"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

The Effect of Boemite and Diaspore Addition on the Rate of Decomposition of Aluminate Solutions

77626
SOV/80-33-2-1/52

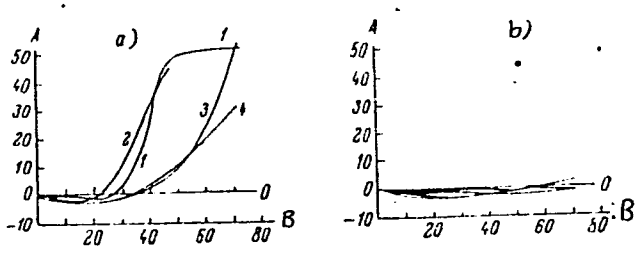

Fig. 3

Card 6/9 See Card 7/9 for caption

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Fig. 3. Decomposition kinetics of aluminate solution with different amounts of seed crystals from incomplete recrystallization product of boemite into diaspore: a -without organic admixtures; b - with organic admixtures, 1% based on Na_2O_{gen}; A -degree of the solution decomposition (in %); B - duration of the decomposition (hours). The seeding ratio: 1 - 0.05; 2 - 0.1; 3 - 0.2; 4 - 0.5. The seeding ratio in Fig. 3b is in the range 0.05-0.5.

Decomposition of the aluminate solutions containing seed crystals of thermal boemite results in precipitation of the comparatively large hydroxide crystals, most of which are +50—100 μ. A very fine precipitate of the hydroxide crystals —40 μ up to

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46-55% was observed when seed crystals of the hydrothermal beomite were used. The solution in this case did not contained any organic admixtures. The small amount of seed crystals (the seeding ratio 0.05 -0.1) facilitates the precipitation of fine crystals. Analysis of the hydroxide crystals indicated that they are composed of hydrargillite and seed crystals and the precent of the hydrargillite is higher than could be expected from decomposition of the solution. It means that part of the seed crystals undergo transformation into hydrargillite. X-ray phase analysis of the precipitates obtained during the decomposition of aluminate solution containing seed crystals of hydrothermal boemite showed that they also contain bayerite, i. e., that hydrothermal boemite on mixing with aluminate solutuion is transformed first into bayerite and then into hydrargillite. The high seeding activity of the product of incomplete recrystalliza-

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tion of boemite into diaspore, compared to hydrothermal boemite, is due to the partially distorted crystalline lattice of unrecrystallized boemite, the outer layer of which is transformed at first into bayerite and then into hydrargillite. The induction periods (as it is shown on the decomposition kinetics curves) is due to the recrystallization of the outer layer of boemite into hydrargillite. Microphotographs of the formed crystals taken with an electron microscope are given. It was concluded that diaspore is inactive as a seeding agent for the decomposition of the aluminate solutuions. There are 9 figures; and 6 references, 2 Soviet, 3 German, and 1 U.S. The U.S. reference is: Laubengayer, A., Weisz, R., J. Am. Chem. Soc., 65, 247 (1943).

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

SUBMITTED: April 11, 1959

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5.4220

78206
SOV/80-33-3-7/47

AUTHORS: Kuznetsov, S. I., Derevyankin, V. A., Shabalina, O. K.

TITLE: The Effect of Added -Alumina and Corundum on the Rate of Decomposition of Aluminate Solutions

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 3, pp 547-552 (USSR)

ABSTRACT: This is a continuation of studies (Abstract 77626) on the rate of decomposition of aluminate solutions under the influence of added aluminum-oxide grains. This time, the authors used -alumina and corundum seeds, and the transitional products between the two, to accelerate aluminate decomposition by growing crystals. The three types of seeds were produced on annealing hydrargillite at 800° C for 4 hr, diaspore at 1,200° C for 5 hr, and hydrargillite at 1,100° C for 12 hr, respectively. Figures 1 and 2 illustrate the seeds of -alumina and its transitional products to corundum

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effectively accelerate the decomposition of dissolved sodium aluminate after a certain period of induction, while corundum does not affect the aluminate decomposition during any duration. The induction period decreases with the increasing quantity of the seeds relative to that of the aluminate solution, i.e., with the seeding ratio. Organic impurities first reduce the decomposing power of ' '-alumina, but later increase it considerably. The decomposition of aluminates by ' '-alumina gives rise to the precipitation of extremely fine aluminum hydroxide. Up to 30% of the grains remain smaller than 40 . .' Small amounts of organic impurities increase this fraction up to even 70%. However, the higher contents of organic substances make the hydroxide slightly coarser. Larger quantities of seeds (seeding ratios 0.2-0.5) also reduce the grain size of the hydroxide. The precipitate, generated by the transitional products from ' '-alumina to corundum, consists of up to 25% of the fraction under 40 ,

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in which the majority of grains vary from 2-5 μ across. X-ray diffraction data proved that all the precipitates consist of hydrargillite and the surface layers of the seeds themselves also turn into hydrargillite during the initial period of induction. Perhaps γ-alumina first turns into boehmite, then into bayerite found in the X-ray diffraction photographs, then into hydrargillite. Electron microscopic data disclosed the composition of γ-alumina of amorphous minute particles, whose porous aggregates have large surfaces per minute volume. During the induction period they become covered with dendritic crystals of boehmite and hydrargillite, 0.1-0.5 μ long and 0.1 μ across, whose crushing off at stirring of the solution produces numerous new crystallization centers. Some of the fine grains of γ-alumina recrystallize into hydrargillite completely and form pseudohexagonal platelets. In conclusion, the authors state that the seeding capacity of boehmite and γ-alumina is related to their instability in the presence of hydrargillite.

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The Effect of Added γ-Alumina and Corundum on the Rate of Decomposition of Aluminate Solutions

78206
SOV/80-33-3-7/47

During the induction period, their surface layers turn into hydrargillite. Diaspore is also unstable but because of the very low rate of its recrystallization into hydrargillite, does not cause decomposition of aluminate solutions. The same reason is likely to be true for corundum. There are 8 figures; 1 table; and 1 Soviet reference.

ASSOCIATION: Ural Polytechnic Institute, Sverdlovsk (Ural'skiy politekhnicheskiy institut. Sverdlovsk)

SUBMITTED: April 11, 1959

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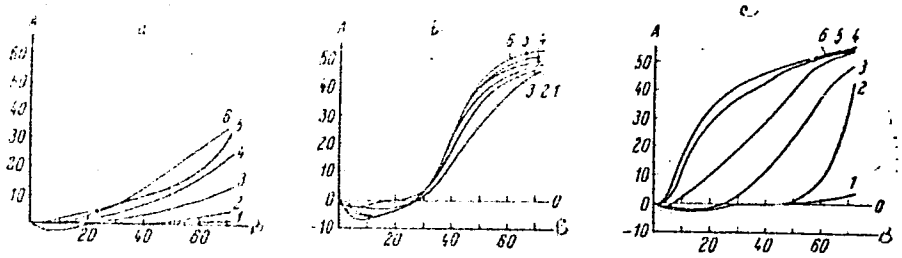

Fig. 1. Decomposition kinetics of aluminate solutions containing different quantities of γ-alumina seeds. (a) Without organic impurities; (b) with 1% O_2 of organic impurities considering total Na_2O 100%; (c) with 2% O_2 of organic impurities; (A) degree of solution decomposition (%); (B) duration of the decomposition (hr). Seeding ratio: 1-0.01; 2-0.05; 3-0.07; 4-0.1; 5-0.2; 6-0.5.

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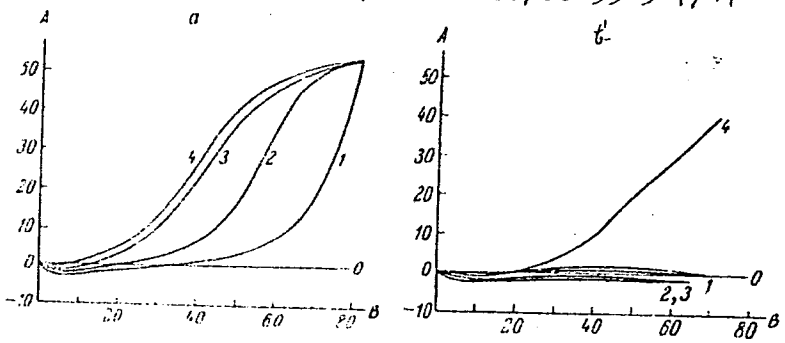

Fig. 2. Decomposition kinetics of aluminate solutions containing different quantities of the seeds produced by an incomplete recrystallization of γ-alumina into corundun. (a) Without organic impurities; (b) 1% O_2 of organic impurities considering total Na_2O 100%; (A) degree of the solution decomposition (%); (B) duration of the decomposition (hr). Seeding ratio: 1-0.05; 2-0.1; 3-0.2; 4-0.5.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

BOGOSLOVSKIY, V.N.; SHABALINA, O.K.

Electron microfractography of ferrates. Fiz.met.i metalloved. 10 no.1:153-156 Jl '60. (MIRA 13:8)

1. Institut metallurgii Ura'skogo filiala AN SSSR i Ural'skiy politekhnicheskiy institut im. S.M. Kirova.
(Ferrates) (Electron microscopy)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

DEREVYANKIN, V.A.; KUZNETSOV, S.I.; SHABALINA, O.K.

Investigating the processes of dissolving and crystal growth of aluminum hydroxide in alkaline aluminate solutions. Trudy Ural.politekh. inst. no. 98:106-115 '60. (MIRA 14:3)
(Aluminum crystals--Growth)
(Electron microscopy)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

S/126/61/012/005/010/028
E111/E435

AUTHORS: Shabalina, O.K., Chufarov, G.I.

TITLE: Mechanism and kinetics of the decomposition of wüstite. I

PERIODICAL: Fizika metallov i metallovedeniye, v.12, no.5, 1961, 697-702

TEXT: Wüstite decomposition below 570°C is important in both scaling and iron-oxide reduction. The authors have therefore carried out an investigation in which special attention was paid to changes in the microstructure of the free wüstite surface during decomposition and to the kinetics of the process as a whole. The process takes place in two stages:

$$(1 - 4y)Fe_{1-x}O \rightarrow (1 - 4x)Fe_{1-y}O + (x - y)Fe_3O_4 \; ; \; x > y \ldots . \quad (1)$$

$$4Fe_{1-y}O \rightarrow Fe_3O_4 + (1 - 4y)Fe_\alpha \ldots . \quad (2)$$

Wüstite was prepared by oxidation of armco iron with a $CO-CO_2$ atmosphere (2:3) at 1040°C cooling to 800°C and quenching. The

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Mechanism and kinetics of ...

wustite scale was chipped off to give 4 x 10 x 0.3 mm coarsely crystalline plate specimens. These plates were vacuum annealed at 350°C for various periods. Decomposition was studied by qualitative X-ray structural phase analysis on the powdered scales in a high-resolution camera. The lattice parameter of wustite and its decomposition products were determined. Magnetic analysis (Ref.10: Kifer, I.I. and Pantyushin, V.S., Testing of Ferromagnetic Materials. Gosenergoizdat, M.-L., 1955) was used for following the process quantitatively, the specific magnetization being determined with the aid of a standard nickel specimen. An electron microscope with a resolution of 100 Å was used to study decomposition on the free surface. The inner and outer faces of the scale were studied by X-ray structural analysis; rapid photography with focusing on the strongest structural lines of the phases was used for phase analysis; the parameter was determined by back reflection. $K_\alpha Co$ radiation was used in all the X-ray work. Powder X-ray patterns showed the initial specimens to be $Fe_{0.925}O$ but there were signs of the start of decomposition on the outer side of the scale. The lattice parameter there was 4.299 Å, that on the inside having the average value of 4.302 Å. A multi-

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Mechanism and kinetics of ...

step relief was found electron microscopically on the outer surface, that on the inside being typical of crystal cleavage. Observations on the decomposition at 350°C showed that within 15 minutes the process had spread to the inner face. At the outer face there was more metastable than original wustite. With further decomposition, wustite disappeared first from the outer and then the inner face; the hypoeutectoidal formation of magnetite was accompanied by the appearance of fairly dense formations at both the inner and outer faces. The course of the process is shown by Fig.4 (specific saturation magnetization σ_s as function of time (log scale) in hours): in about 1 to 1.5 hours the first-stage reaction (1) is completed. This enables σ_s to be checked by calculation, values of x and y being obtained from parameters of the original and metastable wustite (Ref.3: Marion M.F. Doc. metallurg., no.24, 1955, 87) and using the tabulated σ_s value for magnetite. Satisfactory agreement was obtained. After 2 hours holding at 350°C, the second eutectoidal-decomposition stage of the process begins, iron being detected on the outer side of the scale and, after 5 hours, on the

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inner side. On both sides, numerous pores about 0.1 micron in size appeared. This porosity is more pronounced than that in the first stage. Pore formation is due to coagulation of vacancies caused by diffusion of iron ions, which in the wustite lattice occurs more rapidly than diffusion of oxygen ions. There are 7 figures and 13 references: 7 Soviet-bloc and 6 non-Soviet-bloc.

ASSOCIATION: Institut metallurgii UFAN (Institute of Metallurgy UFAN)

SUBMITTED: March 6, 1961

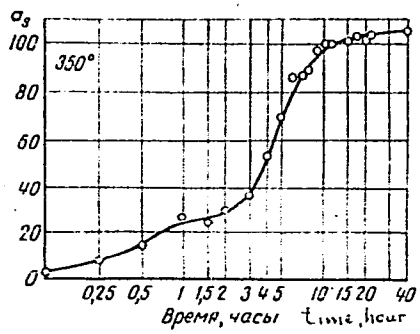

Fig.4.

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S/080/60/033/012/018/024
D209/D305

AUTHORS: Shabalina, O.K., Derevyankin, V.[illegible] and Kuznetsov, S.I.

TITLE: Experimental investigation of aluminum and hydroxides and oxides by means of the electron microscope

PERIODICAL: Zhurnal prikladnoy khimii, v. 33, no. 12, 1960, 2774 - 2777

TEXT: The electron microscope is being increasingly used as a means of assessing the properties of aluminum hydroxides and oxides, so the authors studied various aspects of the preparation of samples for this purpose. Somewhat modified versions of the standard procedure were tested to try and surmount certain difficulties: The presence of soluble alkali impurities; the existence of readily-hydrolyzable substances, such as the titanium compounds noted by M.V. Mironov et al (Ref. 2: Izv. Vuzov, Tsvet. met, 1, 83, 1959); and the occurrence of large crystals with dimensions of 10μ and more. Benzene appears to be the best liquid for preparing sus-

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pensions; ethyl alcohol is unsuitable in view of the damage incurred by the collodion backing on desiccation. Carbon can also be employed as a film-backing in addition to collodion. It is made by evaporating a polystyrene - benzene solution on glass, after which the residue is dusted with carbon. The softened polystyrene is then dissolved in ethyl bromide, and the residual carbon-film is again washed in benzene and dried on the carrier-grating. Collodion and carbon film-backings react differently to concentrated NaOH and aluminate solutions: with NaOH the former material is loosened and fractured and evaporation of the solution, whereas the carbon backing is not affected in this way. A dense, ragged, coagulated layer obscuring all details is also formed when an aluminate solution is evaporated on the collodion film-backing. Investigation of crystals contaminated by alkali discloses the presence of halos or branching folds of alkaline film around them which distorts the true surface picture and gives rise to the illusion of numerous offshoots near diaspore crystals. But previous work by S.I. Kuznetsov et al (Ref. 4: Metallurgiya NDVSh, 4, 87, 1958; Kohaszati La-

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pok, 14, 7, 29, 1959) and V.A. Derevyankin et al (Ref. 5: NDVSh, Metallurgiya, 1, 42, 1959; Tr. Ural'skogo politekh. inst. im. S.M. Kirova, 98, 106, 1960) has shown that diaspore, unlike bemite and gibbsite, does not form dendrites. If these alkali-containing crystals are applied to carbon film-backing, however, they preserve their clear outlines since alkali will not deliquesce on it. As regards the question of large crystals, the very rigidity of the carbon film impedes the application of the technique used by the authors for turning crystals in order to appraise their three-dimensional form; the film fractures and turns with the crystals. This does not happen with collodion backings, and the authors have been able to employ such a method in much of their research. In view of this fact, and taking into account the need for rapidity and simplicity when preparing large numbers of samples for electron-microscope analysis, the standard procedure involving the use of collodion film-backing is recommended, although the expediency of utilizing the other modifications is also noted by the authors. There are 3 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

Experimental investigation of ... S/080/60/033/012/018/024
D209/D305

reads as follows: D.E. Bradley, J. Appl. Phys., 27, 12, 1399, 1956. ✓

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M. Kirova
(Ural Polytechnic Institute im. S.M. Kirov)

SUBMITTED: March 9, 1960

Card 4/4

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

SHABALINA, O.K.; CHUFAROV, G.I.

Mechanism and kinetics of the decomposition of wustite. Fiz. met. i metalloved. 12 no.5:697-702 N '61. (MIRA 14:12)

1. Institut metallurgii Ural'skogo filiala AN SSSR.
(Wustite)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

18 3100 A also 1087

22432
S/080/61/034/007/006/016
D223/D305

AUTHORS: Derevyankin, V.A., Kuznetsov, S.I., and Shabalina, O.K.

TITLE: Effect of additions of titanium oxide and silica on the leaching rate of aluminum hydroxide

PERIODICAL: Zhurnal prikladnoy khimii, v. 34, no. 7, 1961, 1456 - 1461

TEXT: The main part of this article deals with the study of kinetics and the nature of dissolving pure aluminum hydroxide in the presence of titanium and silicon oxides. To establish the nature of dissolving the crystals of hydroxide use was made of electron microscopy, by which means data was obtained on the formation of protective surface films on hydroxide crystals and also on the form of traces of chemical compounds, developed by the reaction of Ti and Si oxide with an alkaline solution of aluminum during leaching. The composition of these compounds were not studied. For leaching experiments following aluminum hydroxides were used: 1)

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D223/D305

Effect of additions of ...

Hydrargilite, obtained under control conditions; 2) Bemite, prepared by the recrystallization hydroargilite under hydro-thermal conditions at 300°C and for 8 hours; 3) Diaspor, prepared by the method of A.W. Laubengayer and R.S. Weisz (Ref. 6: J. Am. Chem. Soc. 65, 247, 1943), i.e. by heating bemite in presence of water at temperature 350-375°C with 2 % of diaspor seed. The results of the experiments confirmed that titanium oxide appreciably lowers the leaching rate of diaspor and bemite, but has no effect on the dissolving rate of hydroargalate. It was also confirmed that titanium oxide inhibition at a temperature of 150°C and higher prevents the leaching of bemite and diaspor; but on reaching 230°C it no longer prevents the leaching rate of bemite while the solution of diaspor is still inhibited. In this respect, TiO_2 gel and rutile differ, the latter being less active. In the presence of waste (3-4 % of the initial weight of solid phase), the inhibiting action of titanium oxide is much smaller and at temperatures above 175° becomes practically zero. The oxides of silicon also deter the leaching of aluminum hydroxide, but to a lesser extent than ti-

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Effect of additions of ...

tanium oxide. The best inhibitors are silica gel and opal. Electron microscopy has confirmed N.K. Druzhinina's suggestion on the mechanism of the inhibitive action of titanium oxides, i.e. the formation of protective films on aluminum hydroxide. The thinness of film is appreciably less than 100 Å and on the addition of waste films were not formed. With an increase in leaching time, the protective films crystallize into needle-shaped crystals which still form protective layers, but now these are porous and alkalies diffuse to aluminum hydroxide and the dissolving rate is higher. Additions of silicon oxides form crystalline protecting films of sodium aluminum silicates on aluminum hydroxide insulating it from alkaline attack. The formation of aluminum silicates on the surface of aluminum hydroxide crystals can be explained in the following manner: Silicon compounds contained in bauxite react with alkaline aluminum solution to form sodium silicate which in turn, reacts with sodium aluminate to form a complex compound $Na_2O \cdot Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$. The form of reaction, state the authors, is probably:

X

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

S/020/61/140/006/029/030
B107/B101

AUTHORS: Chufarov, G. I., Corresponding Member AS USSR, and Shabalina, O. K.

TITLE: Mechanism and kinetics of wustite decomposition

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 6, 1961, 1392-1393

TEXT: The decomposition of wustite on its free surface and the quantitative characteristics of the decomposition kinetics were studied. Wustite produced by oxidation of Armco iron in $CO-CO_2$ atmosphere was chipped off and tempered in vacuo at 350°C. Phase composition and parameter were determined by x-ray structural analysis. Polystyrene carbon replicas of the free surface of the specimens were examined electron microscopically. The magnetic saturation moment was measured by means of magnetic analysis in a ballistic apparatus. Wustite had a parameter of 4.295 Å in its original state. This corresponds to the formula $Fe_{0.907}O$. It has been found that decomposition begins on the outer surface of the scale and is here more intensive, since this surface is richer in O_2. Primary magnetite

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forms on both surfaces as thin and flat formations according to the reaction: $(1-4y)Fe_{1-x}O \longrightarrow (1-4x)Fe_{1-y}O + (x-y)Fe_3O_4$; $x > y$ (1). The resulting metastable wustite contains much less oxygen in the surface layers ($Fe_{0.984}O$) than in the center ($Fe_{0.963}O$). This is indicative of strong decomposition on the free surface, where crystallochemical conversion is much easier. Eutectoid decomposition is determined based on the occurrence of iron and the constancy of the parameter of metastable wustite. It proceeds according to the reaction: $4Fe_{1-y}O \longrightarrow Fe_3O_4 + (1-4y)Fe_\alpha$ (2). This decomposition is accompanied by a characteristic change of the surface microstructure. Numerous fine pores (of about 0.1 μ) are formed. The mechanism of this process is: On leaving the wustite lattice iron ions leave vacancies. These coagulate to micropores which are not overgrown by the magnetite originating from wustite. Additional annealing of the specimens (at 500°C) after decomposition reduced the porosity and revealed clearly the microstructure. Both the large primary magnetite crystals and the eutectoid could be easily distinguished. Microcrystals (of about 0.5 μ) of the secondary magnetite became visible

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in the eutectoid. Presumably, the iron content of the eutectoid is insignificant (about 13 % by volume). Probably, Fe forms intermediate layers between the magnetite microcrystals. The curve $\sigma_s(t)$ was plotted (Fig. 4) as a result of magnetic analysis and shows that the specific intensity of saturation magnetization of wustite specimens is a function of the annealing time at 350°C. The experimental values of σ_s could be used to determine the decomposition degree in any intermediate stage and to estimate the decomposition rate in different periods. This became possible owing to the constancy of the quantitative interrelations between the phases formed. The rate during the first period (pre-eutectoid separation of magnetite) exceeds that of the second period (eutectoid decomposition) by a factor of about seven. There are 4 figures and 6 references: 3 Soviet and 3 non-Soviet.

ASSOCIATION: Institut metallurgii Ural'skogo filiala Akademii nauk SSSR (Institute of Metallurgy of the Ural Branch of the Academy of Sciences USSR), Ural'skiy politekhnicheskiy institut im. S. M. Kirova (Ural Polytechnic Institute imeni S. M. Kirov)

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DEREVYANKIN, V.A., kand. tekhn. nauk; KUZNETSOV, S.I., prof., doktor tekhn. nauk; SHABALIN, O.K., inzh.

Effect of titanium and silicon oxide admixtures on the leaching rate of aluminum hydroxides. Sbor. nauch. trud. Ural. politekh. inst. no.122:102-110 '61. (MIRA 17:12)

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S/126/62/013/005/020/031
E111/E435

AUTHORS: Shabalina, O.K., Chufarov, G.I.

TITLE: Mechanism and kinetics of the decomposition of wustite. II

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.5, 1962, 766-768

TEXT: In an earlier paper (FMM, v.12, no.5, 1961, 697) work on wustite decomposition at 350°C was reported. In this paper wustite decomposition at 400 and 500°C was studied. In the present work the same batch of wustite was used in the form of plates of scale 0.3 mm thick with a lattice parameter of 4.302 Å corresponding to $Fe_{0.925}O$. Annealing was carried out in vacuo (10^{-4} mm Hg). The saturation magnetization was determined as a function of annealing time, the same specimen being used for constructing a complete curve. X-ray patterns were taken from the same specimen to obtain the phase analysis of the inside and outside of the scale. A separate specimen, which had undergone the same treatment as the other specimen, was used for the X-ray

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powder method determination of lattice parameter. Changes in the surface microstructure during decomposition were followed with the aid of an electron microscope (resolution 100 Å). The work suggested that in addition to the iron + magnetic eutectoid the surface contains primary magnetite crystals. The decomposition must follow the equation

$$4Fe_{1-x}O \longrightarrow Fe_3O_4 + (1 - 4x)Fe, \quad (x = 0.075)$$

The process at 500°C is much slower than at 350°C and is different in other ways. This is explicable on the basis of the two-stage mechanism. There are 2 figures.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M.Kirova
Institut metallurgii Ural'skogo filiala AN SSSR
(Ural Polytechnical Institute imeni S.M.Kirov,
Metallurgy Institute of the Ural Branch AS USSR)

SUBMITTED: September 23, 1961

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

S/020/62/142/002/028/029
B101/B144

AUTHORS: Shabal'ina, O. K., and Chufarov, G. I., Corresponding Member AS USSR

TITLE: The maximum rate of decomposition of wustite

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 2, 1962, 411-412

TEXT: The rate of thermal decomposition of wustite at 400 and 500°C was investigated. The decomposition products were subjected to X-ray structural and electron-microscopic examinations, and the kinetics of the process was clarified by measuring the variation in specific magnetization saturation σ_s during heating. Decomposition follows the reaction $4Fe_{1-x}O \rightarrow Fe_3O_4 + (1 - 4x)Fe$; $x = 0.093$. Details of the process: The preeutectoid separation of Fe_3O_4 and eutectoid decomposition are caused by diffusion of iron ions out of lattice points; coagulation of vacancies to pores which are not immediately filled with Fe_3O_4. This porosity facilitates the transformation of neighboring sections. Recrystallization, however, is also accelerated with increasing temperature. The pores are

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closed, and the total rate of the process decreases. There are 1 figure and 3 references: 1 Soviet and 2 non-Soviet.

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SUBMITTED: September 22, 1961

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S/020/63/148/004/024/025
B192/B101

AUTHORS: Shabalina, O. K., Chufarov, G. I., Corresponding Member AS SSSR

TITLE: Decomposition kinetics of wüstite

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 4, 1963, 890-892

TEXT: The decomposition kinetics of wüstite was studied by measuring the specific saturation magnetization $\sigma_s(t)$ as a function of time in samples with a lattice constant of 4.032 Å between 200°C and 500°C. The measured curves show that two successive reactions take place below 400°C: (1) a pre-eutectic separation of magnetite, and (2) a eutectic decomposition of metastable wüstite; while there is only one above 400°C: (3) eutectic decomposition of the original wüstite. The molar fraction $\alpha(t)$ of the converted material was calculated from the experimental data. The behavior of $\alpha(t)$ is determined by the number N of pores in the material. For $\alpha \leq 1/2$, the measured points satisfy the equation $\alpha/(1-\alpha) = \exp(kt - b_1)$, where k and b_1 are constants; the equation is valid on the assumption that N is

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proportional to α. For $\alpha \geq 1/2$, the measured points follow the relation $\alpha/(1 - \alpha) = \exp(b_2 - 2nt^{-1/2})$, where $n = k'/D^{3/2}$; k' and b_2 are constants. This equation is valid on the assumption that N is proportional to $\alpha(Dt)^{-3/2}$, where D denotes the diffusion coefficient of vacancies. In the reactions (1) and (2), k increases with the temperature up to a saturation value at ~400°C and decreases in reaction (3). In all three reactions, n is practically equal and independent of temperature; b_2 increases below 400°C and decreases above this temperature. There are 3 figures.

ASSOCIATION: Institut metallurgii Ural'skogo filiala Akademii nauk SSSR (Institute of Metallurgy of the Ural Branch of the Academy of Sciences USSR)

SUBMITTED: October 1, 1962

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L 19397-63 EWT(l)/EWP(q)/EWT(m)/EWP(B)/BDS AFFTC/ASD/ESD-3/IJP(C) JD
ACCESSION NR: AT3001931 S/2912/62/000/000/0321/0326

AUTHORS: Kuznetsov, S.I.; Derevyankin, V.A.; Shabalina, O.K.

TITLE: Some observations of the processes of dissolution and growth of crystals of Aluminum hydroxide in alkaline alumina solutions

SOURCE: Kristallizatsiya i fazovyye perekhody. Minsk, Izd-vo AN BSSR, 1962, 321-326

TOPIC TAGS: crystal, crystallization, crystallography, solution, dissolution, growth, Al, hydroxide, precipitation, leaching, dendrite, dendritic, lamellar, acicular, bemite, diaspore, hydrargillite, Ti

ABSTRACT: This paper is a progress report on the long-term project at the Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute) on the character of the dissolution and growth of crystals of alumina in alkaline Al solutions with especial reference to the Bayer method. The laboratory work was primarily done at the Institute; industrial experiments were performed by the Aluminum industry. Investigation methods employed: Electron microscope, X-ray diffraction, crystal-optical and chemical methods of analysis. Earlier stages of the authors' work were published in cited references. The present paper is a concentrated, informative,

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survey on the most interesting data on the dissolution and growth of Al-hydroxide crystals. (1) Processes of dissolution (leaching). Hydrargillite crystals in unsaturate alumina solutions, when heated to near b.p., break up into fragments. Upon this initial comminution, they dissolve promptly. Diaspore crystals usually dissolve at the faces, with the formation of fissures and perforations. At times, the holes in bemite or diaspore exhibit a sharply defined hexagonal shape. When Al hydroxides with additions of Si oxides are leached, growths of fairly equiaxial crystalline formations of Na hydroalumosilicate (some of 1.6-micron diam) form on the dissolving particles. Upon full dissolution of the hydroxide crystals on which these spherical particles had formed the latter exhibit apertures. Experiments show the presence of films of Ti compounds on the dissolving bemite and diaspore crystals. During leaching these films crystallize into acicular crystals visible under an optical microscope. Photographs of these formations are shown in the article. (2) Crystallization processes (separation of Al solutions). Without stirring, alumina solutions form practically only antiskeletal forms of crystalline growth, so that crystals of hydrargillite grow primarily in the form of lamellar dendrites. Lamellar growths form on the plane of the pinacoid. There are virtually no prismatic growths. Thoroughly stirred alumina solutions, expecially with primer, give rise to a greater probability of the deformation of growths and, hence, various defects. When, in a lamellar growth, spiral dislocation occurs, it may grow into a

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ACCESSION NR: AT3001931 0

prism. Growing dendrites undergo deformations which increase the number of directions of growth. The dendrites lose their SC structure and assume a fairly equiaxial form. The decomposition products of alumina solutions are usually well crystallized; hence they lend themselves well to electron-microscope and X-ray-diffraction analysis. The various crystalline products and the sequence of their precipitation by various agents are described. The best precipitation of alumina solutions under the action of nonhydrargillitic primers for industrial purposes is obtained with the use of a bemite primer obtained by 250°C roasting of hydrargyllite. Optimal primer ratio: 0.2-0.3. A brief survey is also given on the process of recrystallization of hydrargillite into bemite and diaspore in water and alumina solutions, including the layerwise structure arising from the periodic "wave-like" character of the crystallization. Orig. art. has 5 figs.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 16Apr63 ENCL: 00

SUB CODE: CH, PH, MA, EL NO REF SOV: 006 OTHER: 000

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APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

SHABALINA, O.K.; CHUFAROV, G.I.

Mechanism and kinetics of the decomposition of wüstite.
Fiz. met. i metalloved. 15 no.5:690-696 My '63. (MIRA 16:8)

1. Ural'skiy politekhnicheskiy institut im. S.M. Kirova i Institut metallurgii Ural'skogo filiala AN SSSR.
(Wustite)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

LAKERNIK, M.M.; LAVROV, L.G.; SHABALINA, R.I.

Condensing zinc into a liquid metal in a lead-sprayed condensator during the electrothermal treatment of intermediate products from complex metal ores. Sbor. nauch. trud. Gintsvetmeta no.19:387-396 '62. (MIRA 16:7)

(Nonferrous metals--Electrometallurgy)
(Condensation products(Chemistry))

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

KRYUK, V.I.; MARTIN, Yu.S.; SHAPALINA, E.I.

Dissolution kinetics of an iron-base alloy in liquid mattes.
Izv.vys.ucheb.zav.; tsvet.met. 38 no.3:33-35 Mr '65. (MIRA 18:6)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

NOSKOV, S.K., kand.tekhn.nauk; ODINOKOV, S.D., kand.tekhn.nauk; SIROTKINA, O.V., starshiy tekhnik; KRETOVA, L.V., starshiy tekhnik. Prinimala uchastiye SHABALINA, V.I., mladshiy nauchnyy sotrudnik. SKVORTSOVA, I.P., red.izd-va; TEMKINA, Ye.L., tekhn.red.

[Album of technological schemes and drawings of the equipment, instruments, and devices to be used in covering roofs with rolled materials] Al'bom tekhnologicheskikh skhem i chertezhei oborudovaniia, instrumentov i prisposoblenii dlia ustroistva krovel' iz rulonnykh materialov. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit.materialam, 1960. 48 p. (MIRA 13:6)

1. Akademiya stroitel'stva i arkhitektury SSSR. Institut organizatsii, mekhanizatsii i tekhnicheskoy pomoshchi stroitel'stvu.
(Roofing--Equipment and supplies)

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UTENKOV, V.F., kand.tekhn.nauk [deceased]; BOGATYREV, I.I., kand.tekhn. nauk; DODIN, V.Z., inzh.; GORDIYENKO, N.A., inzh.; MUKHA, V.M., inzh.; BEREZOVSKIY, B.I., inzh.; KOVALEVSKIY, P.I., inzh.; ROGOVSKIY, L.V., inzh.; SHABALINA, V.I.; PETROVA, V.V., red.izd-va; ABRAMOVA, V.M., tekhn.red.

[Temporary instructions for carrying out building and assembly operations in the Far North and in permafrost regions] Vremennye ukazaniia po proizvodstvu stroitel'no-montazhnykh rabot v usloviiakh Krainego Severa i raionov rasprostraneniia mnogoletnei merzloty. VU 2-60. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit. materialam, 1960. 59 p. (MIRA 14:6)

1. Akademiya stroitel'stva i arkhitektury SSSR. Institut organizatsii, mekhanizatsii i tekhnicheskoy pomoshchi stroitel'stvu.
(Russia, Northern—Building—Cold weather conditions)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

SHABALINA, V.I., inzh.

Mechanization of gluing of roll roofing materials. Mekh. stroi. 20 no.10:6-8 O '63. (MIRA 16:10)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

SHABALINA, V.I.; DEMBITSKIY, A.D.; GORYAYEV, M.I.

Isomerization of d-sabinene to l-α-thujene. Zhur. ob. khim. 34 no.11:3855 N '64 (MIRA 18:1)

1. Institut khimicheskikh nauk AN Kazakhskoy SSR.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5

GORYAYEV, M.I., akademik; SHABALINA, V.I.; DEMBITSKIY, A.D.

Acid isomerization of sabinene. Dokl. AN SSSR 168 no.1:155-156 S-O '64 (MIRA 17:8)

1. Institut khimicheskikh nauk AN KazSSR. 2. AN KazSSR (for Goryayev).

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001548230003-5"

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SHEVCHENKO, F.P., starshiy nauchnyy sotrudnik; SHABALINA, Z.S., starshiy nauchnyy sotrudnik

Noctuid moths as corn pests in the Altai. Zashch.rast.ot vred.i bol. 7 no.6:29-30 Je '62. (MIRA 15:12)

1. Altayskiy nauchno-issledovatel'skiy institut sel'skogo khozyaystva.
(Altai Territory--Corn (Maize)--Diseases and pests)
(Altai Territory--Owlet moths)

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DANCHEVSKIY, V.I.; SAVEL'YEV, B.I.; BORISOV, V.V., red.;
SHABALINA, Z.S., red.-leksikograf

[Italian-Russian military dictionary] Ital'iansko-russkii voennyi slovar'. Moskva, Voenizdat, 1965. 404 p.
(MIRA 18:6)

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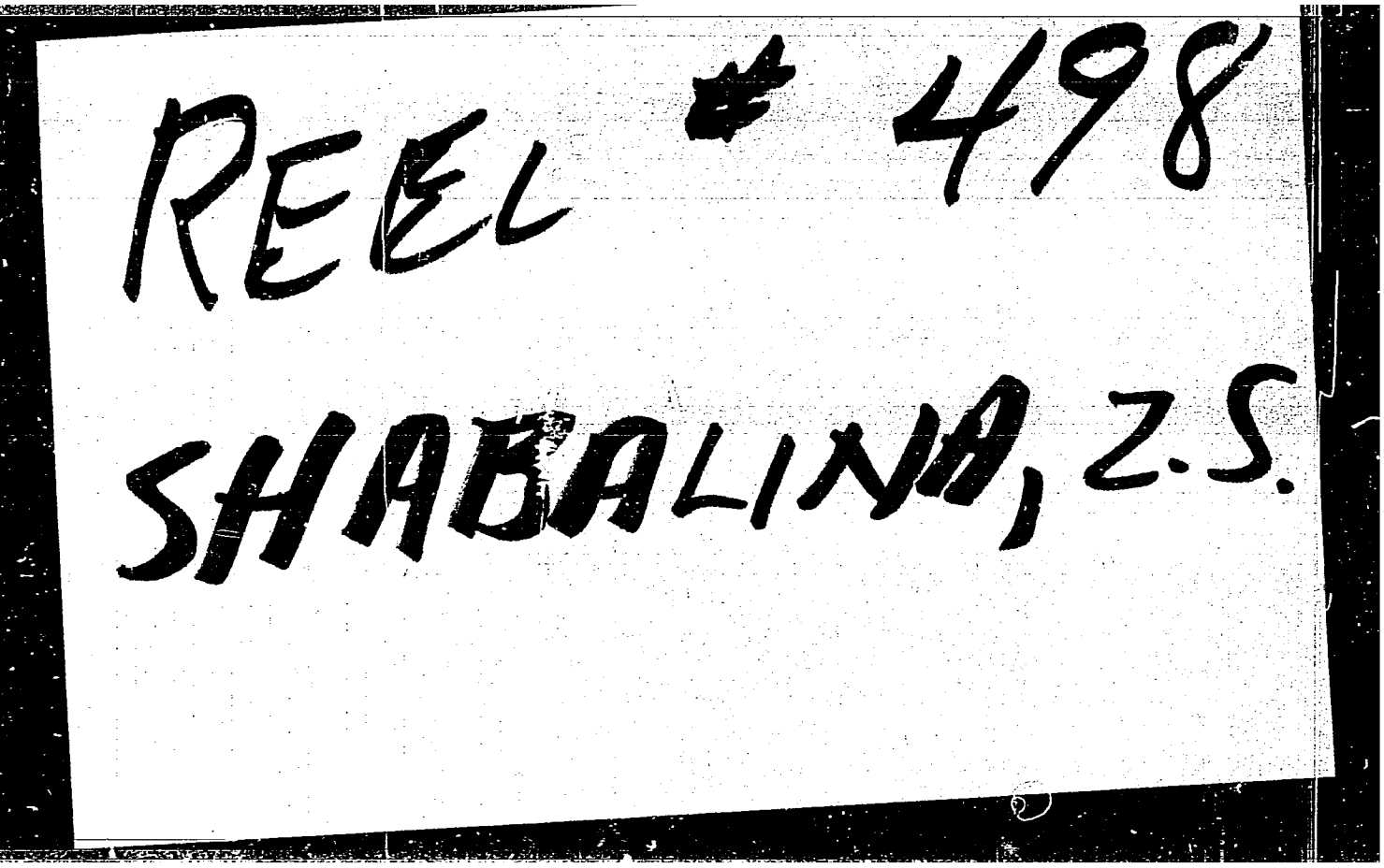

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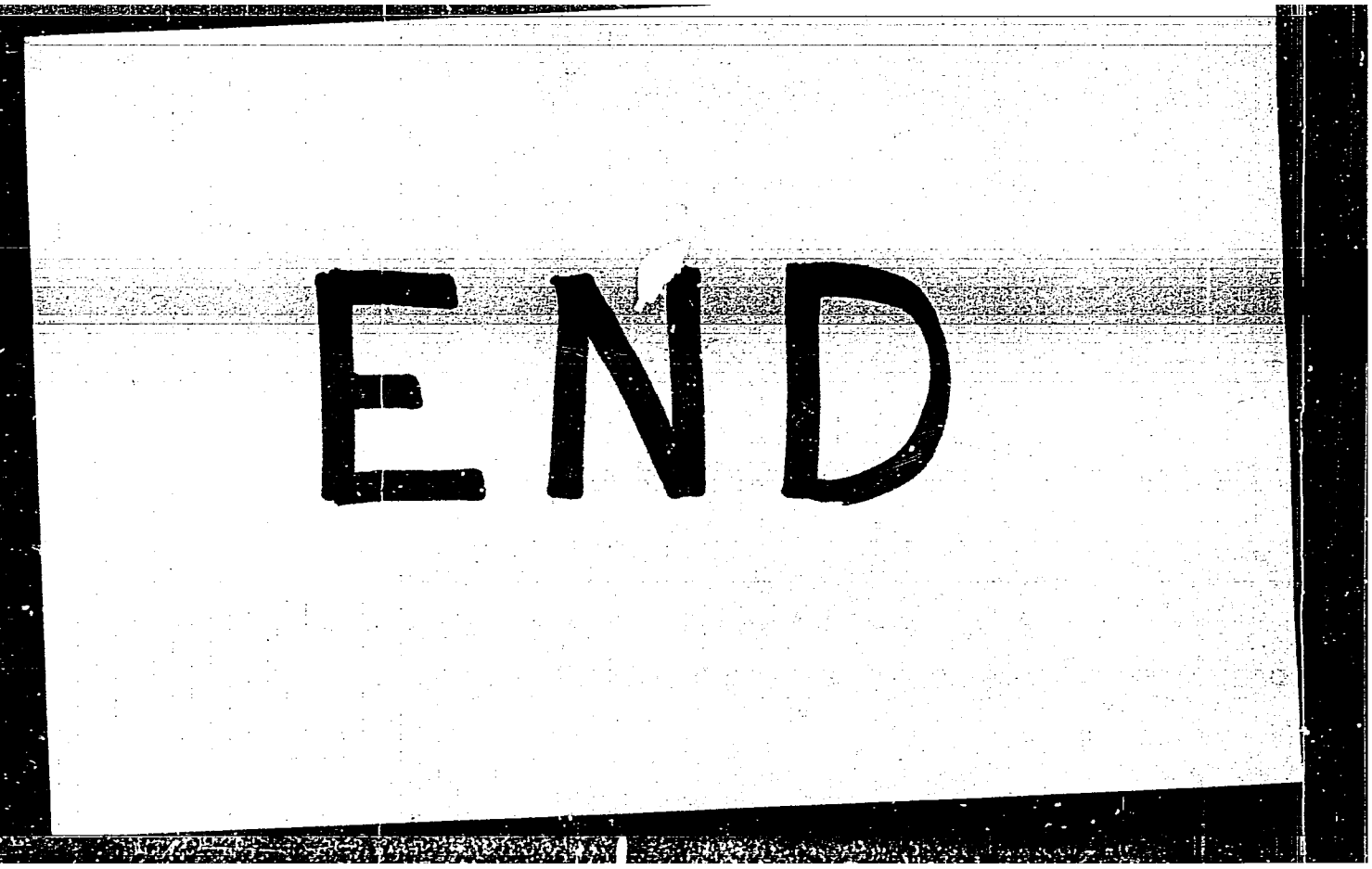

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