reduction, Chemical)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; KETOV, A.N.

Reduction of barium sulfate with carbon monoxide at high temperatures. Zhur. prikl. khim. 33 no.8:1719-1723 Ag '60. (MIRA 13:9)
(Barium sulfate) (Carbon monoxide)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; KETOV, A.N.

Thermal decomposition of zinc sulfite. Zhur. prikl. khim. 33 no.8:1724-1729 Ag '60. (MIRA 13:9)
(Zinc sulfite)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; KAMEKO, B.S.

Study of the ways of utilizing hydrolysis acid. Zhur. prikl. khim. 33 no.9:1976-1981 S '60. (MIRA 13:10)

1. Permskiy gosudarstvennyy universitet imeni A.M. Gor'kogo.
(Sulfuric acid)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V. V., Doc Tech Sci, "~~Investigation~~ Study of Calcination of Sulfur-containing Compounds." Leningrad, 1961. (Min of Higher and Sec Spec Ed RSFSR, Leningrad Order of Labor Red Banner Technol Inst im Lensovet). (KL, 3-61, 212).

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

S/081/62/000/011/036/057
E071/E192

AUTHORS: Ketov, A.N., and Pechkovskiy, V.V.

TITLE: A study of the reactivity of carbonaceous materials using differential thermal analysis

PERIODICAL: Referativnyy zhurnal, Khimiya, no.11, 1962, 502, abstract 11 M 34. (Sb. nauchn. tr. Permsk. politekhn. in-t, no.10, 1961, 65-70).

TEXT: Using a Kurnakov pyrometer, heating rate curves of carbonaceous materials, heated in a stream of air and CO_2, filtering through the substance studied, were obtained. The heating rate was 25 °C/min., the fineness of materials 0.25-0.5 mm, the rate of gas flow 5 litres/hour. For charcoal the exothermic reaction with air was observed at 292 °C and for graphite at 348 °C. The temperatures of the beginning of interaction with CO_2 were found: charcoal 721 °C, semicoke 856 °C, coke 854 °C. A dilution of CO_2 with nitrogen does not change the temperature of the endothermic peak, but decreases its value. Saturation of charcoal with solutions of Na_2CO_3 and K_2CO_3

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

S/137/62/000/005/031/150
A006/A101

AUTHORS: Amirova, S. A., Pechkovskiy, V. V., Prokhorova, V. G., Polotnyanshchikova, M. I.

TITLE: Roasting of granulated and moistened vanadium-containing charges in an enlarged laboratory furnace

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 18, abstract 50108 ("Sb. nauchn. tr. Permsk. politekhn. in-t", 1961, no. 10, 111 - 119)

TEXT: The authors studied optimum conditions of roasting granulated V-charges and the possibility of combining granulation, drying and roasting of moistened V-charges in an enlarged rotating tubular furnace. For this purpose, mixtures consisting of converter slag, sylvinite, and refuse slime, were granulated and roasted. Best results were obtained when roasting granules of 2 - 5 mm fraction at 850°C with addition of sylvinite (n = 0.5) and 5% refuse. The degree of V extraction was 94 - 95%. Roasting of moistened, freshly prepared granules at 850°C makes it possible to extract up to 95% V. Roasting of the charge with simultaneous granulation of the material in the furnace is possible, the charge

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is granulated to 94 - 95%, V_2O_5 extraction is 95% at 950°C and 4 - 4.5 hours roasting time. Best results in simultaneous granulation, drying and roasting are obtained with a charge consisting of slag with addition of sylvinite (n = 0.5) and 5% refuse, with 10.5% moisture at a slope angle of the furnace of 1°30'. When employing such methods of roasting V-containing slags, V extraction increases up to 94 - 95%. There are 7 references.

G. Svodtseva

[Abstracter's note: Complete translation]

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S/137/62/000/005/032/150
A006/A101

AUTHORS: Amirova, S. A., Pechkovskiy, V. V., Prokhorova, V. G., Polotnyanshchikova, M. I., Derendyayeva, M. P.

TITLE: Preliminary oxidizing as a means of raising the degree of vanadium extraction from converter slags

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 18, abstract 5G109 ("Sb. nauchn. tr. Permsk. politekhn. in-t", 1961, no. 10, 121 - 129)

TEXT: Studies were conducted of the optimum conditions for roasting V-charges composed of previously oxidized slag and alkaline admixtures. All experiments were made on an enlarged laboratory rotary furnace 2,500 mm long with 100 mm inner diameter. Initial material was converter slag of the following composition (in %): V_2O_5 13.5; MnO 3.8; MgO 0.95; Fe_{disp} 3.1; FeO 37.9; TiO_2 8.2; SiO_2 31.4; Cr_2O_3 9.1; CaO 1.1; Al_2O_3 2.04. KCl and commercial sylvinite containing NaCl 74.5% and KCl 22%, were employed as alkaline admixtures. The molar ratio, in composing the charge, of the alkaline admixture to

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Preliminary oxidizing as a means of...

V_2O_5 of the slag was 1 or 0.5. Oxidized slag was obtained by roasting the initial slag in an enlarged laboratory furnace for 6 hours at 850 - 880°C; it contained 11.45% V_2O_5. During its leaching out in the laboratory with H_2SO_4 of 7% concentration, 91.5% V were extracted into the solution. The prepared and thoroughly mixed charges were placed into the furnace. The duration of roasting was regulated by changing the slope angle and the rotation speed of the furnace pipe. It was found that roasting of a charge of previously oxidized slag and sylvinite permits up to 94 - 95% V extraction at 800°C during 7 hours; 91% V is extracted in the form of water soluble compounds. The addition to the charge of waste slag from the Chusovo Metallurgical Plant in a 10% amount, reduces caking and increases the degree of V extraction. There are 5 references.

G. Svodtseva

[Abstracter's note: Complete translation]

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

S/137/62/000/005/030/150
A006/A101

AUTHORS: Amirova, S. A., Pechkovskiy, V. V., Prokhorova, V. G., Dorendyayeva, M. P.

TITLE: Developing a new technology of extracting vanadium from converter slags

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 17 - 18, abstract 5G107 ("Sb. nauchn. tr. Perms,. politekhn. in-t", 1961, no. 10, 131 - 137)

TEXT: On the model of a generalized laboratory unit optimum conditions were studied for the following stages of a technological system for extracting V from slag: oxidizing roasting of crushed converter slag without admixtures; hot acid lixiviation of the roasted slag, and precipitation of V_2O_5 from the solutions obtained. The experiments were made with converter slags of the following chemical composition (in %): V_2O_5 13.5; FeO 37.9; Cr_2O_3 9.1; MnO 3.8; TiO_2 8.2; CaO 1.1; MgO 0.95; SiO_2 34.4; Al_2O_3 2.0 and Fe_{met} 3.1. It was found that optimum conditions for roasting non-granulated slag are as follows:

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LOZHKIN, A.F.; PECHKOVSKIY, V.V.; SUBOCHEVA, N.L.

Formation of acid-soluble barium compounds in the reduction roasting of barite. Izv. vys. ucheb. zav.; khim. i khim. tekh. 4 no. 2:242-246 '61. (MIRA 14:5)

1. Permskiy gosudarstvennyy universitet im. A.M. Gor'kogo. Kafedra tekhnologii neorganicheskikh veshchestv.
(Barium salts) (Barite)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

LOZHKIN, A.F.; PECHKOVSKIY, V.V.; SUBOCHEVA, N.L.

Reduction firing of granulated barite concentrates. Izv.vys. ucheb.zav; khim.i khim.tekh. 4 no.5:832-836 '61. (MIRA 14:11)

1. Permskiy gosudarstvennyy universitet, kafedra tekhnologii neorganicheskikh veshchestv.

(Barite)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

KETOV, A.N.; PECHKOVSKIY, V.V.; STARKOV, N.P.; VARSKOY, B.N.

Preparation, composition, and certain properties of basic cadmium sulfate. Zhur.neorg.khim. 6 no.9:2009-2013 S '61. (MIRA 14:9)
(Cadmium sulfate)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; ZVEZDIN, A.G.

Vanadium trioxide oxidation kinetics. Kin. i kat. 5 no.3: 424-429 My-Je '64.

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; GAYSINOVICH, M.S.

Infrared spectra of the thermal decomposition products of copper, zinc, cadmium, and aluminum sulfates. Zhur. neorg. khim. 9 no.10: 2299-2302 O '64. (MIRA 17:12

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; MAL'TSEVA, T.G.

Thermochemical transformations in the sulfuration of cobalt oxides with sulfur dioxide in the presence of carbon. Izv. vys. ucheb. zav., tsvet. met. 7 no.5:45-50 '64 (MIRA 18:1)

1. Kafedra tekhnologii neorganicheskikh veshchestv Permskogo politekhnicheskogo instituta.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; MAL'TSEVA, T.G.

Sulfidization of iron oxides by sulfur dioxide in the presence of carbon. Zhur.prikl.khim. 38 no.6:1199-1206 Je '65.

1. Permskiy politekhnicheskiy institut. (MIRA 18:10)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; BERESNEVA, T.I.

Kinetics of the reduction of iron-vanadium spinel by hydrogen. Zhur.prikl.khim. 38 no.6:1247-1252 Je '65. (MIRA 18:10)

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; KURMAYEV, R.Kh.

Chlorination of vanadium trioxide and vanadium spinels in a melt. Zhur.prikl.khim. 38 no.9:2107-2110 S '65. (MIRA 18:11)

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

KETOV, A.N.; PECHEROVSKIY, V.V.; [illegible], I.F.

Investigating the interaction of cadmium oxide with various chlorination agents. Izv. vys. ucheb. zav.; tsvet. met. 7 no. 4: 107-111 '64 (MIRA 19:1)

1. Permskiy politekhnicheskiy institut, kafedra tekhnologii neorganicheskikh veshchestv.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

VOLYNTSEVA, Z.P.; GLUSHANKOV, S.L.; KETOV, A.N.; PECHKOVSKIY, V.V.; SHMELEVA, Z.A.

Thermogravimetric analysis in the production technology of active coals. Zhur. prikl. khim. 38 no.10:2359-2362 O '65. (MIRA 18:12)

1. Submitted May 23, 1963.

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKO[illegible] [illegible]OFRONOVA, A.V.

Thermochemical transformations of copper iodide. Zhur. neorg. khim. 10 no.7:1513-1515 Jl '65. (MIRA 18:8)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; SOFRONOVA, A.V.

Thermochemical transformations of barium and calcium iodides in the inert oxidizing and reducing media. Zhur. neorg. khim. 10 no.6:1427-1432 Je 65. (MIRA 18:6)

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; VOROB'YEV, N.I.

Reactions of vanadium chlorides with hydrogen, oxygen and water vapors. Zhur. neorg. khim. 10 no.6:1433-1440 Je '65. (MIRA 18:6)

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PROKHOROV, N.M.; PECHKOVSKIY, V.V.

Investigating ceramic molds for precision casting. Lit. proizv. 5:26-28 My '64. (MIRA 18:3)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; VOROB'YEV, N.I.; OSTROVSKAYA, T.V.

Thermochemical transformations of chromium and manganese chlorides. Zhur. neorg. khim. 9 no.9:2059-2065 S '64.

(MIRA 17:11)

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L 10663-65 EWG(j)/EWT(m)/EPF(c)/EPR/EWP(b) Pr-4/Ps-4 SSD/AS(mp)-2/
AEDC(a)/RAEM(i)/AFETR/AFWL/ASD(m)-5/ASD(a)-5/ESD(t) JD/JW/JG

ACCESSION NR: AP4041063 S/0195/64/005/003/0424/0429

AUTHOR: Pechkovskiy, V. V.; Zvezdin, A. G.

TITLE: Kinetics of vanadium trioxide oxidation

SOURCE: Kinetika i kataliz, v. 5, no. 3, 1964, 424-429

TOPIC TAGS: vanadium trioxide, oxidation, kinetics, vanadium pentoxide, process mechanism, autocatalysis, diffusion, activation energy, additive, oxidation acceleration

ABSTRACT: The oxidation of V_2O_3 was investigated to determine whether the process is autocatalytic and whether it is possible to establish the mechanism of the process with formal kinetic equations. The experiments were run in apparatus described by O. Kadlets, M. M. Dubinin (Izv. AN SSSR, Otd. khim. n. 1031, 1956) wherein the samples were heated to the desired temperature in a closed system, then the timer was engaged as air was admitted (circulating at different rates with the help of a pump). The oxidation product is V_2O_5. At all temperatures investigated (260-480) the oxidation starts rapidly, decreases sharply at first and then more slowly. It was established that the maximum on the rate of reaction-

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ACCESSION NR: AP4041063

duration of heating curve, which was sometimes considered an indication of the existence of autocatalysis, is in the case of V_2O_3 merely an indication of the increase in reaction rate occurring while heating the materials to the test temperature. Arrhenius formal kinetics equations describe the kinetics of the process in the 300-480C range. When the degree of oxidation is over 60% and the temperature is above 460C the effects of diffusion inhibition (diffusion of oxygen through the product layer) become strongly apparent. The calculated apparent energy of activation of the oxidation of V_2O_3 with atmospheric oxygen varies from 29-37 kcal. Addition of KCl has no accelerating effect on the oxidation. Orig. art. has: 2 tables, 7 figures and 3 equations.

ASSOCIATION: Permskiy politekhnicheskiy institut (Perm Polytechnical Institute)

SUBMITTED: 11Feb63 ENCL: 00

SUB CODE: IC, GC NO REF SOV: 008 OTHER: 000

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APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

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AMIROVA, S.A.; PECHKOVSKIY, V.V.; PROKHOROVA, V.G.; OSTROVSKAYA, T.V.; LEZHNEVA, A.A. (Perm')

Oxidation of iron-vanadium spinel by oxygen. Zhur. fiz. khim. 38 no.4:916-920 Ap '64. (MIRA 17:6)

1. Permskiy politekhnicheskiy institut.

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PECHKOVSKIY, V.V.; KETOV, A.N.; MAL'TSEVA, T.G.; PRIDATCHENKOV, V.G.

Thermographic investigation of the interaction of sulfur dioxide with calcium carbonate in oxidizing atmosphere. Izv. vys.ucheb. zav.; khim. i khim. tekh. 6 no.6:991-996 '63. (MIRA 17:4)

1. Permskiy politekhnicheskiy institut, kafedra tekhnologii neorganicheskikh veshchestv.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; VOROB'YEV, N.I.; OSTROVSKAYA, T.V.

Thermochemical transformations of nickel and cobalt chlorides.
Zhur.neorg.khim. 9 no.4:778-785 Ap '64. (MIRA 17:4)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; VARSKOY, E.N.; TYULENEVA, G.Ye.

Mechanism of the oxidation of a vanadium-containing spinellide. Zhur. fiz.khim. 37 no.7:1603-1606 Jl '63. (MIRA 17:2)

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; VOROB'YEV, N.I.

Thermochemcial transformations of iron chlorides. Zhur.neorg.khim. 9 no. 1:12-19 Ja '64. (MIRA 17:2)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; DERENDYAYEVA, M.P.

Drying and oxidative roasting of granular vanadium slag in a laboratory fluid-bed furnace. Izv.vys.ucheb.zav.;khim.i khim.tekh. 6 no.4:625-630 '63. (MIRA 17:2)

1. Permskiy politekhnicheskiy institut. Kafedra tekhnologii neorganicheskikh veshchestv.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; PROKHOROVA, V.G.; ZHEBELEVA, T.V.; LEZHNEVA, A.A.

Oxidation of manganese-vanadium spinel by oxygen. Zhur. fiz. khim. 38 no.1:108-114 Ja'64. (MIRA 17:2)

1. Permskiy politekhnicheskiy institut.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

KETOV, A.N.; PECHKOVSKIY, V.V.; KOSTIN, L.P.

Chlorination of magnesium oxide. Zhur. neorg. khim. 9 no.2: 467-469 F'64. (MIRA 17:2)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; TYULENEVA, G.Ye.; VARSKOY, B.N.

Investigation of the mineral constituents of oxidized vanadium slags. Zhur. prikl. khim. 36 no.5:937-941 My '63. (MIRA 16:8)

1. Permskiy politekhnicheskiy insittut.
(Vanadium ores) (Metallic oxides)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; VOROB'YEV, N.I.

Roasting of ferrous sulfate in a fluidized bed (pilot plant testing). Izv.vys.ucheb.zav.;khim. i khim.tekh. 6 no.2:268-273 '63. (MIRA 16:9)

1. Permskiy politekhnicheskiy institut, kafedra tekhnologii neorganicheskikh veshchestv.
(Iron sulfate) (Fluidization)

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AMIROVA, S.A.; PECHKOVSKIY, V.V.; PROKHOROVA, V.G.; ZHEBELEVA, T.V.

Oxidation of manganous oxide by oxygen. Zhur. fiz. khim. 37 no.6:1328-1335 Je '63. (MIRA 16:7)

1. Permskiy politekhnicheskiy institut.
(Manganese oxides) (Oxygen)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PESCHKOVSKIY, V.V.; PROKHOROVA, V.G.; KOLPAKOV, L.Ye.; RAYDALIN, S.I.

Studying the oxidation of vanadium-bearing slag in industrial conditions. Izv. vys. ucheb. zav.; tsvet. met. 5 no.6:93-97 '62. (MIRA 16:6)

1. Permskiy politekhnickeskiy institut, kafedra tekhnologii neorganicheskikh veshchestv.
(Vanadium—Metallurgy) (Slag)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; ZVEZDIN, A.G.; BERESNEVA, T.I.

Kinetics of the thermal decomposition of magnesium, zinc, copper, and cobalt sulfates. Kin.i kat. 4 no.2:208-213 Mr-Ap '63. (MIRA 16:5)

1. Permskiy politekhnicheskiy institut.
(Sulfates) (Chemical reaction, Rate of)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; ZVEZDIN, A.G.

Investigating the kinetics of decomposition of nickel, magnesium and manganese carbonates. Uch. zap. Perm. gos. un. 17 no.1: 35-44 '60. (MIRA 14:11)

(Carbonates)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

AMIROVA, S.A.; PECHKOVSKIY, V.V.; PROKHOROVA, V.G.; ZUYEVA, N.D.

Investigating the conditions for chlorination of converter slag. Uch.zap. Perm. gos. un. 17 no.1:73-82 '60. (MIRA 14:11)

(Chlorination)
(Slag)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKOVSKIY, V.V.; AMIROVA, S.A.; KAMEKO, G.F.; POLOTNYANSHCHIKOVA, M.I.

Effect of granulation on the oxidizing roasting of vanadium slag. Izv. vys. uchob. zav.; tsvet. met. 4 no.3:88-93 '61. (MIRA 15:1)

1. Permskiy gosudarstvennyy universitet, kafedra tekhnologii neorganicheskikh veshchestv.
(Vanadium--Metallurgy)
(Slag)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001239810018-8

PECHKURENKO, A.I.

Appliances for jointing articles and sharpening tools. Politekh. obuch. no.6:82-85 Je '58. (MIRA 11:6)

1. Nauchno-issledovatel'skiy institut pedagogiki Ministerstva prosveshcheniya BSSR.
(Manual training) (Tools)

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