

A C S

Comments

Hydraulic slag anhydrite cement. P. P. Bursikov
Nevost Tekhniki, 10 [2] 33-35 (1941); *Zhurnal po*
Chem. Zemstva, 1942, I [2] 3083-94. As only about 25%
of the blast-furnace slag is put to profitable use in Russian
foundries, a long series of experiments were made to dis-
cover its further application. Good results were obtained
by grinding dried basic Martin, Bessemer, and foundry
slags with 6 to 10% anhydrite (gypsum fired to 300° to
700° or natural anhydrite) as well as 3 to 5% dolomite.
After storage in water for 28 days, a resistance to pressure
of 180 to 335 kgm. per cm.² depending on the mixing
proportion (1:3 with standard sand) was obtained. Sug-
gestions for the manufacturing process and uses of these
clinker free blast furnace anhydrite slag cements are given.
MVC

Budnikov, P.P.

BC

Calcium sulphate as a source of sulphur chlorides. I. Chlorination of calcium sulphate in presence of reducing agents. II. Optimum conditions for the chlorination process. P. P. Budnikov and E. I. Kretsch (J. Appl. Chem. Russ., 1941, 14, 747-764, 755-765; cf. A., 1930, 1211).—I. When the mixture CaSO_4 (gypsum) + 4C (lignite C) was chlorinated over the range 225-850°, the CaSO_4 began to decompose at 345° to give S chlorides (I), the yield of S as SO_2 rising rapidly as the temp. increased to 725° (96% yield). The max. yield of S at 740-750° was obtained with the mixture CaSO_4 + 3C. Under these conditions, inax. yields were obtained using coal or lignite C or sugar C (98.5-98.7%), and the lowest yield with coke (87.4%); anthracite, bone C, or electrode C gave intermediate yields. At the optimum conditions [740-750°, CaSO_4 + 3C (lignite)], the reaction was very rapid, a 96% yield being obtained in 15 min. The addition of NaCl or Na_2SO_4 (0.1 g.-mol per g.-mol CaSO_4) increased the speed of the reaction at 630-640°; addition of Fe_2O_3 or of SiO_2 decreased the yield of S. All experiments were carried out with small samples.

II. Repetition confirmed the above results for larger quantities of the reactants. The optimum temp. for the prep. of (I) by chlorinating the stoicheiometric mixture CaSO_4 + 3C (anthracite) + 0.1M Na_2SO_4 (all previously baked together at 600-800°) was 700-750°. Chlorination of the stoicheiometric mixture CaSO_4 + 4C + 0.1M Na_2SO_4 produced both CS_2 and (I). The heat produced during these reactions is calc.

unm 3.61

N.G.

A.C.S.

Refractories

Interaction of kaolin and coal at high temperatures. P. BUDNIKOV AND E. Z. DOURANT, *Compt. Rend. Acad. Sci. URSS*, 1941, No. 32, 31-36 (1941); *Brit. Chem. Phys. Abstr.*, 1942, I, Nov., 400. Appreciable quantities of SiC and $\alpha\text{-Al}_2\text{O}_3$ were formed when a kaolin and a clay were each heated with 25% of oil-gas coke at 1600° to 2000° .

C 4

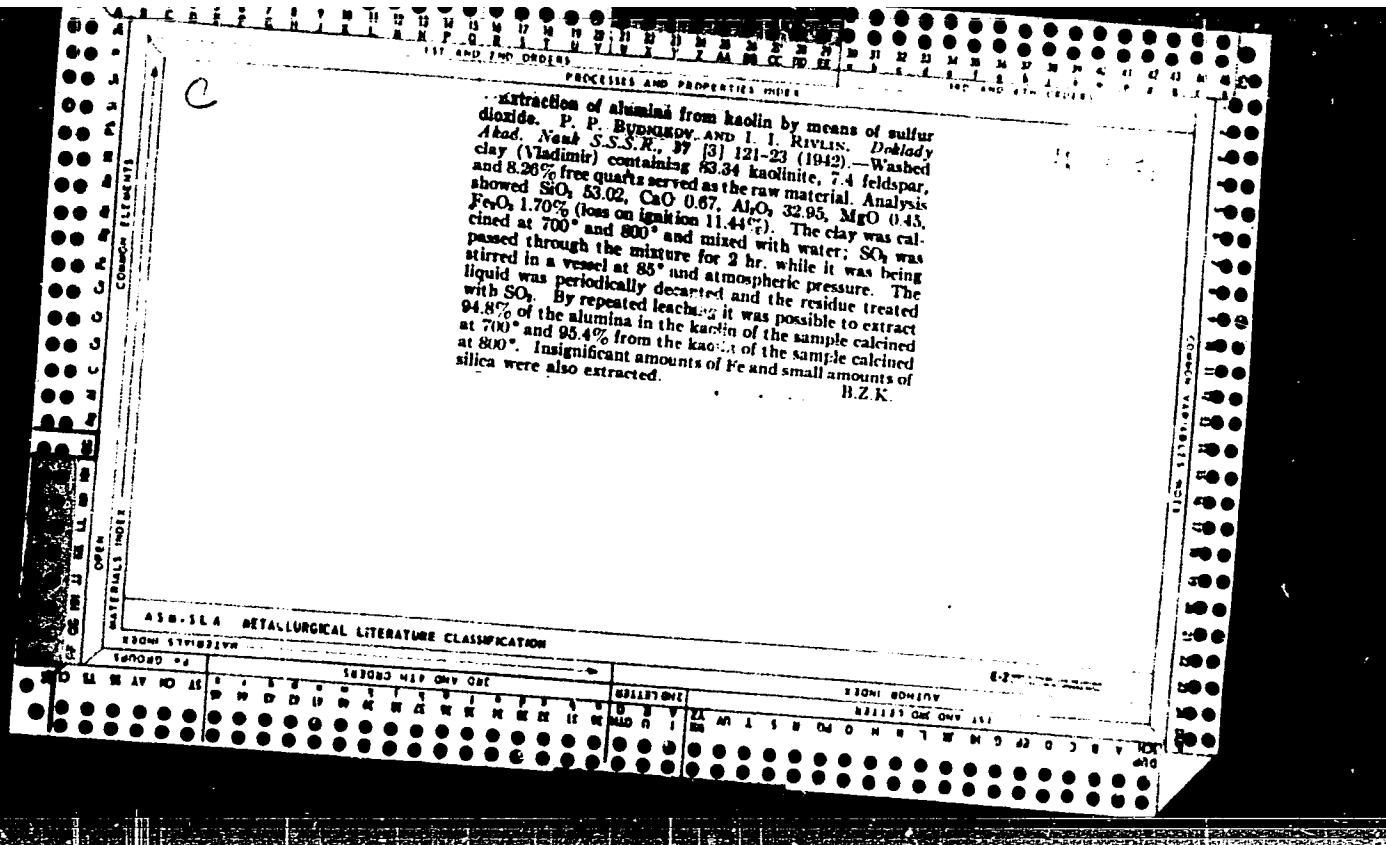
Anhydrite cement. P. P. BUDNIKOV. Abstracted in
Visn Akad. Nauk Ukr. R.S.R., 1942, p. 43.—B. investigated the manufacture of anhydrite cement from gypsum and anhydrite found in the Bashkir Republic of the Soviet Union. The addition of various catalysts in amounts of 1 to 3% during the hydration of the anhydrite was found to have a practical value for "revivification" of the anhydrite and the manufacture of cement. On the basis of extensive laboratory experiments and semicommercial tests, the anhydrite cement is prepared by calcining the gypsum at 600° to 700° (or drying the natural anhydrite), and grinding with suitable additions, such as bisulfate or sodium sulfate (0.6%) and copper sulfate (8%). The cement is being made commercially in Ufa. B.Z.K.

3-3-40

Improving the Building Characteristics of Anhydrous
Alumina Cement. By I. G. GOLDSTEIN. *Patent Abstracts of Russia*, No. 34, pp. 73-87. Defects in concrete
blocks made from alumina cement are caused by the heat
generated in the formation of $3\text{CaO}\cdot\text{Al}_2\text{O}_5\cdot 6\text{H}_2\text{O}$ instead of
the usual hydration process: $2(\text{CaO}\cdot\text{Al}_2\text{O}_5) + 10\text{H}_2\text{O} =$
 $2\text{CaO}\cdot\text{Al}_2\text{O}_5\cdot 7\text{H}_2\text{O} + \text{Al}_2\text{O}_5\cdot 3\text{H}_2\text{O}$. These defects were
eliminated by the addition of gypsum calcined at 600°
to 700°. Addition of 25 to 30% of the anhydrous
 CaSO_4 to the alumina cement used in the prepara-
tion of plastic concrete which was hardened under
adiabatic conditions at 60° to 65° resulted in a mechanical
strength of 450 kg./cm.² after 2 days and 520 kg./cm.²
after 7 days. Specimens of rigid rammed concrete showed
a compressive strength of 600 kg./cm.² after 1 day and 800
kg./cm.² after 7 days. Samples of concrete prepared from
alumina cement without the addition of anhydrous CaSO_4
and hardened under adiabatic conditions showed a com-
pressive strength of 220 kg./cm.² after 2 days and 144
kg./cm.² after 7 days.

B.Z.K.

33-18



C

GYPSUM—ITS INVESTIGATION AND USE (GIPS—EGO ISSLEDOVANIE I PREDMETIE). 3d ed. P. P. Budnikov. Stroizdat Markomstroya, Moscow-Leningrad, 1943. 373 pp. Price 25R. — Part I gives a survey of both Soviet and foreign literature on problems regarding the general characteristics of gypsum and anhydrite, types of deposits, and also physical and chemical properties of various modifications of gypsum. Part II is devoted to the exposition of experimental and theoretical investigations; several chapters having practical applications are included. New experimental data on the production of sulfuric acid, Portland cement, and slag-Portland cement from mixtures of clay and Ca sulfate are given. The following new chapters are noted because of their special interest: Chapter 12, "Heat of hydration of gypsum dehydrated at various temperatures"; Chapter 26, "Corrosion of concrete from slag-anhydrite (clinkerless) cement"; and Chapter 22, "Chemistry of slag-anhydrite (clinkerless) cement." The book

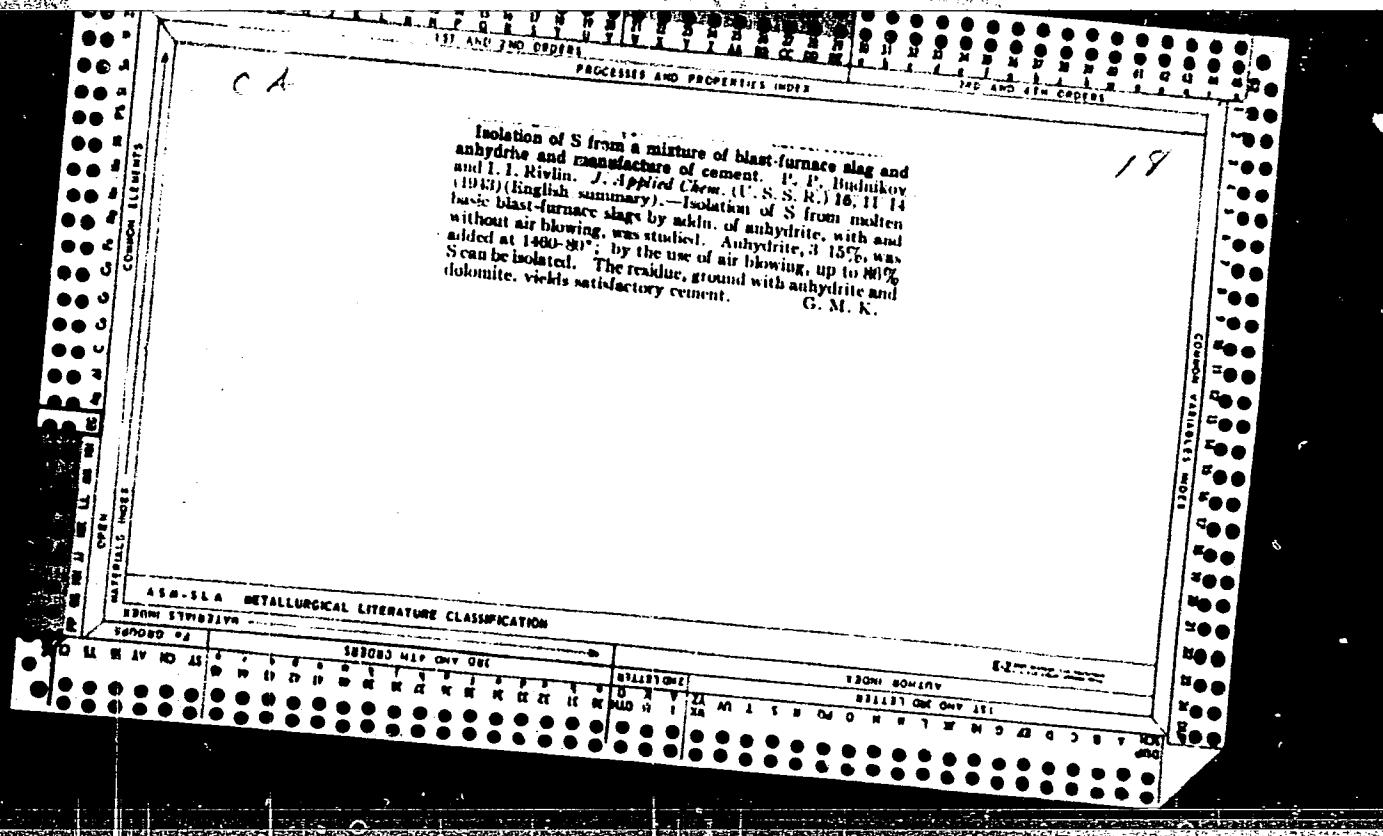
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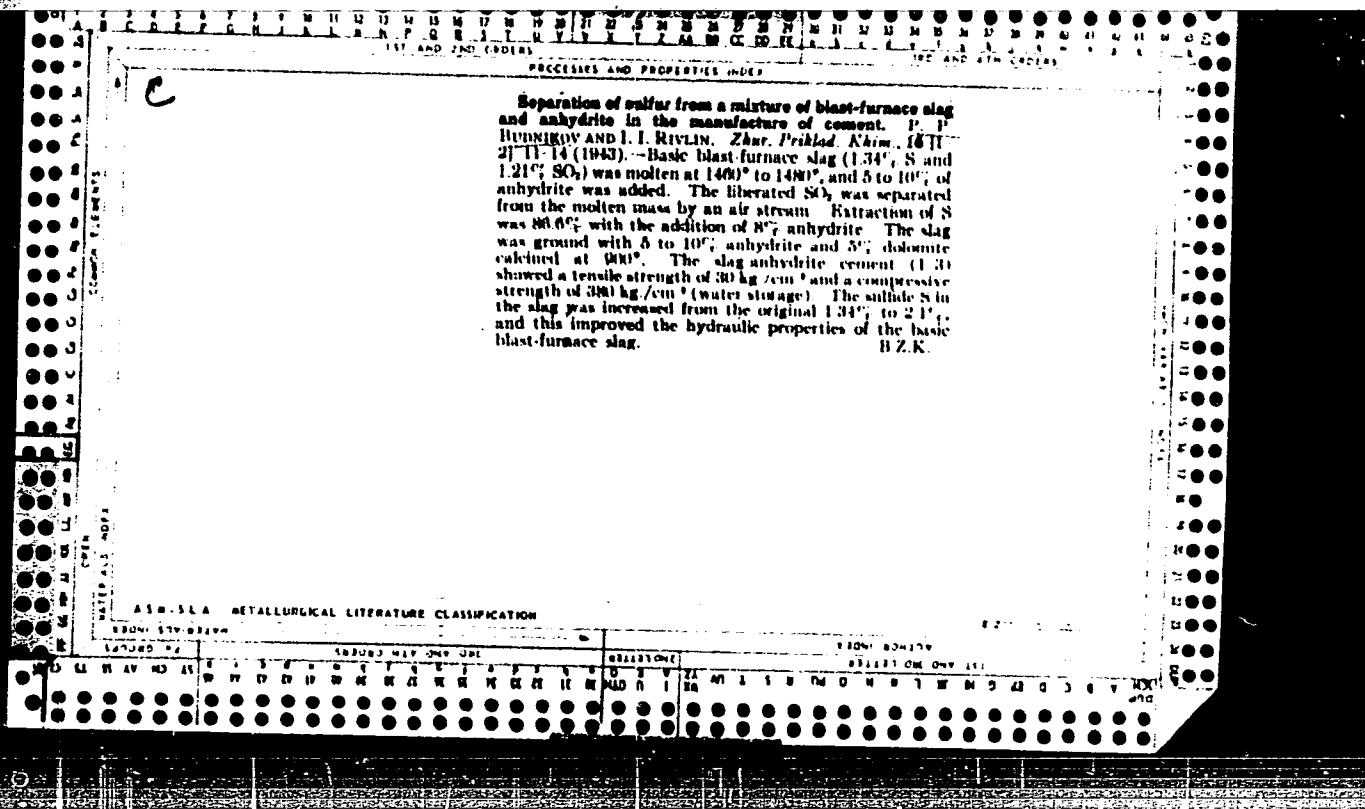
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was proofread carelessly. The excellent literature references would have far greater value if they were arranged together in one section at the end of the book instead of being split up.

B.Z.K.

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C	Cement Elements Oxide Metals Magnetic Minerals Other Physical Properties Reactions Slag Solubility Temperature Testing Units Weight X-ray	<p>Production of ammonium sulfate and Portland cement from a mixture of gypsum (anhydrite) and blast-furnace slag. P. P. Bunninov. <i>Zhur. Priklad. Khim.</i>, 16 [1-2] 7-9 (1943).—The mixture of blast-furnace slag and gypsum was wet-ground to pass sieves having 400 openings/cm.² (10% residue) and 900 openings/cm.² (0.2% residue) and treated with ammonium carbonate at about 40° while being agitated. The yield of ammonium sulfate was 96.4%. The residue was filtered off without difficulty and had a moisture content of about 20%. The residue was fired in an electric furnace at 1460° and yielded a normal Portland cement clinker containing SiO₂ 23.73, Al₂O₃ 3.47, Fe₂O₃ 2.34, CaO 68.26, MgO 1.10, MnO 0.40, and SO₃ 0.38%; the coefficient of saturation was 0.93. The clinker was ground with (1) 2% gypsum, (2) 5% gypsum and 70% slag, and (3) 15% anhydrite and 70% slag. All samples of cements passed the physicomechanical tests.</p> <p>B.Z.K.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Hydraulic cements from acid blast-furnace slags. D. P. Budnikov. *J. Applied Chem. (U. S. S. R.)* 16, No. 11/12, 337-34 (1943); *Tzement* 16, N. 5/6, 3-8 (1944).—A high-grade hydraulic cement was produced from granulated, acid blast-furnace slag without adding portland cement. The ratio of CaO to SiO₂ + Al₂O₃ should not be less than 0.7 and the ratio of SiO₂ to Al₂O₃ not over 3.2; the MnO content should not exceed 3.8%. As activators for cement made from acid slags were used native or artificial anhydrite approx. 10 and dolomite calcined at 1100-20° 3-7%. The dolomite can be replaced by a corresponding quantity of MgO + CaO. Exptl. results and analyses are tabulated. M. Husek

AB-114 METALLURGICAL LITERATURE CLASSIFICATION

EDITION 1962/70

EXPIRES 1967

SEARCHED

SEARCHED

SERIALIZED

SERIALIZED

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INDEXED

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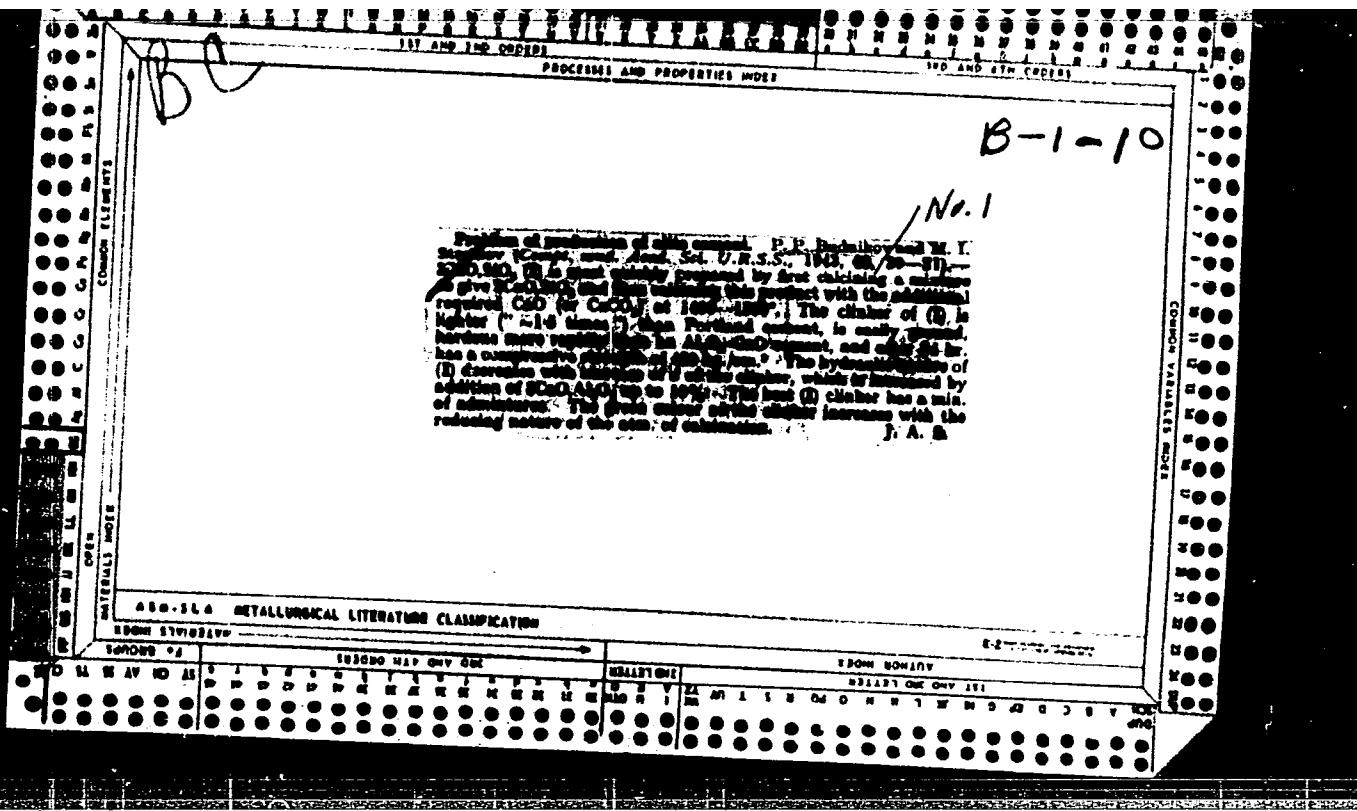
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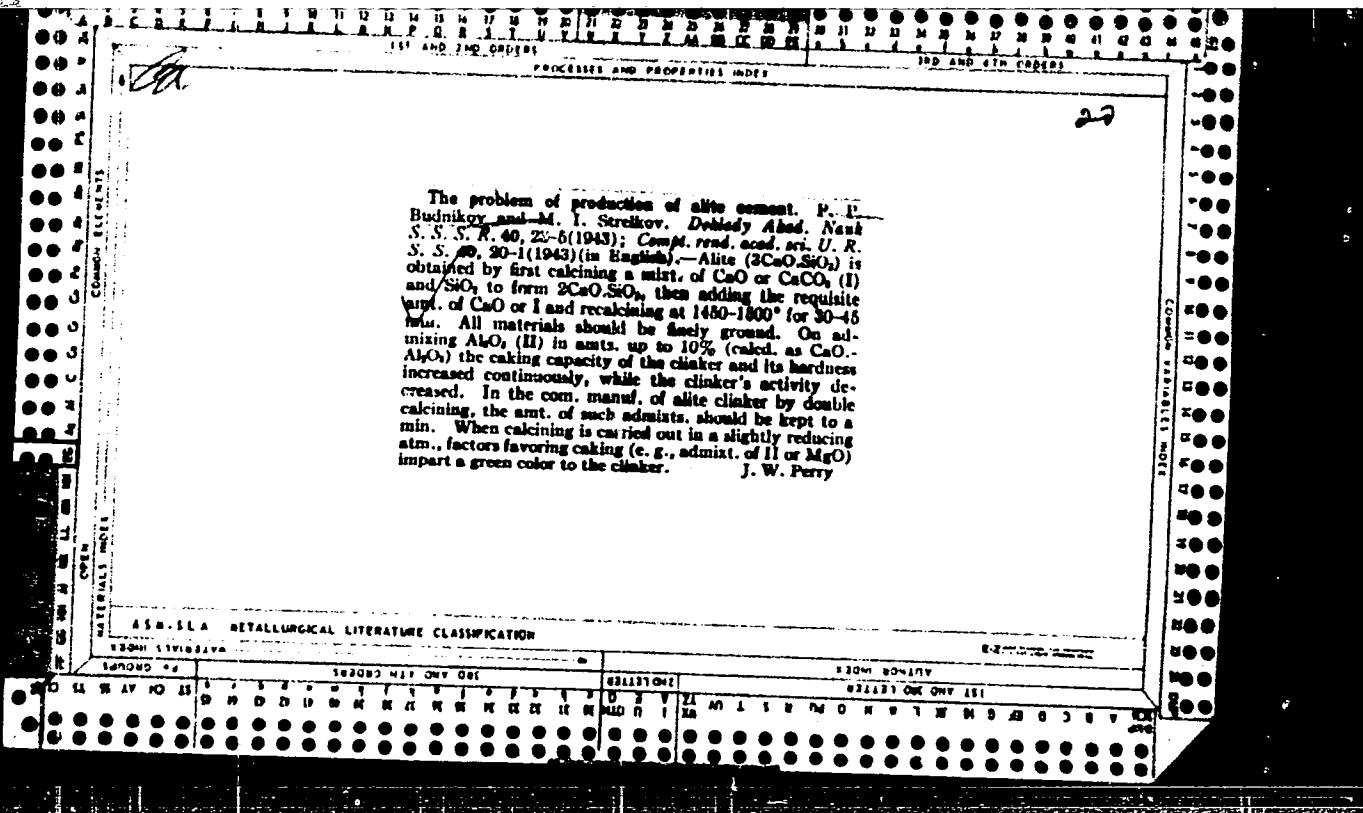
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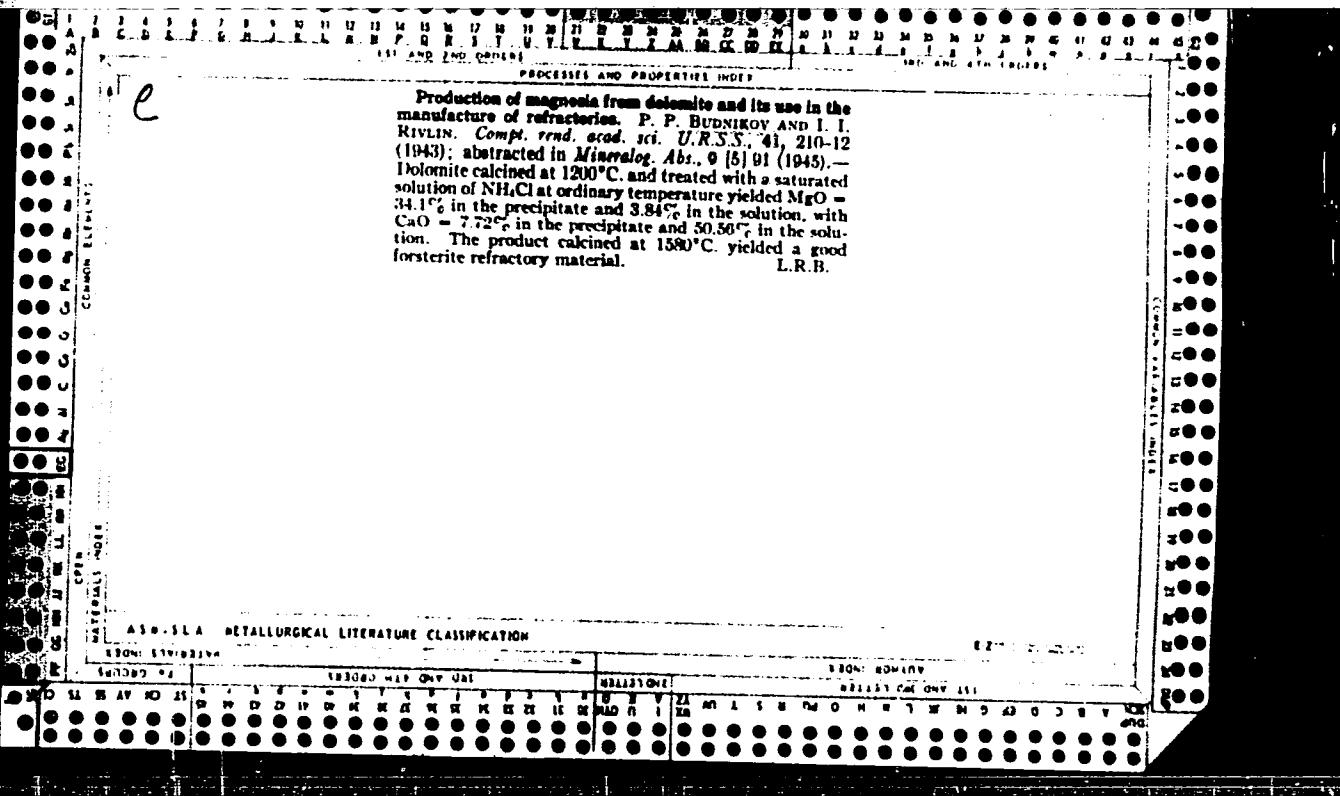
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Hydraulic cement from acid blast-furnace slags. P. P.
BUNINOV, J. *Applied Chem. (U.S.S.R.)*, 16, 337-41
(1943); *Brit. Abstracts*, 1945, March, B1, 102 — Acid slags
having $\text{CaO}:(\text{SiO}_2 + \text{Al}_2\text{O}_3)$ not less than 0.7 and $\text{SiO}_2:$
 Al_2O_3 not less than 2.2 give, with 10% CaSO_4 and 1 to 3%
 CaO or 3 to 7% $\text{CaO} + \text{MgO}$ (from dolomite at 1000° to
 1150°), hydraulic cements of standard properties. In-
stead of $\text{CaO} + \text{MgO}$, Portland cement clinker can be
used.







1ST AND 2D LETTER AUTHOR INDEX		2D LETTER	3D AND 4TH ORDER	5TH OR AT END OF CITE.	PC GROUPS
AS-11A METALLURGICAL LITERATURE CLASSIFICATION					
COMMON VARIABLES INDEX					
<p>Budnikov, P. P., and Rivlin, L. V. PREPARATION OF MAGNESIA FROM DOLOMITE AND ITS USE FOR PRODUCING REFRACTORIES. <i>Doklady Akad. Nauk S.S.R.</i>, 41, 222-24 (1943); <i>Compt. rend. acad. sci. U.R.S.S.</i>, 41, 210-12 (1943) (in English).—Approximately 90% of the MgO in dolomite (I) can be recovered in moderately pure form by calcining I at 1200° for 1 hr., cooling, treating with a saturated solution of NH₄Cl (II) at 15 to 18° for 1 hr. and filtering off the undissolved MgO. High calcination temperature of treatment with II is given. However, lowering the concentration of II to 10% had only a slightly adverse effect. Satisfactory refractory products were obtained by slowly heating mixtures consisting of 25, 30, and 40% of serpentine ($3\text{MgO} \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$) with, respectively, 75, 70, and 60% of the MgO (produced as described) to 1580°, holding at that temperature for 20 minutes and then cooling. The possibility of including the above-outlined process for separating MgO as an integral step in the Solvay process is mentioned.</p>					
PROCESS AND PROPERTIES INDEX					
MAP ONLY ONE					

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On the problem of manufacturing of high-strength gypsum. P. P. Budnikov. *Compt. rend. acad. sci. U. R. S. S.*, 41, 288-90 (1952) (in Russian). - Steaming gypsum under a range of conditions (e. g., for 7-8 hrs. under 1.3 atm. or for 3 hrs. under 8 atm.) converts it into a felted mass of acicular crystals of semihydrate. The length of the crystals varies from 0.1 to 10 mm. In contrast, the semihydrate produced by calcining at 170° is mostly powder, material devoid of well developed cryst. structure. After setting the acicular semihydrate retains its felted structure. Compression strengths of 133 kg./cm.² and 200 kg./cm.² after 1 and 7 days, resp., of setting have been observed.

J. W. Perry

ASB-3A METALLURGICAL LITERATURE CLASSIFICATION

ECONOMIC SECTION

GENERAL SUBJECTS

GENERAL	SECONDARY MET. IND. ONE	INDUSTRIAL	SECONDARY MET. IND. ONE
000-000	000-000	000-000	000-000

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Production of clinkers cement with utilization of heat from molten blast-furnace slags for calcining of activating admixtures. P. D. Iudinova. *Compt. rend. acad. sci. U. R. S. S.*, 47, 379-81 (1943) (in English).—Heat is evolved by using molten slag to calcine gypsum and dolomite to form clay activators. Calculated data are given on the setting time and the tensile and compression strength after 4, 7 and 28 days of setting of cements prep'd. by combining 30% of an activator with 65% and 70% resp., of various slags (Bessemer, open-hearth and foundry) and 5% and 9% of gypsum. Retardation of setting rate and loss in strength were observed only after storing the cements for 3 months.

*Boring the
J. W. Petty*

ASB-SEA METALLURGICAL LITERATURE CLASSIFICATION		E-2000-1964	
FROM STANDING	TO STANDING	FROM BORROW	TO BORROW
SEARCHED	SEARCHED	REFRESHED	REFRESHED
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LITERATURE CREDITS
PROCESSES AND PROPERTIES INDEX
1RD AND 2ND COPIES

CA

Microcolorimetric determination of V in rocks, minerals and ores by means of bariumite. I. P. Alimarin. *J. Applied Chem. (U. S. S. R.)* 17, 83-93 (1944) (English summary).—A colorimetric micro or semimicro detn. of V in minerals and ores can be based on oxidation of bariumite in 10 N H_3PO_4 , whereby an intense yellow coloration results, which can serve to detect V in diln. of 1:8,000,000. The effect of chromates and manganates is eliminated by the use of MoI₂ salt and NaNO₃. The sample is treated with H_3PO_4 alone or together with HF. G. M. K.

Determination of P in limestone by titration of excess

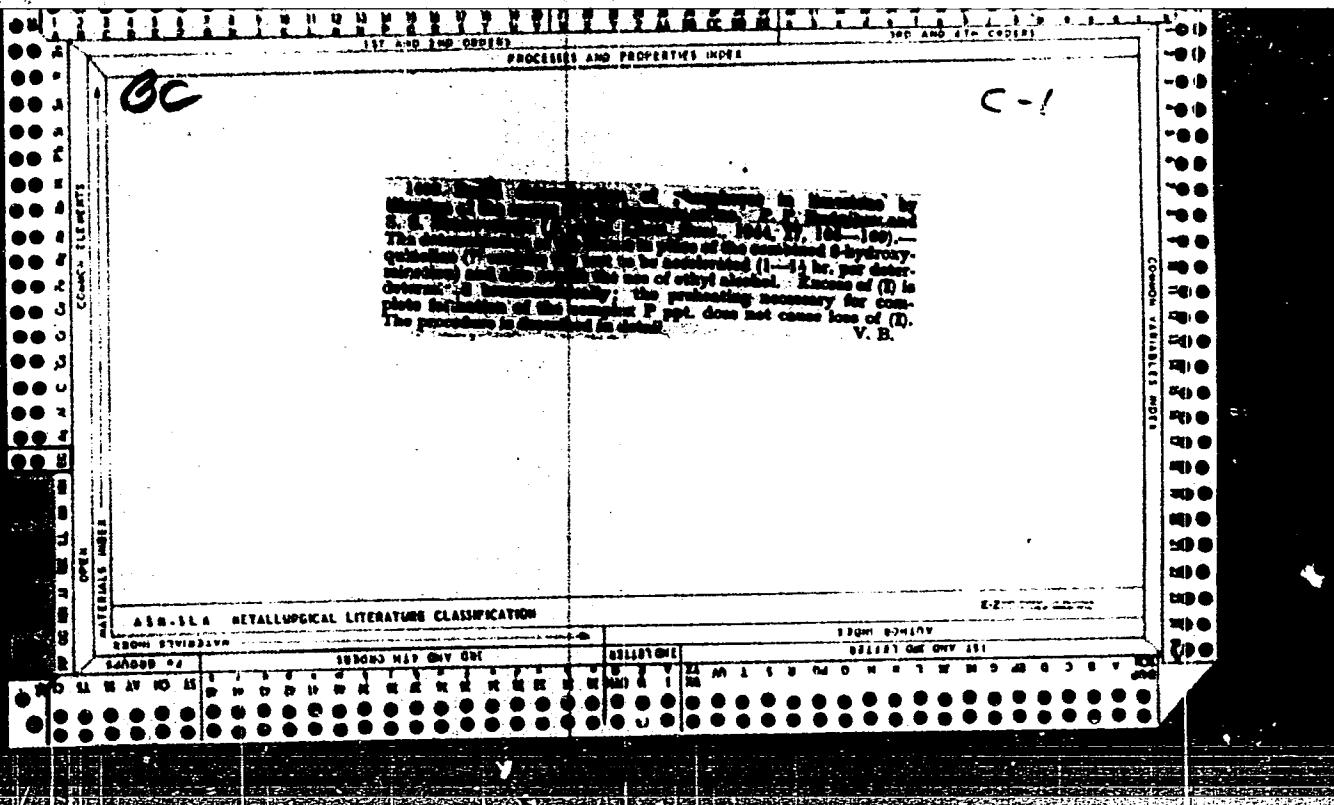
'8-hydroxyquinoline. P. P. Budnikov and S. S. Zhukovskaya. *J. Applied Chem. (U. S. S. R.)* 17, 165-9 (1944) (English summary).—P can be detd. by pptn. with $(NH_4)_2MoO_4$ together with oxine hydrochloride in dil. HCl soln. The excess oxine is detd. in the filtrate by titration with KBrO-KBr soln. G. M. Kosolapoff

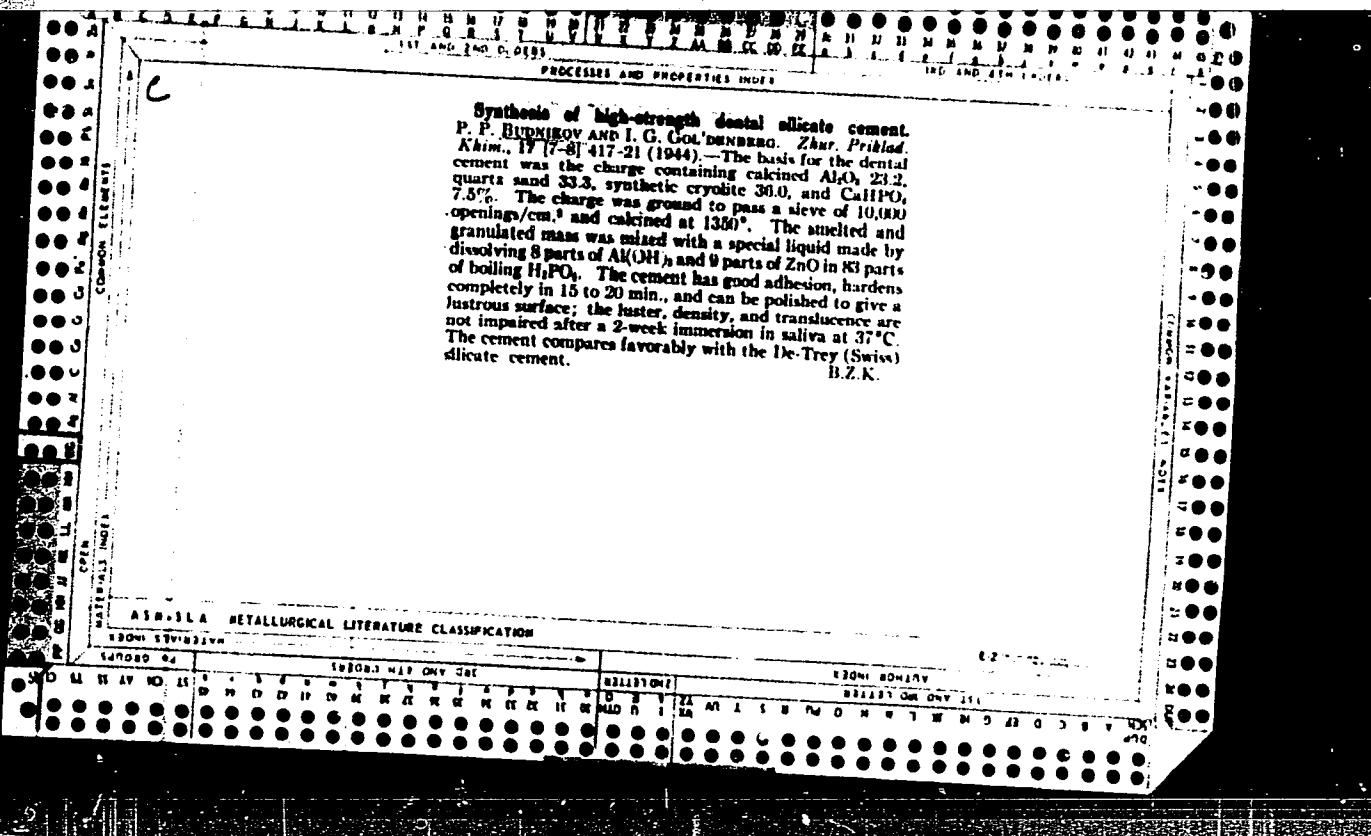
7

COMPOSITION	REVIEWED
MATERIALS INDEX	SEARCHED
OPEN SHELVES	REFINED

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SUBJ. INDEX				
SEARCHED	SEARCHED	SEARCHED	SEARCHED	SEARCHED
SEARCHED	SEARCHED	SEARCHED	SEARCHED	SEARCHED





131-200-100-000000

PROCESSES AND PROPERTIES INDEX

IND. AND ATH. CREDITS

Ca

20

The theory of solidification of sulfated slag cements
P. P. Budnikov and V. M. Lezhnev. *Compt. rend. acad.*
sci. URSS, 43, 297-9; *Doklady Akad. Nauk S.S.R.*
43, 302, 18(1944). The solidification of sulfated slag
cements, like that of other hydraulic cements, is caused
by the mol. forces of cohesion between new solid hydrated
formations. The distinguishing feature of sulfate slag
cement is that the calcium sulfosilicate ($3\text{CaO}\cdot\text{Al}_2\text{O}_5\cdot 3\text{CaSO}_4\cdot 3\text{H}_2\text{O}$) which forms in great quantities on solidifi-
cation of the cement does not produce swelling, and there
is no collapsing of the solidifying cement as in the case of
portland cement. On the contrary, the initial strength of

the cement becomes higher and the further increase in
strength is secured by the development of the spon. process
of Ca hydroxylates ($\text{CaO}\cdot\text{SiO}_2\cdot\text{H}_2\text{O}$) and Ca hydro-
silicate ($2\text{CaO}\cdot\text{Al}_2\text{O}_5\cdot 7\text{H}_2\text{O}$), which is stimulated by the
formation of sulfosilicates. This solidification process
is dependent upon the concn. of free CaO in the soln.
and upon the presence of CaSO_4 in sufficient quantities.
The evolution of heat upon solidification of the sulfated
slag cement is about 20-30 cal./g. of cement as compared
to 30-50 cal./g. for portland cement. I. F.

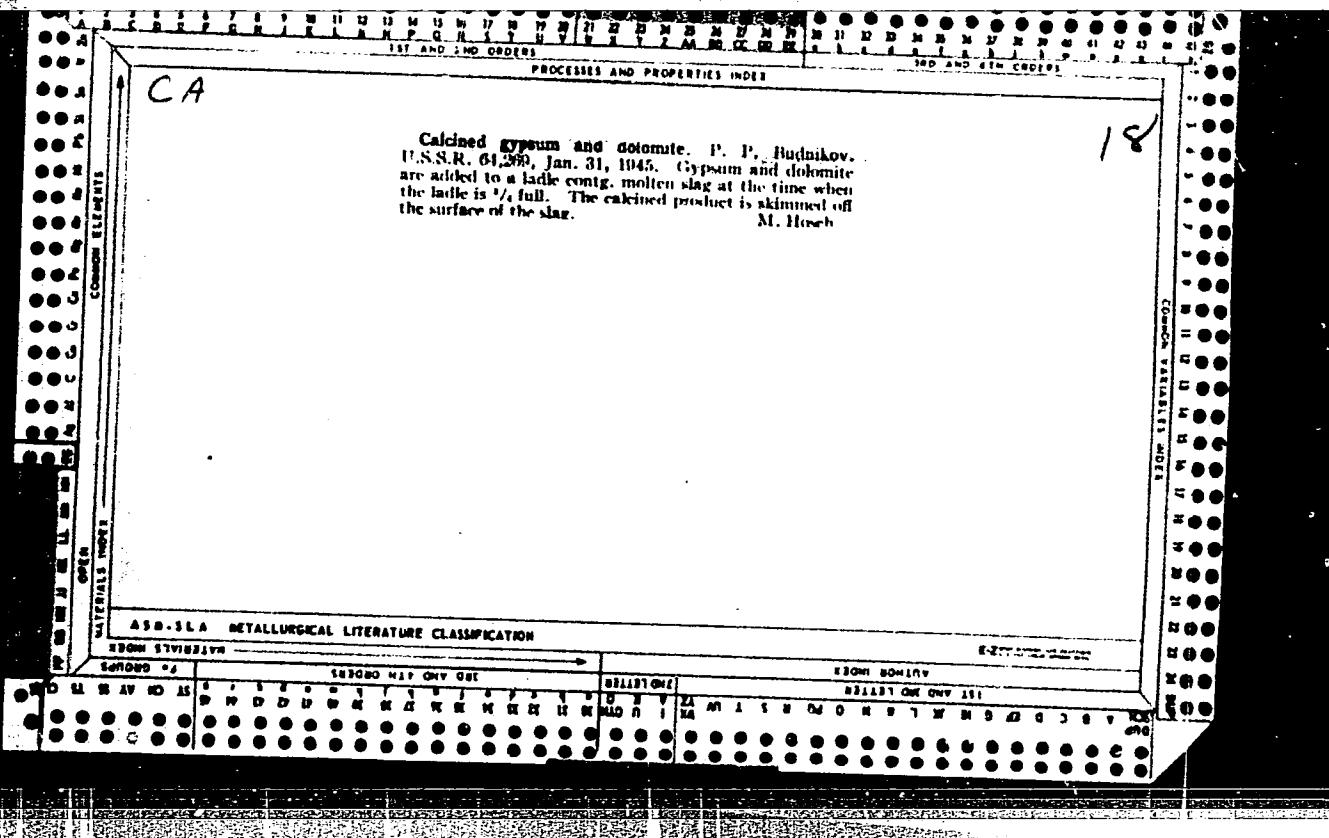
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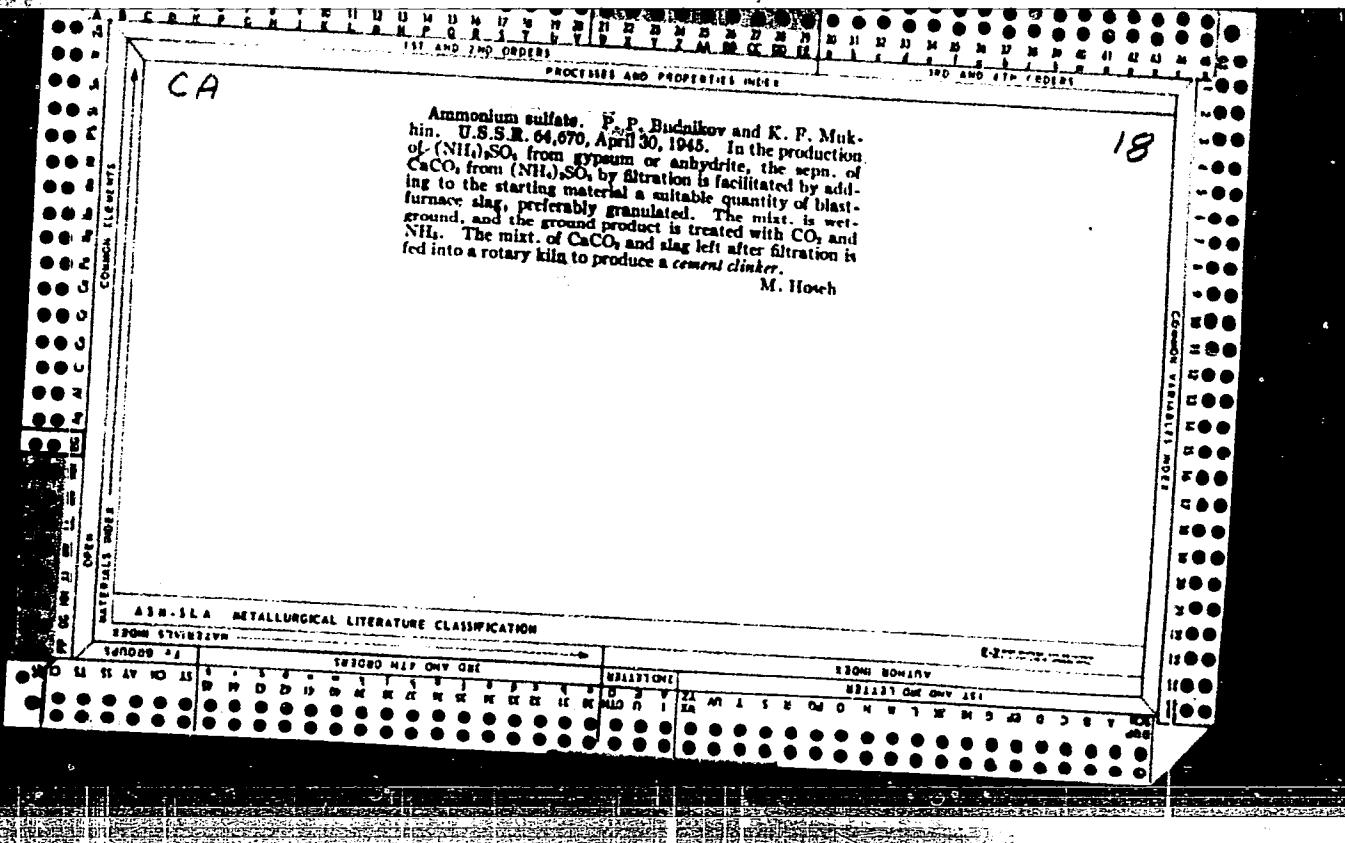
SECOND EDITION

REVISED EDITION

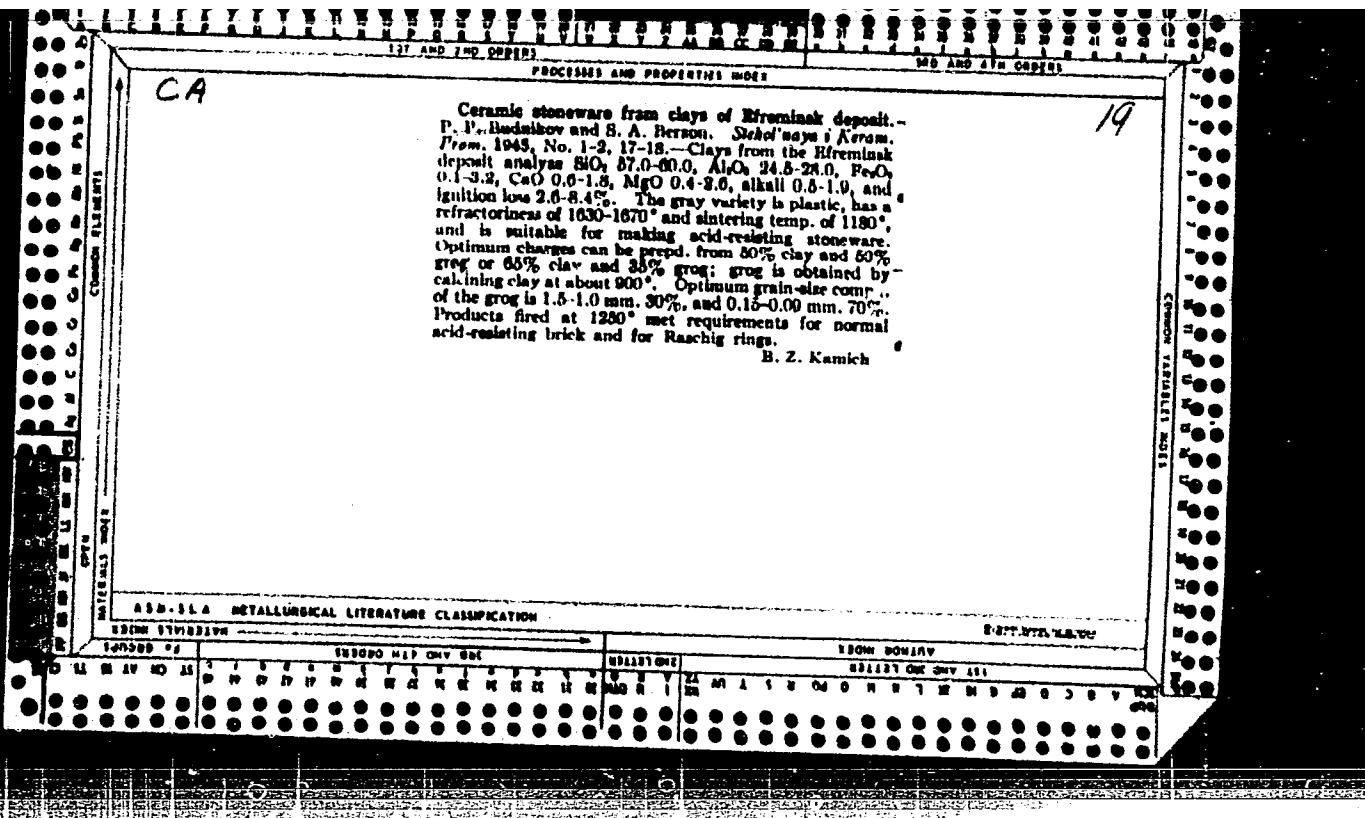
SECOND EDITION

REVISED EDITION





Dehydration of gypsum during its treatment with steam
in an autoclave. P. A. Burovskoy, V. I. Dubovitskii, AND
V. K. Dzhineev. Sovetsk. Khim. Nauch.-Issledovatel'.
Izdat. Giproizob. Prom., 1945, pp. 9-18.—A systematic investigation was conducted on the dehydration of gypsum by treating it with steam under pressure in an autoclave to obtain $\text{CaSO}_4 \cdot 0.5\text{H}_2\text{O}$. Gypsum from the Artemovsk deposits in the Donets Basin was used, which analyzed SiO_2 1.51, Al_2O_3 0.21, Fe_2O_3 0.13, CaO 81.92, MgO 0.31, SO_3 46.86, and water of hydration 20.14%. Treatment for 2 hr. at 8 kg./cm.² (gauge pressure) followed by drying at 67° to 70° gave practically 100% of the hemihydrate. Calculation of the heat balance shows that the dehydration can be conducted in one apparatus (autoclave) with the specific heat consumption not greater than that of the most advanced gypsum calcination plants. — B.Z.K.



A.C.S.

Refined

Dolomite and "sivash" solutions as sources of magnesium oxide. P. I. Lutynskiy. Ogranich. 1948, No 2-3, 16-21. Details of the treatment of dolomite to obtain magnesium oxide are given. The other sources of magnesium oxide are the numerous salt lakes of northern Crimea, called "Sivash." Both of these raw materials are a good source of magnesium oxide. Dolomite should be fired at 1200° and then treated at ordinary temperature with a solution of ammonium chloride. Magnesium oxide obtained in this way can be used for the manufacture of magnesium, magnesite, and forsterite refractories. 11 references. M.V.C.

100 AND 700 SIGHTS
PROCESSES AND PROPERTIES INDEX

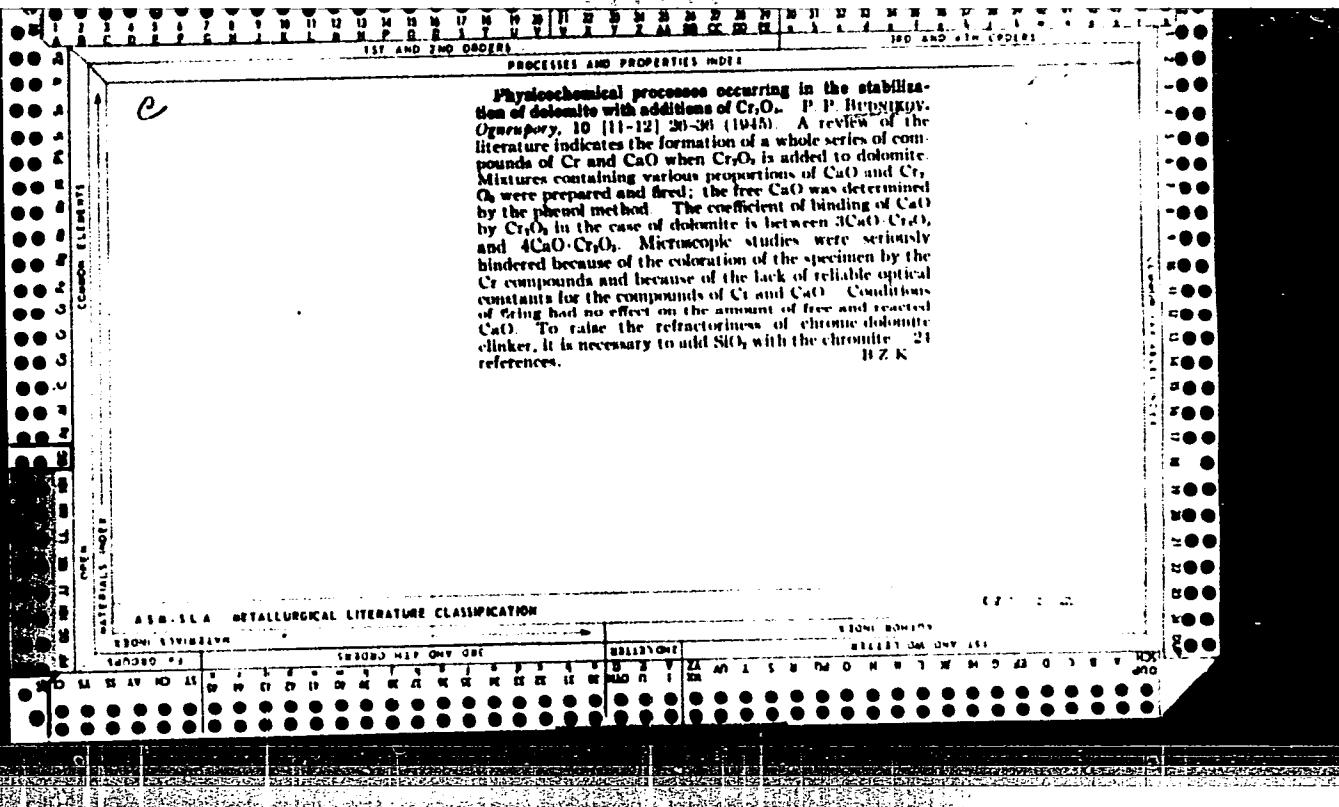
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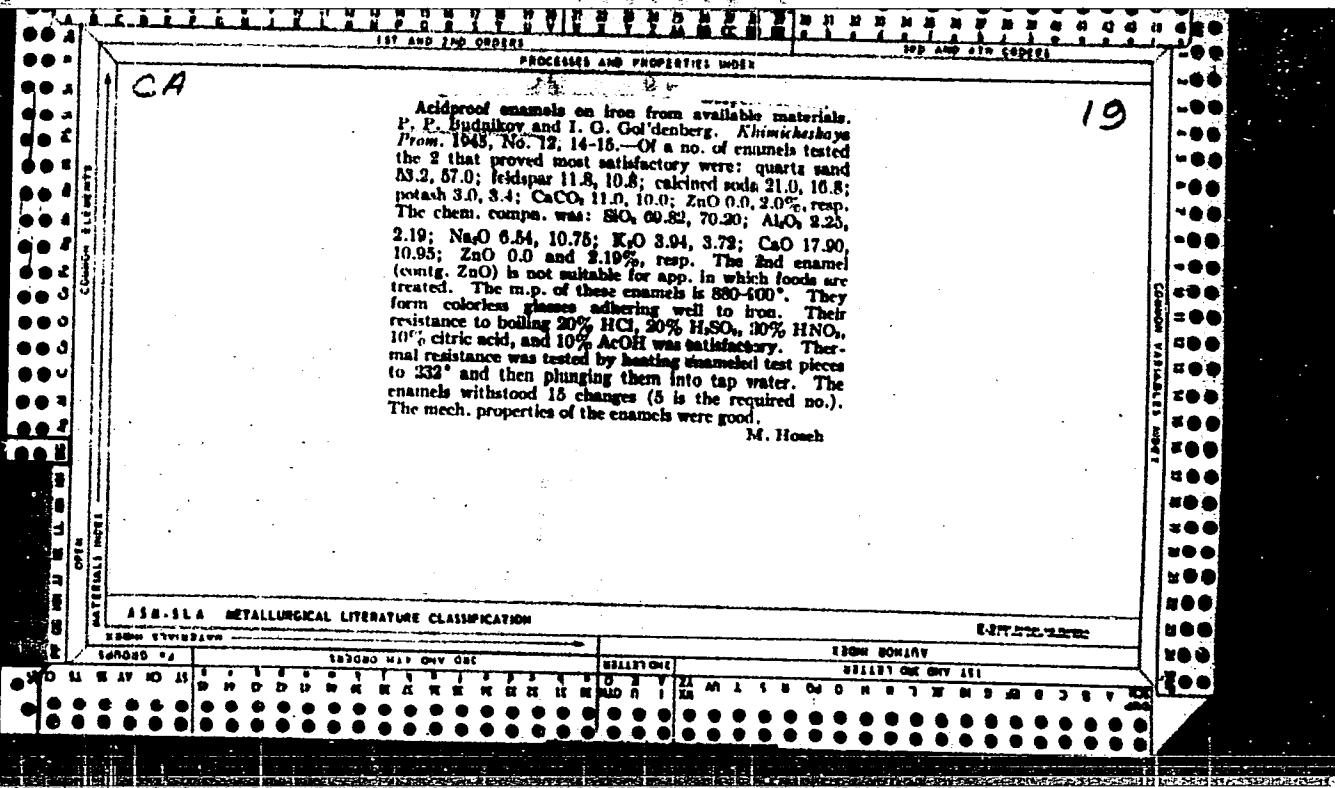
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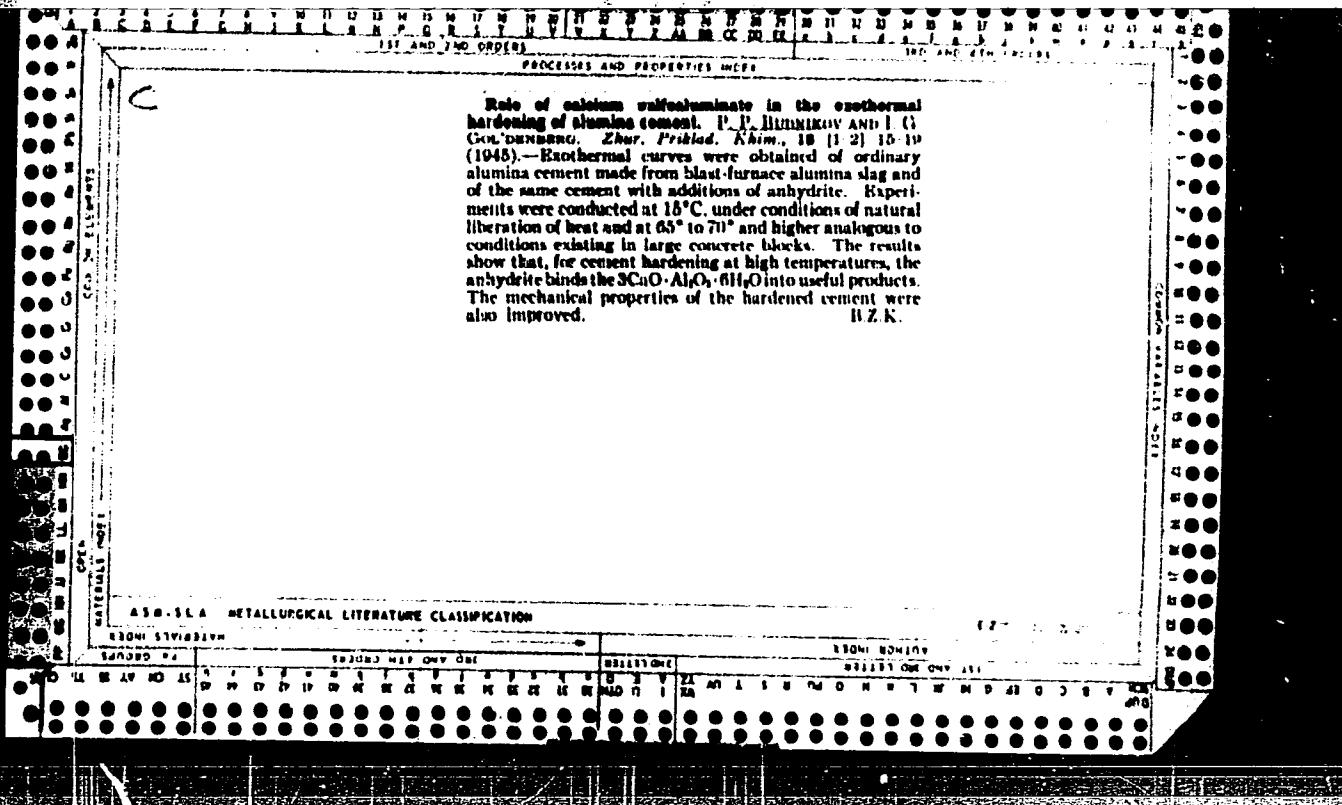
Dolomite and "sivash" solutions as sources of magnesium oxide. P. P. Budnitskoy. Ogranichnyi 10, No. 2-3, 16-21 (1945).—Details of treatment of dolomite to obtain MgO are given. The other sources of MgO are the numerous salt lakes of Northern Crimea, called "sivash." Dolomite should be fired at 1200° and then treated at ordinary temp. with a soln. of NH₄Cl. MgO thus obtained can be used for the manuf. of magnesia, magnesite, and forsterite refractories. M. V. Condole

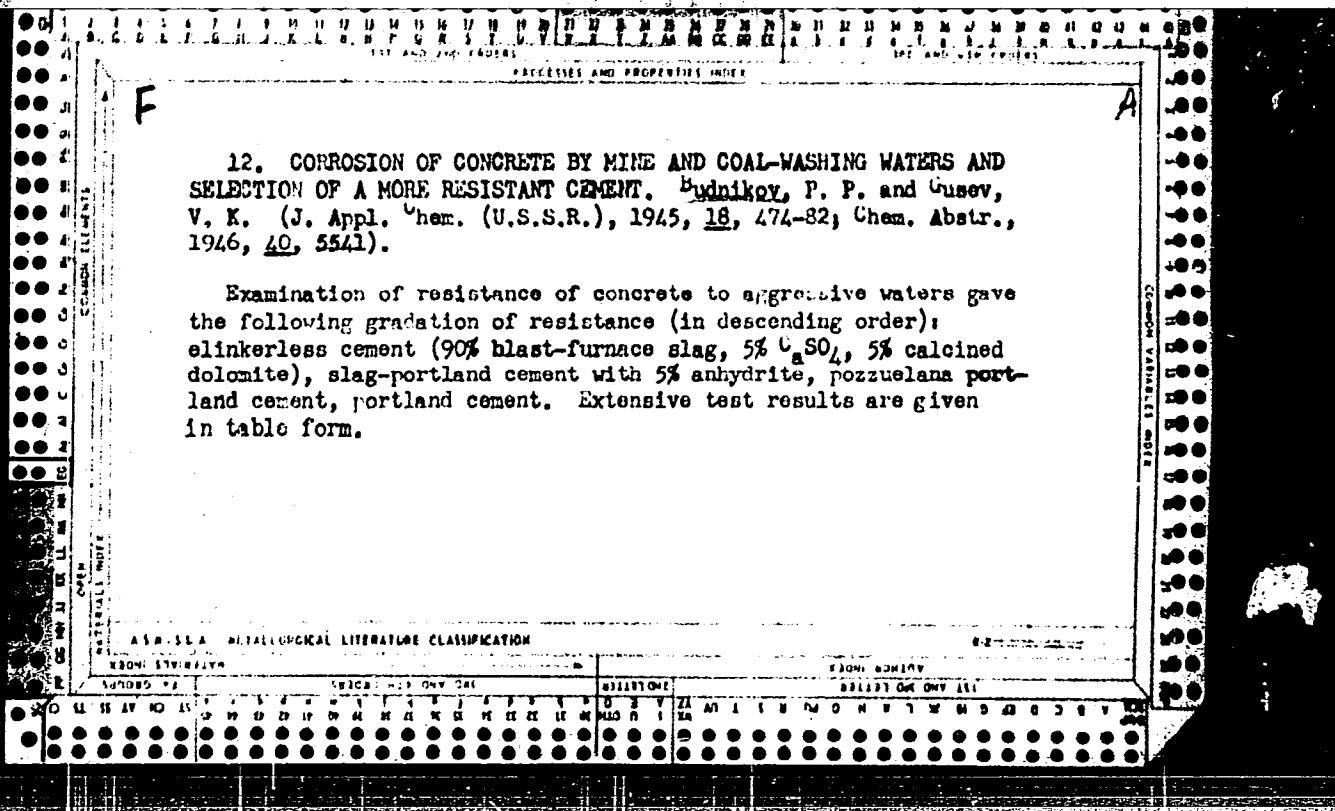
ASB-5A METALLURGICAL LITERATURE CLASSIFICATION

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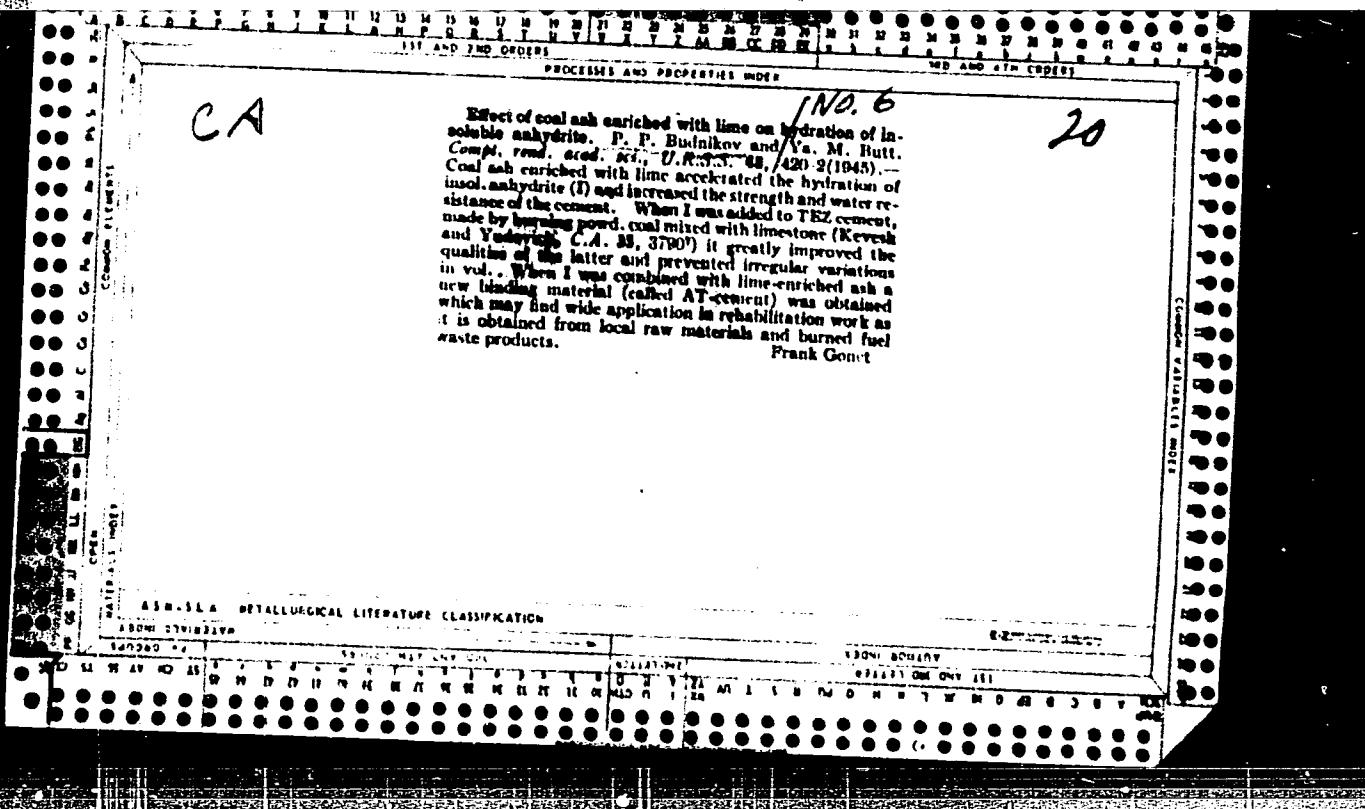




2844. EFFECT OF COAL ASH ENRICHED WITH LIME UPON HYDRATION OF INSOLUBLE ANHYDRITE. Budnikova, P. P. and Butt, J. M. (Compt. Rend. (Doklady) Acad. Sci. U.R.S.S., 1945, 28, 420-2) Coal ash can be made into a binding material by mixing with lime or burning powdered coal and limestone. The latter method gives "TKZ-cement", which contains 32-46% lime and 7.5-25% alumina. The variation of lime content results in a volume variation which is a serious drawback. A modified cement is described in which insoluble anhydrite and TKZ-cement are mixed, the lime acting as a catalyst on the hydration of the anhydrite and the calcium sulphate stabilizes the volume of the solidifying lime. The reactions involved are discussed. The resulting product is called AT-cement; optimal compression strength was 331 kg/cm² and tensile 24.5 kg/cm². The authors conclude that the At-cement has a wide application in construction work, and can be produced from local raw materials.

ASB-SEA METALLURGICAL LITERATURE CLASSIFICATION

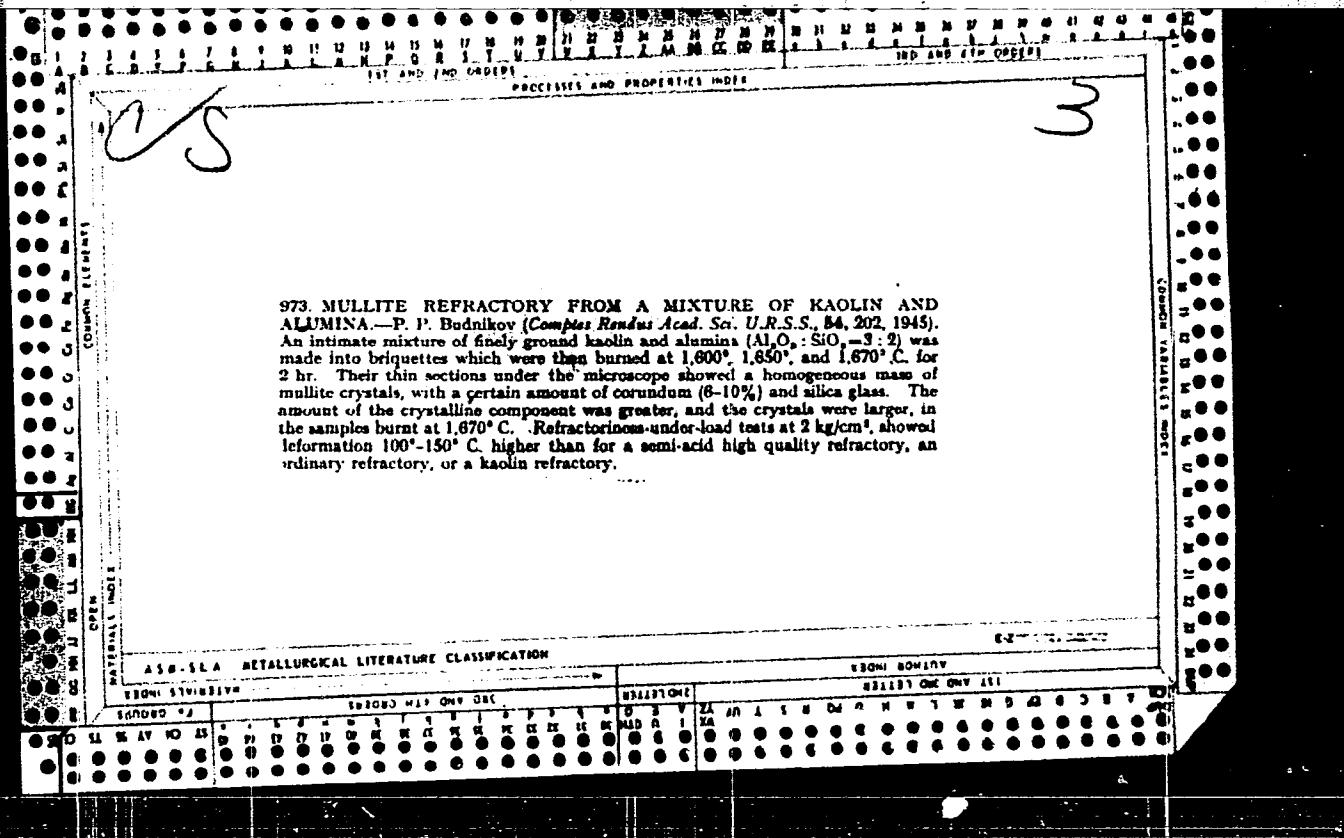
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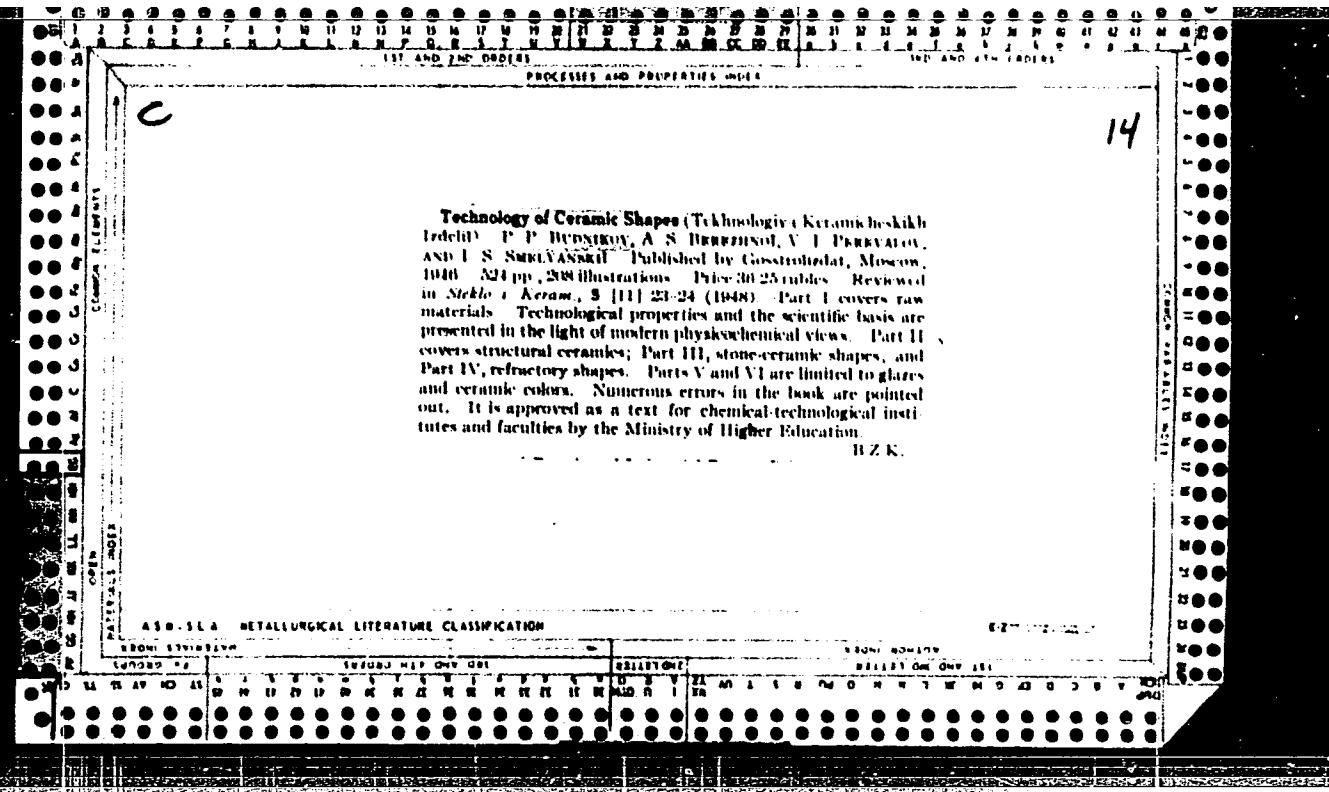


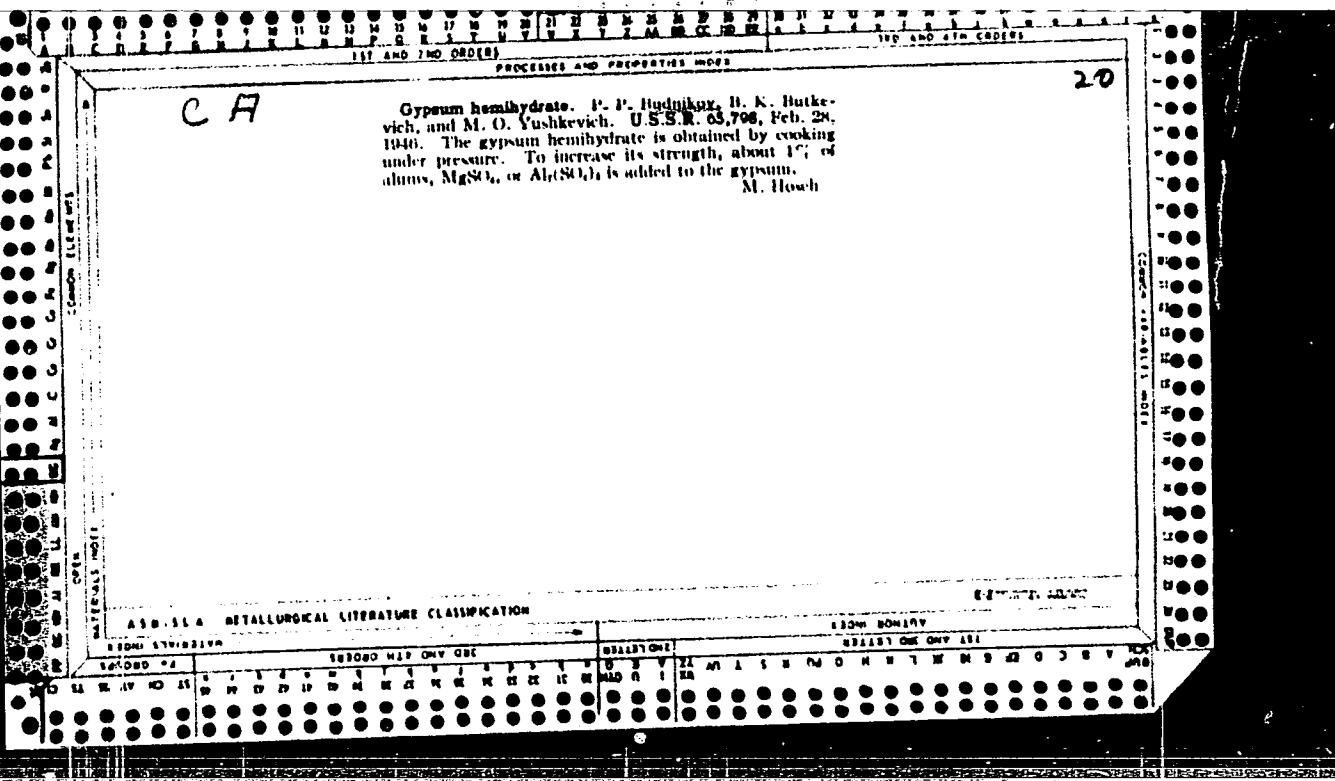
Effect of lime-enriched coal ash on the hydration of insoluble anhydrite. V. F. Benshaw and V. A. M. Biagi. Compt. rend. acad. sci. U.R.S.S. 1956, 100, 27 (1953). The authors suggested the preparation of a two component cement (AT) from (1) lime-enriched coal ash and (2) insoluble anhydrite or some other modification of CaSO_4 . Starting materials were (1) 10 to 90 anhydrite and 90 to 10% TEZ cement (32 to 48 lime and 7.5 to 25% alumina), (2) 83 anhydrite, 10 TEZ ash, and 1% lime, and (3) 83.5 anhydrite, 15 TEZ ash, and 1.5% lime. Hydration of insoluble anhydrite was accelerated, and mechanical strength and water resistance of the cement were increased by the addition of the lime-enriched coal ash. The properties of the TEZ cement were greatly improved, and there were no irregular variations in the volume. High quality binding material is obtained from insoluble anhydrite and lime-enriched ash.

B.Z.K.

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PROCESSES AND PROPERTIES INDEX																																																																																
<p><i>CA</i></p> <p>Mullite refractory from a mixture of kaolin and alumina. P. F. Budnikov. <i>Compt. rend. acad. sci. U.R.S.S.</i> 49, 202 (1948).—A mullitization process takes place when kaolinite is heated in the range of 1150-1170° whereby silica is liberated in the form of cristobalite. $3(Al_2O_3 \cdot 2SiO_4 \cdot 2H_2O) = 3(Al_2O_3 \cdot 2SiO_4) + OH_2O$; $3(Al_2O_3 \cdot 2SiO_4) = 3Al_2O_3 \cdot 2SiO_4 + 4SiO_2$. The yield of mullite and growth of crystals increase with the temp., but the theoretical amt. is never attained, because part of the Al_2O_3 enters into combination with the melts of the clay to form a SiO_2 glass of varying viscosity. The formation of a viscous vitreous phase is unfavorable in a clay refractory on its deformation under load at high temp. The harmful effect of the vitreous phase can be checked somewhat by the introduction of material high in alumina, such as bauxite, diaspor, sillimanite, kyanite, andalusite, or alumina. Best results are obtained when alumina is added, so that at certain temps. the silica liberated from the kaolinite combines to form mullite crystals. $Al_2O_3 \cdot 2SiO_4 + 2Al_2O_3 = 3Al_2O_3 \cdot 2SiO_4$. Initial material may be Prosiansk kaolin and com. alumina. A mixt. of fine-ground kaolin and alumina in the ratio of $Al_2O_3:SiO_2 = 3:2$ was made into briquettes which were then burned at 1000, 1050, and 1070° for 2 hrs., given a petrographic investigation and quantitatively examined for mullite with 20% H_2O. Microscopic examn. showed a homogeneous mass of mullite crystals. The amt. of crystals and the crystal formations were larger in the samples burned at 1070°. Burning temps. and percentages of mullite were: 1000°, 70.3; 1050°, 81.4; 1070°, 83.7. In addn. to mullite and silica glass, 6-10% corundum was always present. A 2-4% addn. of such substances as cryolite, fluosilicate, $MgCl_2$, P_2O_5, or B_2O_3 will lower the burning temp. so that the viscosity of the glass is decreased and the crystals of the mullite accelerated. From a kaolin-alumina mixt. with 2% $MgCl_2$ added, a refractory was prep'd. by using grains under 0.8 mm., 30%; from 0.6 to 1 mm., 45%; from 1 to 2 mm., 25%. The binding material was PB clay from Chasov-Yar (12%). The mass (moisture 6.5%) was pressed into cylinders 5 to 8 cm., and burned at 1500°. Results showed that the mullite refractory prep'd. from a mixt. of kaolin and silica is superior, as regards deformation under load, to both the ordinary refractory and kaolin refractory.</p> <p style="text-align: right;">R. T. Ramsey</p>																																																																																
ABSTRACTS OF METALLURGICAL LITERATURE CLASSIFICATION																																																																																
<table border="1" style="width: 100%;"> <thead> <tr> <th rowspan="2">SEARCHED</th> </tr> <tr> <th>SEARCHED</th> </tr> </thead> <tbody> <tr> <td>SEARCHED</td> </tr> </tbody> </table>																				SEARCHED																																																												
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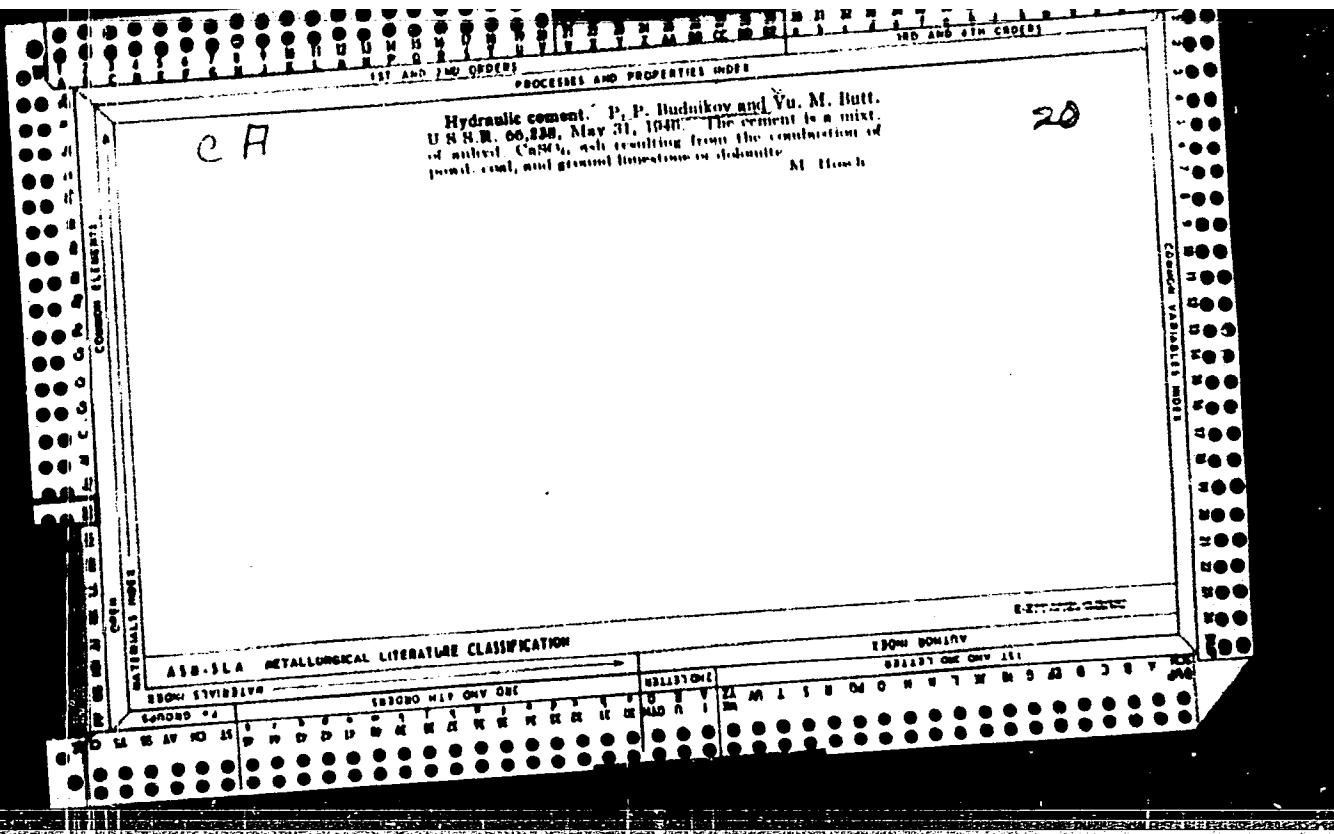


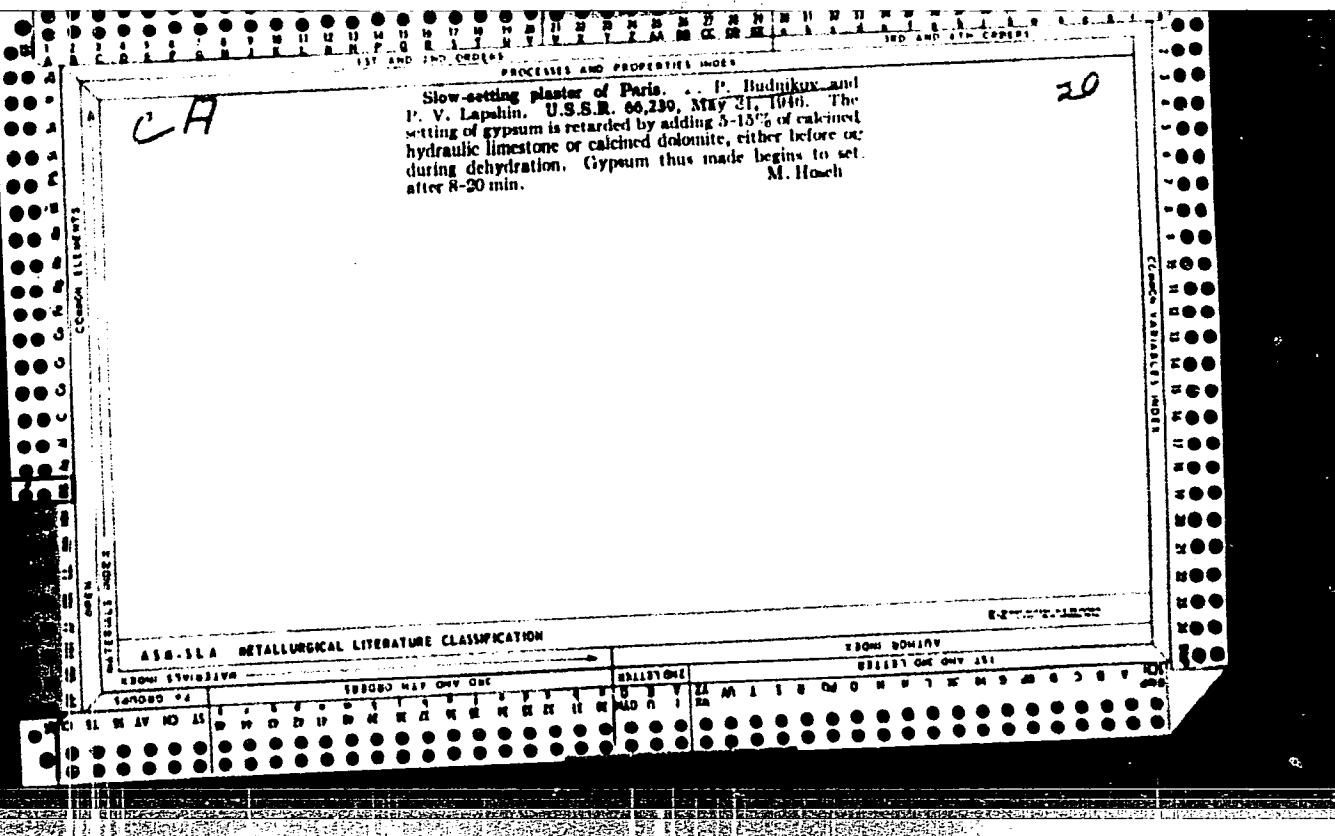


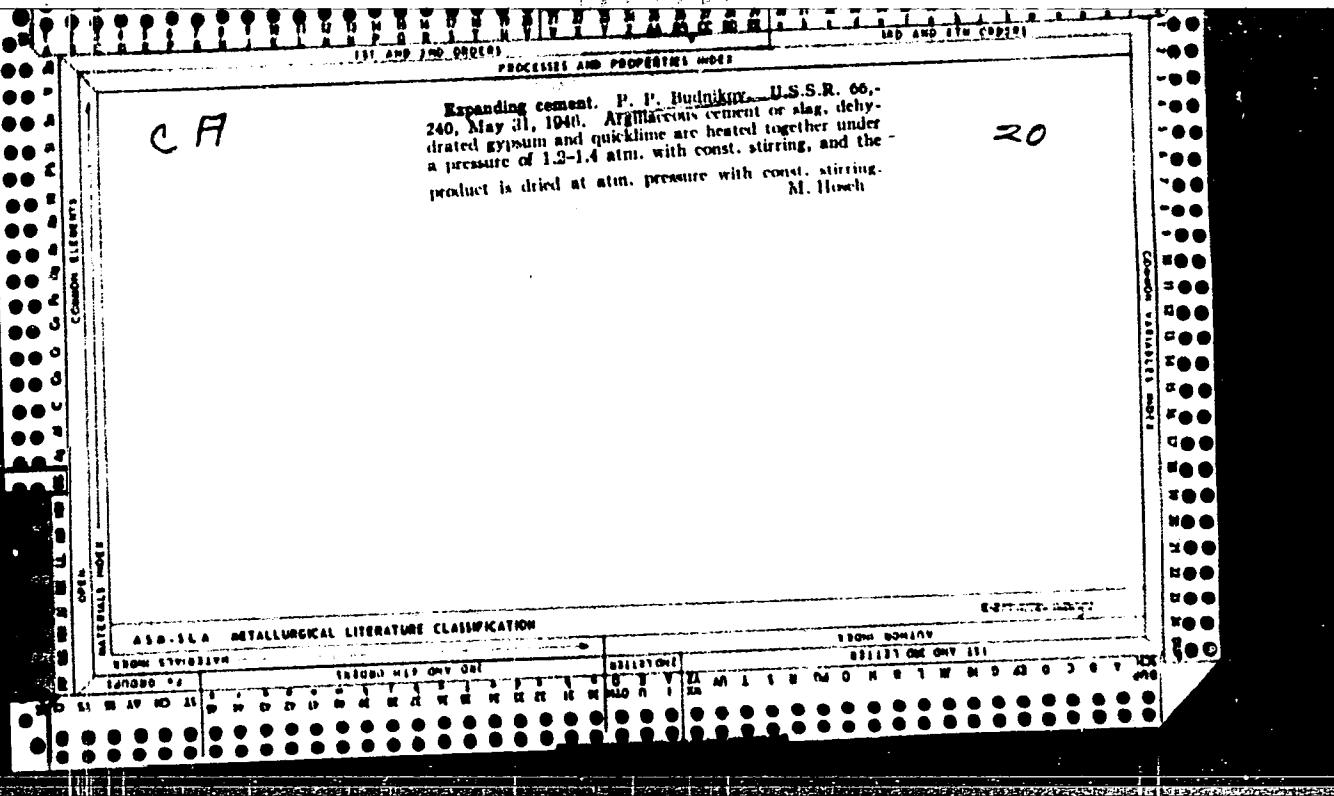


BUDNIKOV, P. P.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION										E-Z-TITLE INDEX									
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C A										High-strength plaster of Paris. P. P. Budnikov. U.S.S.R. 66,235, May 31, 1936. Gypsum is autoclaved at 1.2 atm. and the product is ground in a ball mill or a rod mill, and at the same time dried with hot flue gases. M. Hosch									



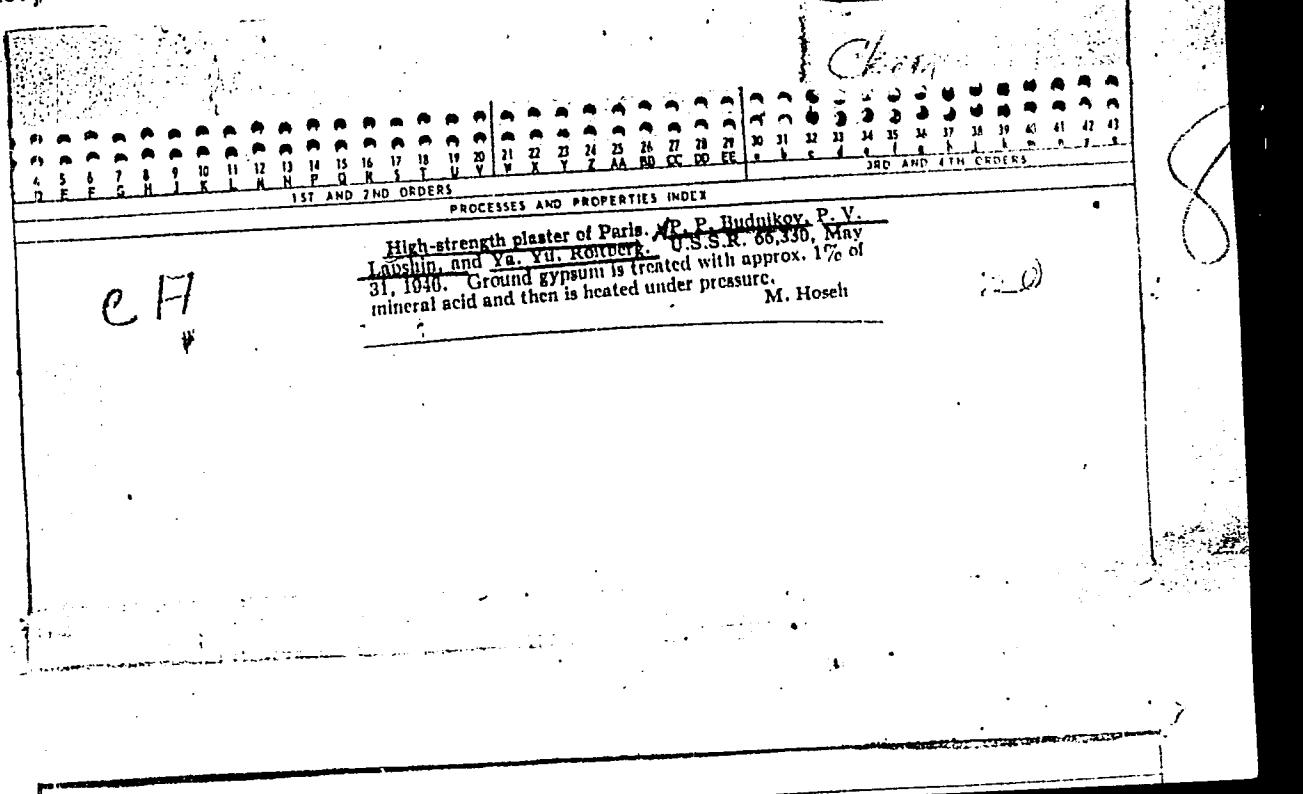




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BUDNIKOV, P. P.



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P. P. BUDNIKOV

PROCESSES AND PROPERTIES INDEX

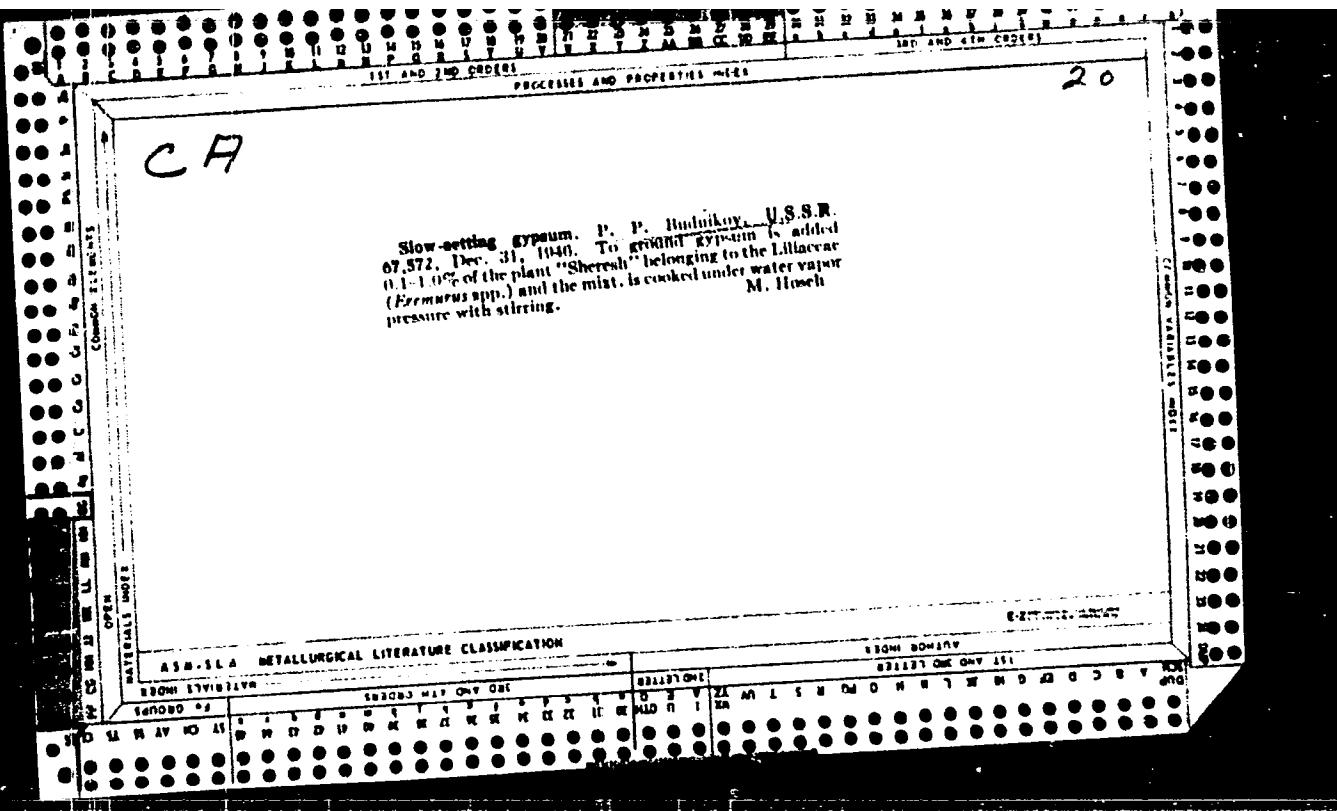
White Hydraulic binder for decorative purposes. ^{P.}
BUDNIKOV AND L. O. LUNGIN. U.S.S.R. 66,692, July 31, 1940;
abstracted in Chem. Zentr., 1948, I [11/12] 748.—The binder is
made of a mixture of granulated blast-furnace slag, lime, and cal-
cined kaolin. These constituents are added without calcining if
waste product from the process of producing AlCl₃ from kaolin is
used instead of calcined kaolin. M.H.A.

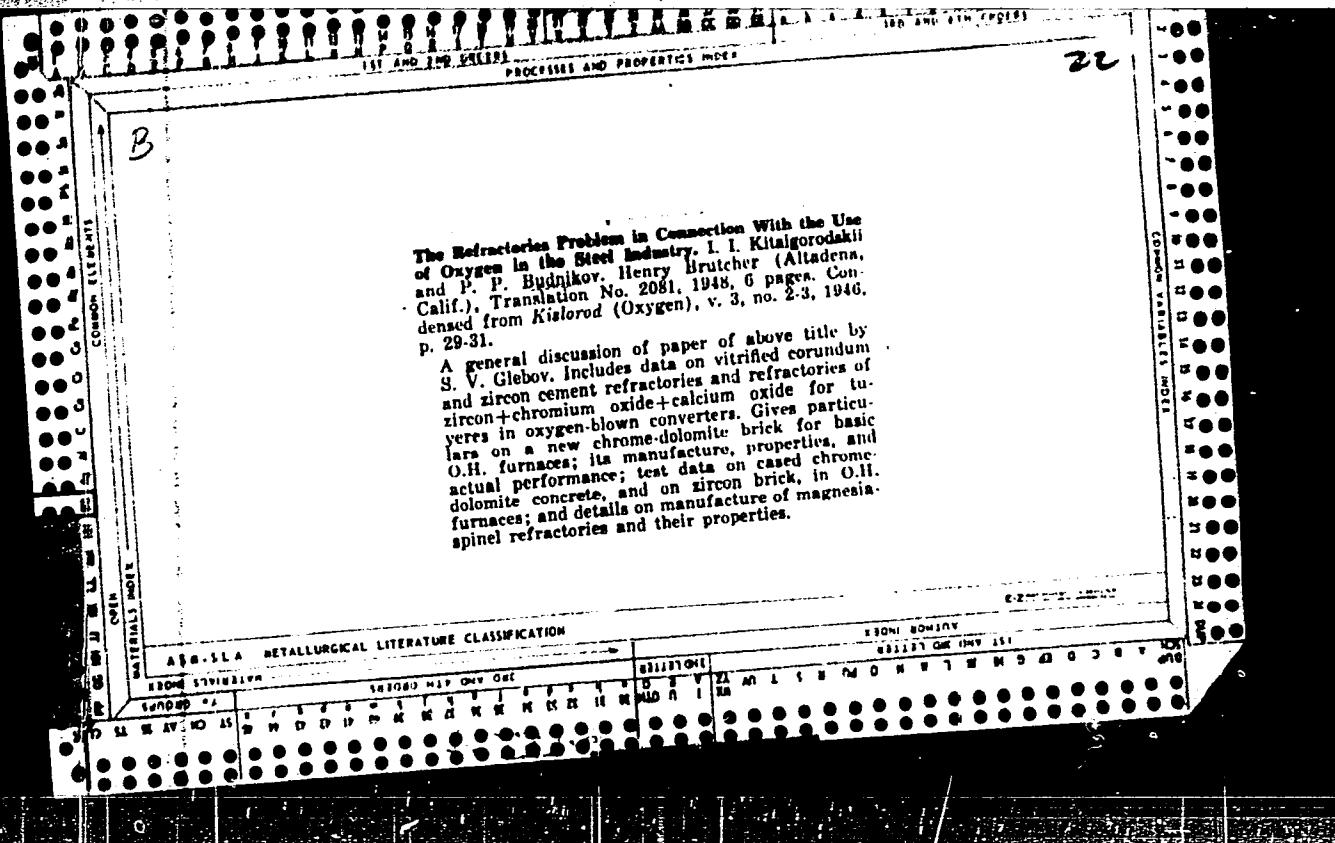
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1ST AND 2ND ORDERS PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

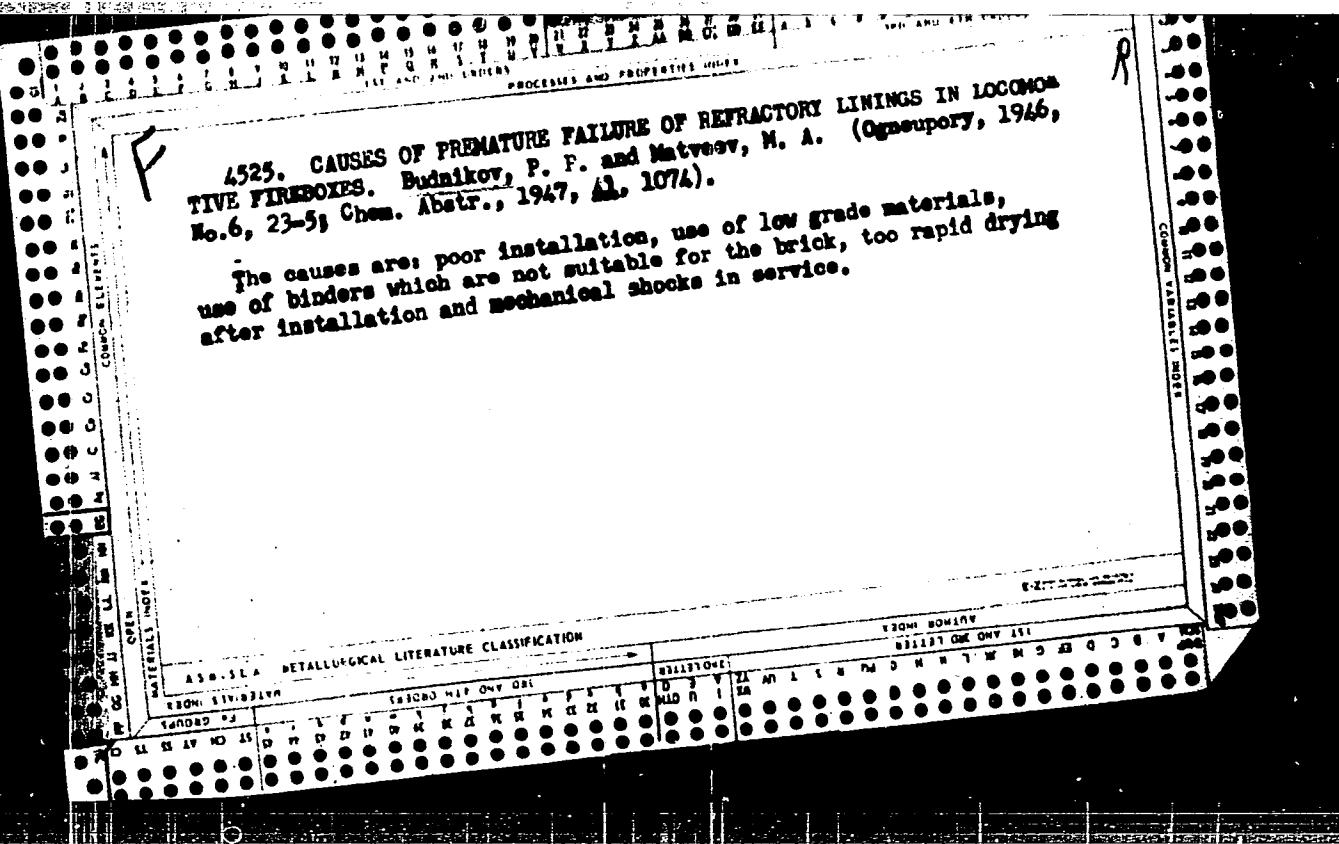
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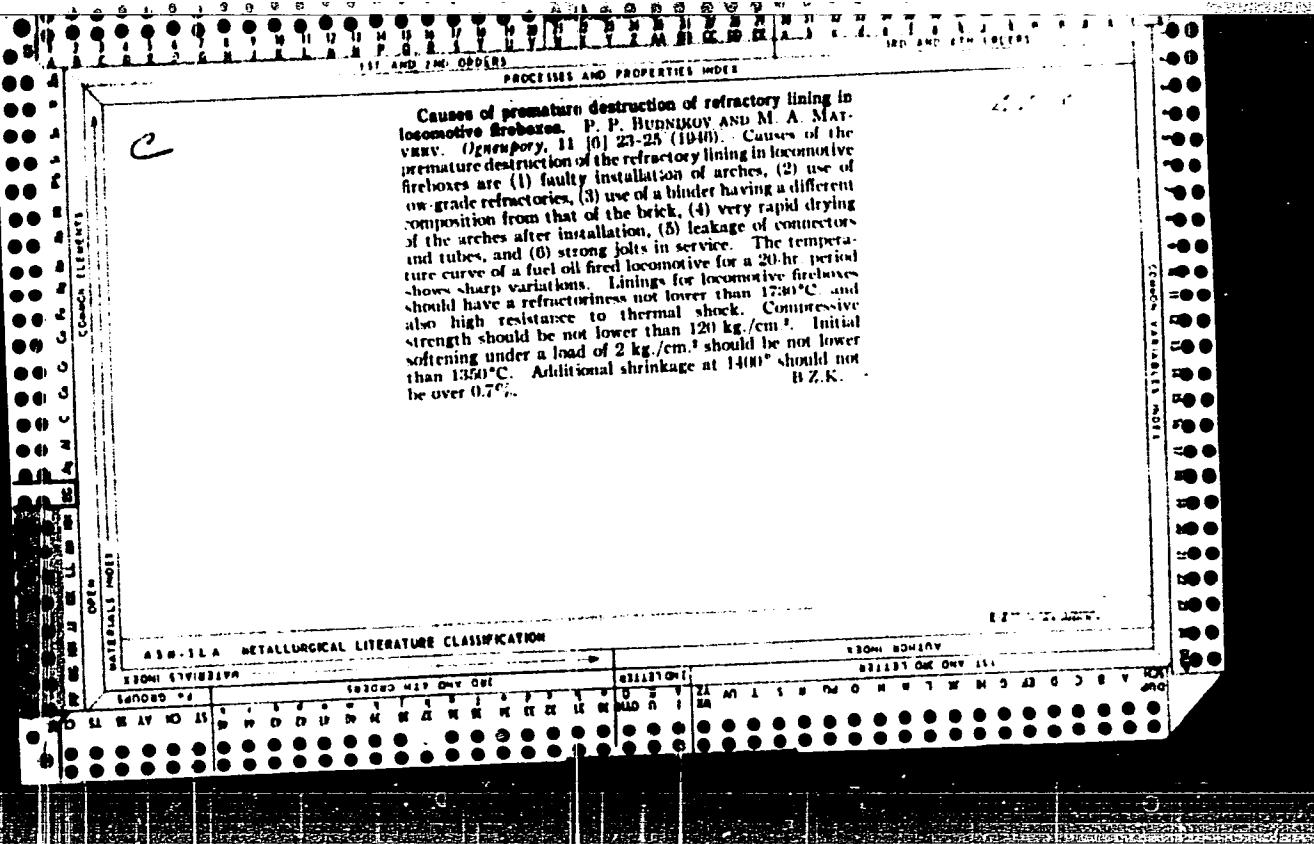


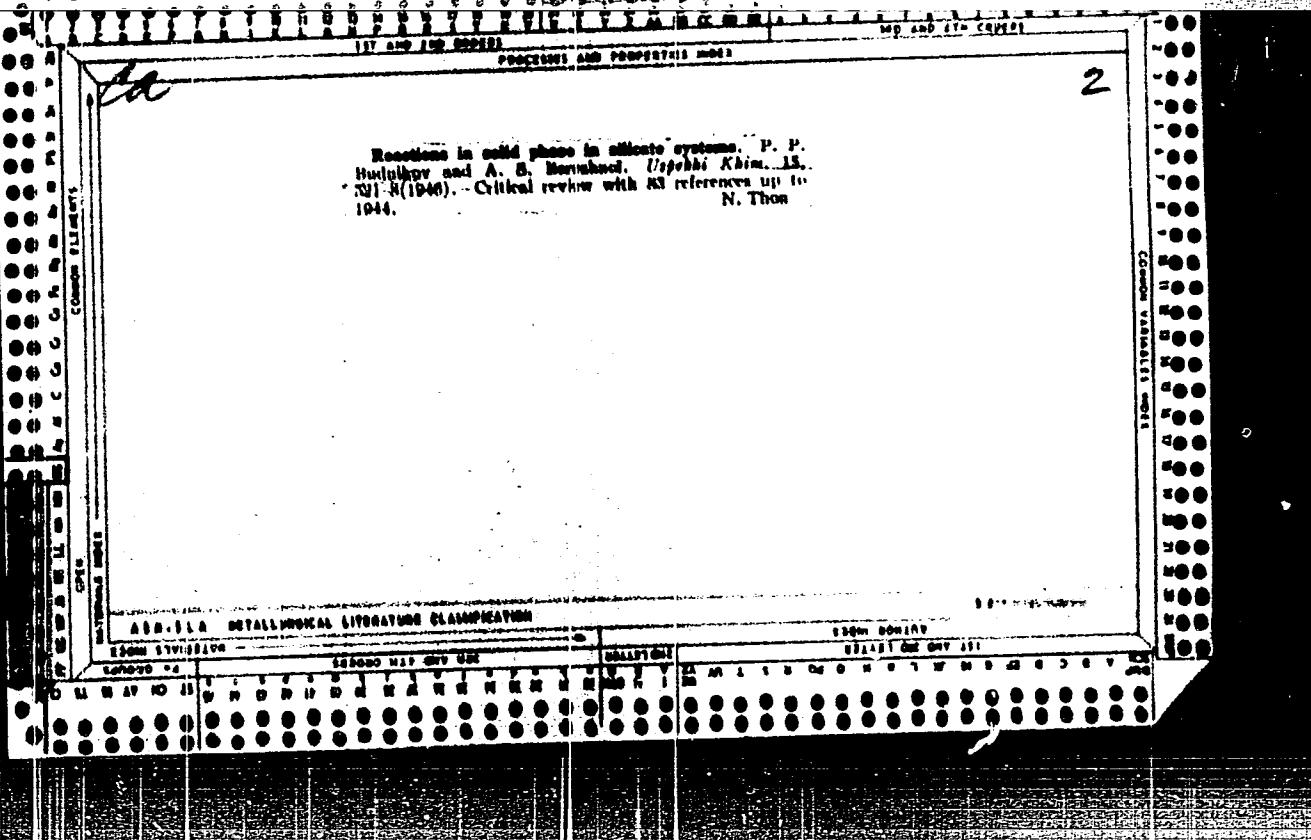


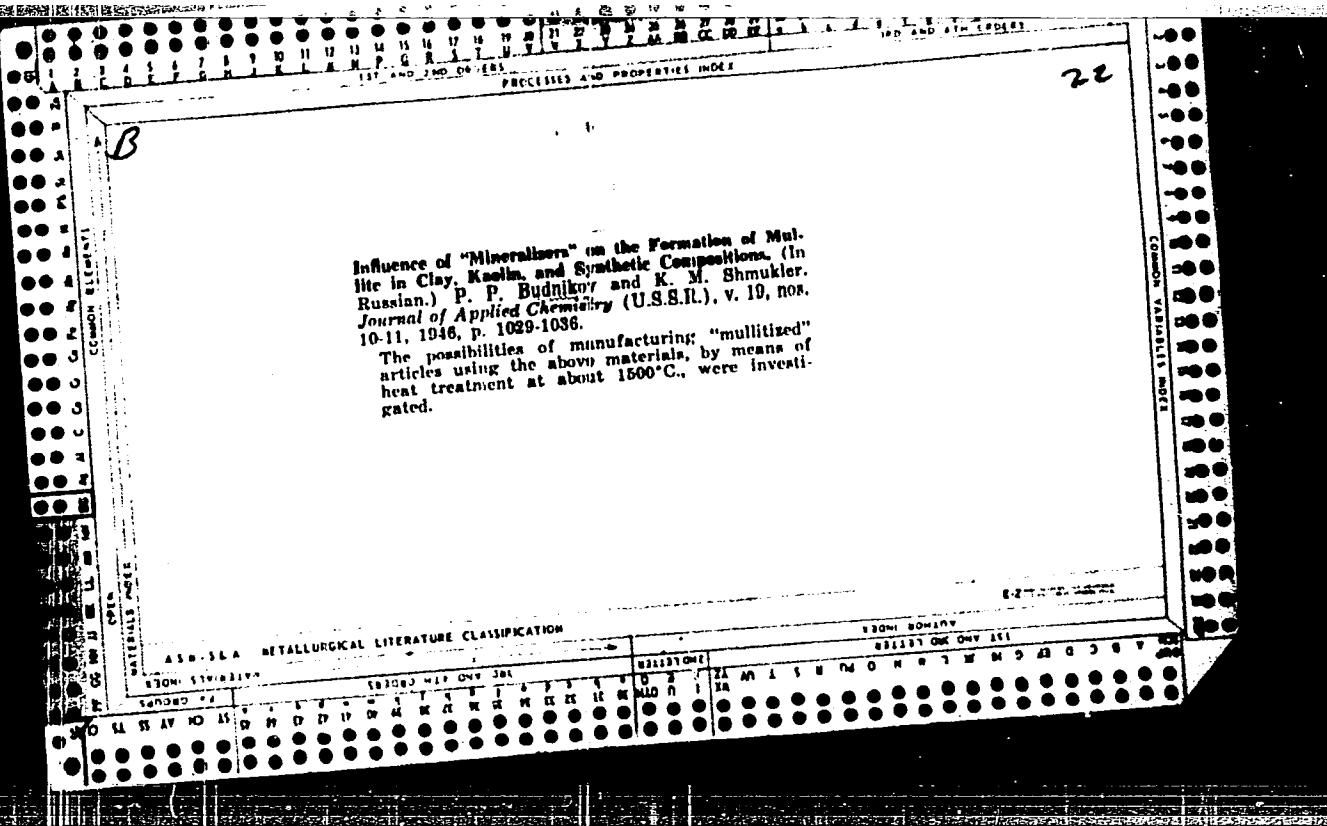
PREPARATION AND PROPERTIES OF -GYPSUM HEMIHYDRATE.
P. P. Budnikov. Danzirid. Nauch. Dokl. Akad. Nauk SSSR No. 4
(122), 35-44 (1946). — gypsum hemihydrate having a
compressive strength of 189 to 215 kg./cm.² was obtained
by heating finely ground gypsum for 1.5 hr. at 1.3 atm. in
an autoclave with continual stirring and then drying it at
160° for 1 hr. without pressure. To lengthen the setting
time and to reduce the extent of expansion during the hy-
dration and hardening, it is suggested that lime, TEZ ce-
ment, or sherech (*Mesmyrus spectabilis*) be added; the last
is best and should be added in amounts of 0.1 to 0.5% prior
to the heating. A flowsheet of the process is given. Cf.
Sovrem. Abstrachia, 1947, April, p. 82f.

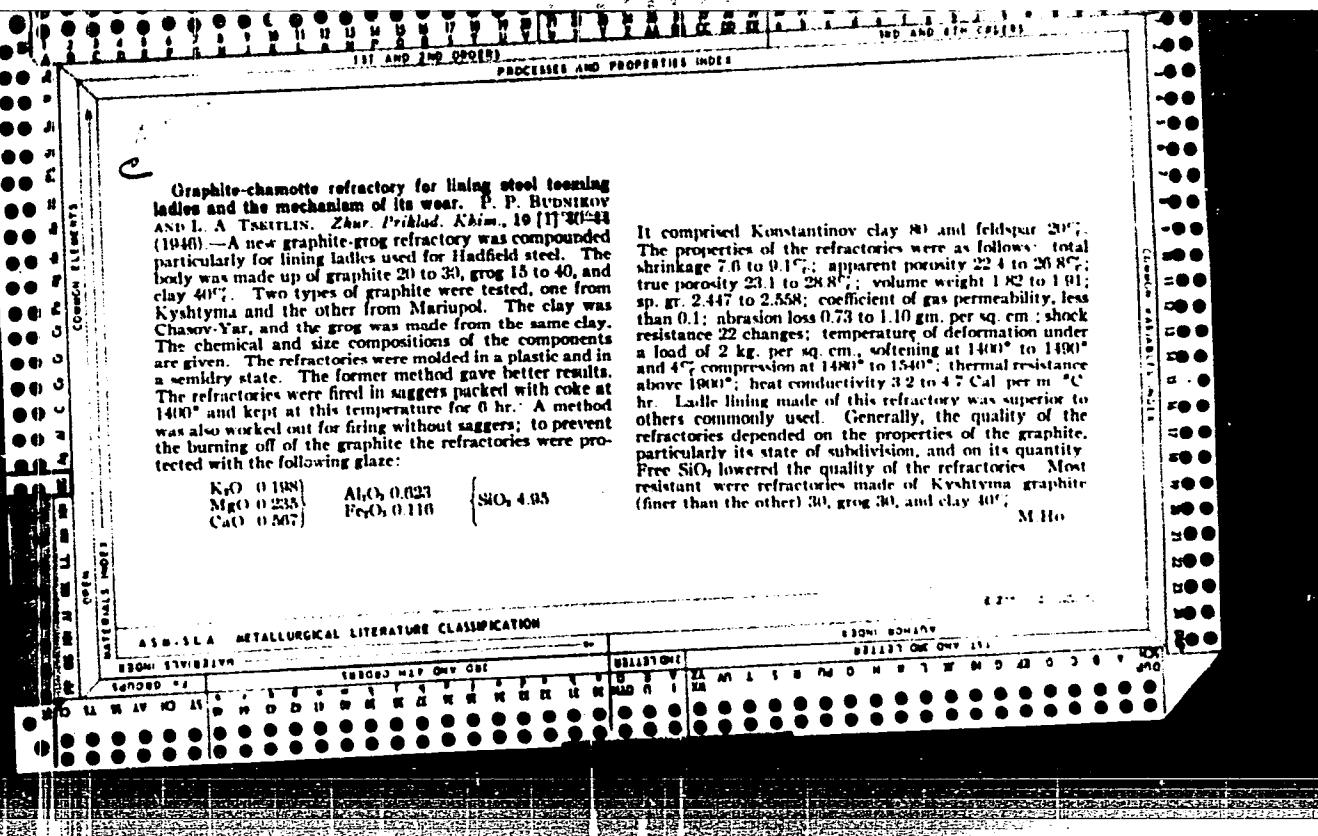
B.Z.K.





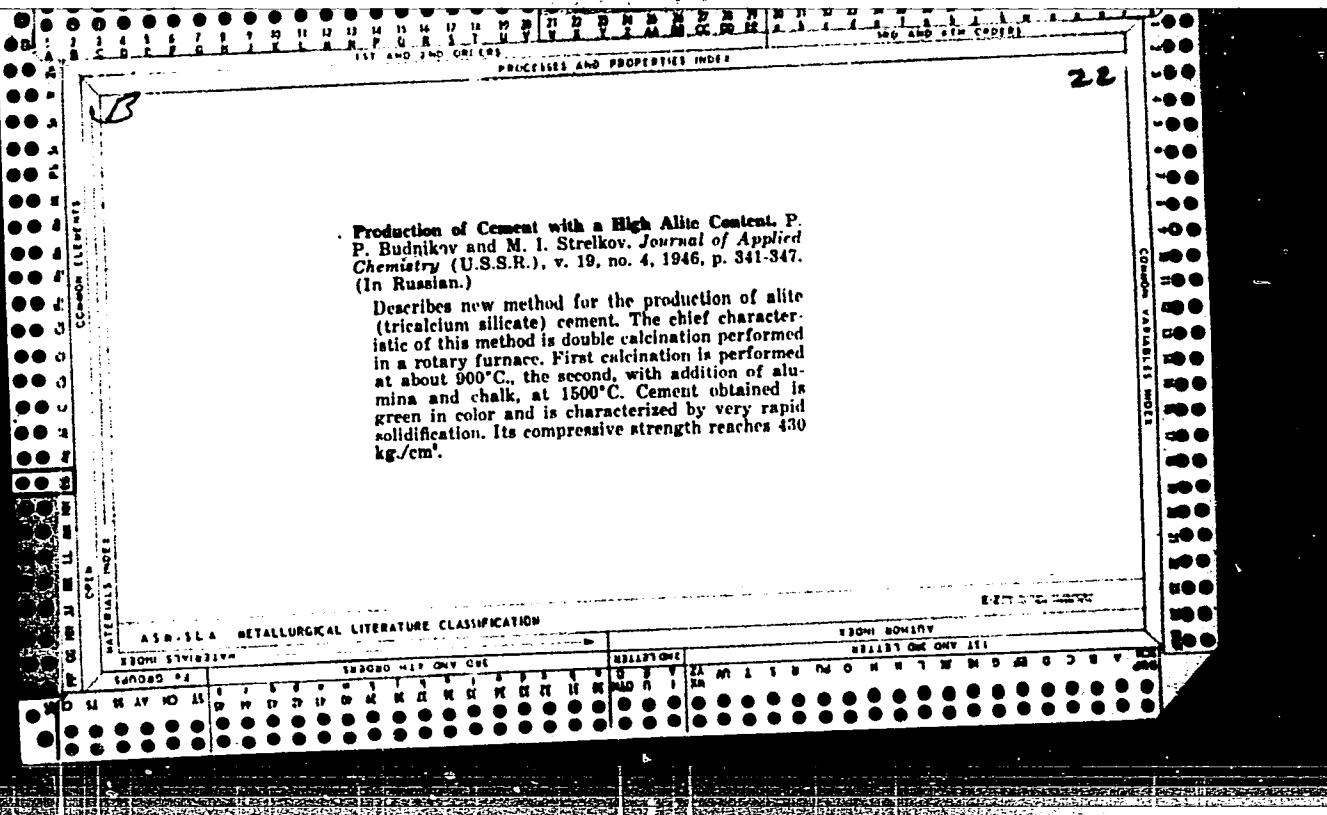


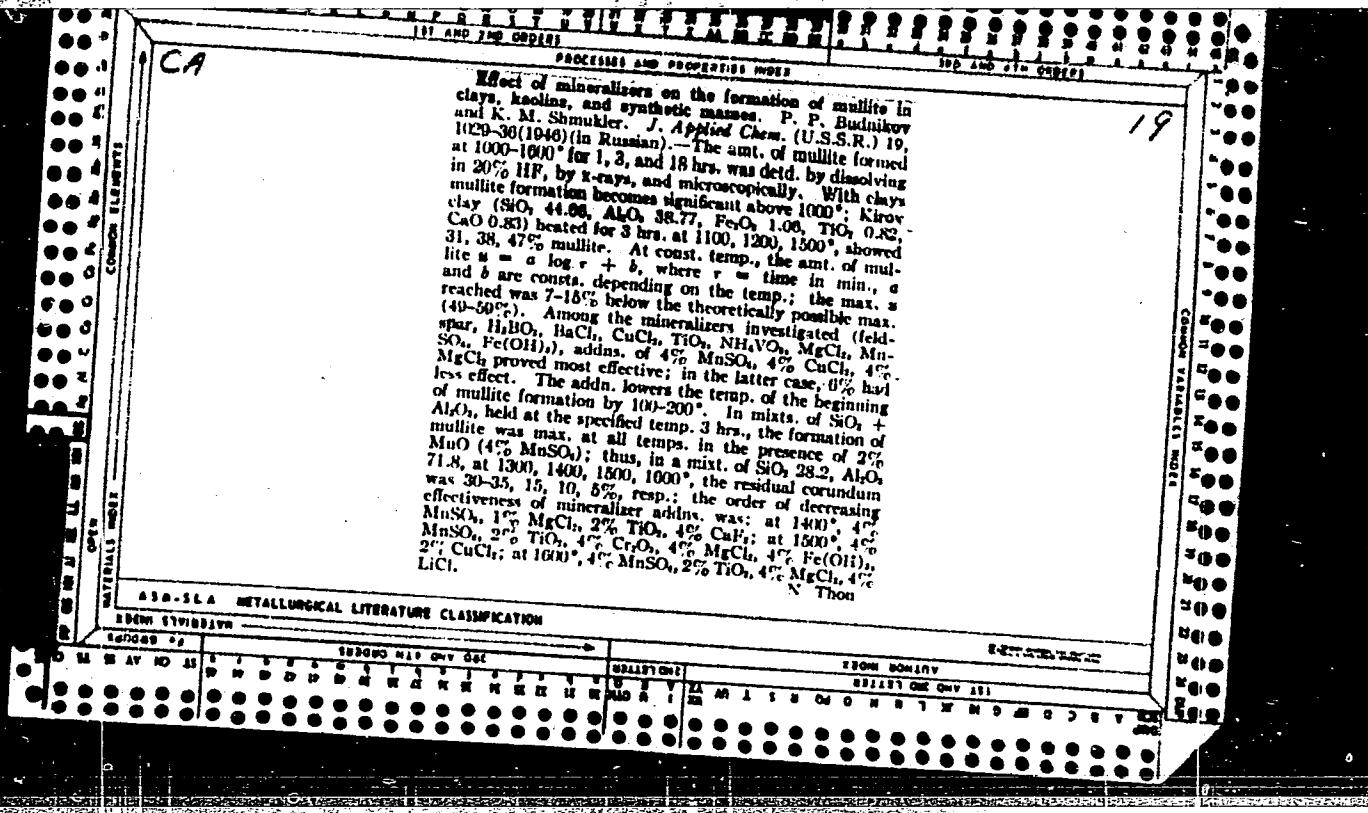




1210. GRAPHITE-REFRACTORY CLAY LINNINGS OF STEEL CASTING BUCKETS
AND THE MECHANISM OF THEIR WEAR. Budnikov, P. F. and Zeitlin, L. A.
(J. Appl. Chem. (U.S.S.R.), 1946, 19, No.1, 41-45; Battelle Libr.
Rev., Nov., 1946, No.11, 41).

Investigation of the adaptability of graphite-refractory clay for the lining of buckets used in manganese steel casting gave the following results: graphite-refractory clay lined buckets showed a considerably improved resistance to wear; these linings restrict the inclusion of non-metallic substances into molten metal; resistance to wear of such linings depends on the quality of graphite (particularly its dispersion) and on its content in the refractory compound. Presence of free silicate in such a compound reduces resistance.





caused a reduction in the amount of Al_2O_3 relative to that of mullite. It is possible to obtain a mullite refractory suitable for blast-furnace use by the addition of 2% MnO (4% MnSO_4) to a charge consisting of clays and kaolins with calcined alumina in proportions that will insure a complete mullite refractory by firing at 1500° to 1600°C . The MnO will not favor carbon deposition within the brick.

B. Z. K.

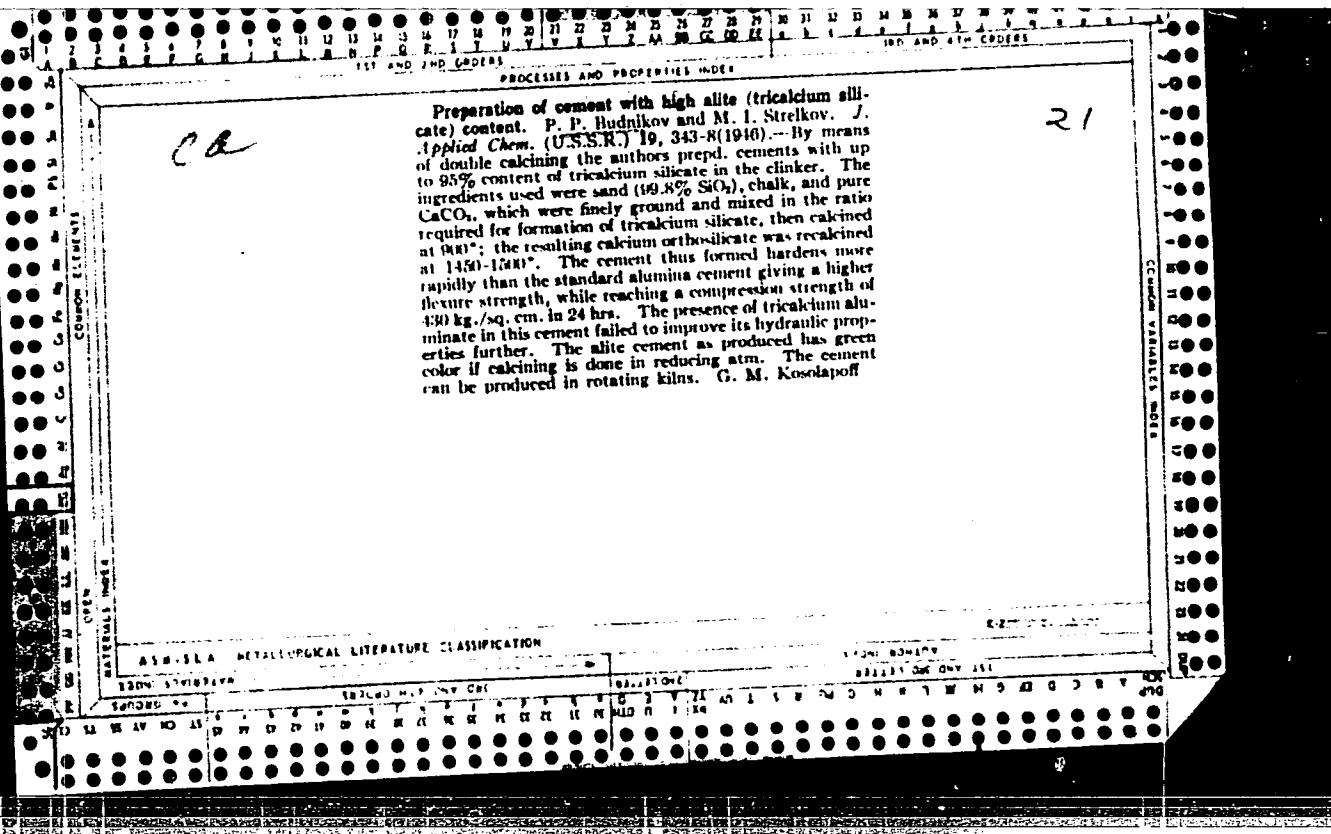
BUDNIKOV, P. P.

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PROCESSING AND PROPERTIES OF

Problem of obtaining cement with a high alite content
P. P. BUDNIKOV AND M. I. STANIKOV. *Zhur. Priklad*
Khim., 1974, 343-48 (1948). A cement was obtained
containing 95% tricalcium silicate (alite) in the clinker.
A method of double calcination was used for producing the
alite cement. A mixture of silica and chalk had been
calcined at a temperature of 800°; more chalk and alumina
were added to the 8-dicalcium silicate obtained, and the
intimate mixture of these was calcined at a temperature
of 1500°. The compressive strength of the alite cement
obtained reached 430 kg/cm² in one day.

AI-SLA METALLURGICAL LITERATURE CLASSIFICATION



S

CHROME-DOLOMITE HIGH REFRACTORY CONCRETE AND BRICK. P.P. Budnikov. (Comptes Rendus (Doklady) de l'Academie des Sciences de l'U.R.S.S., 1946, vol 51, p 615; British Ceramic Abstracts, 1948, May-June, p 193a). Results of tests on an unfired chrome-dolomite refractory showed that it may replace magnesite and chrome-magnesite bricks in steel furnaces. A chrome-dolomite refractory in the form of a metal-cased tube was tested in the end wall of a 40-ton open-hearth furnace operating on oil. At the point in question silica and other refractories withstood from 40 to 50 melts, whereas the chrome-dolomite refractory withstood 370 melts. In the back wall of an open-hearth furnace, disintegration of chrome-dolomite bricks and magnesite bricks was identical. It is concluded that the use of unfired chrome-dolomite bricks effects big savings in fuel and cuts down the consumption of magnesite.

APPENDIX METALLURGICAL LITERATURE CLASSIFICATION

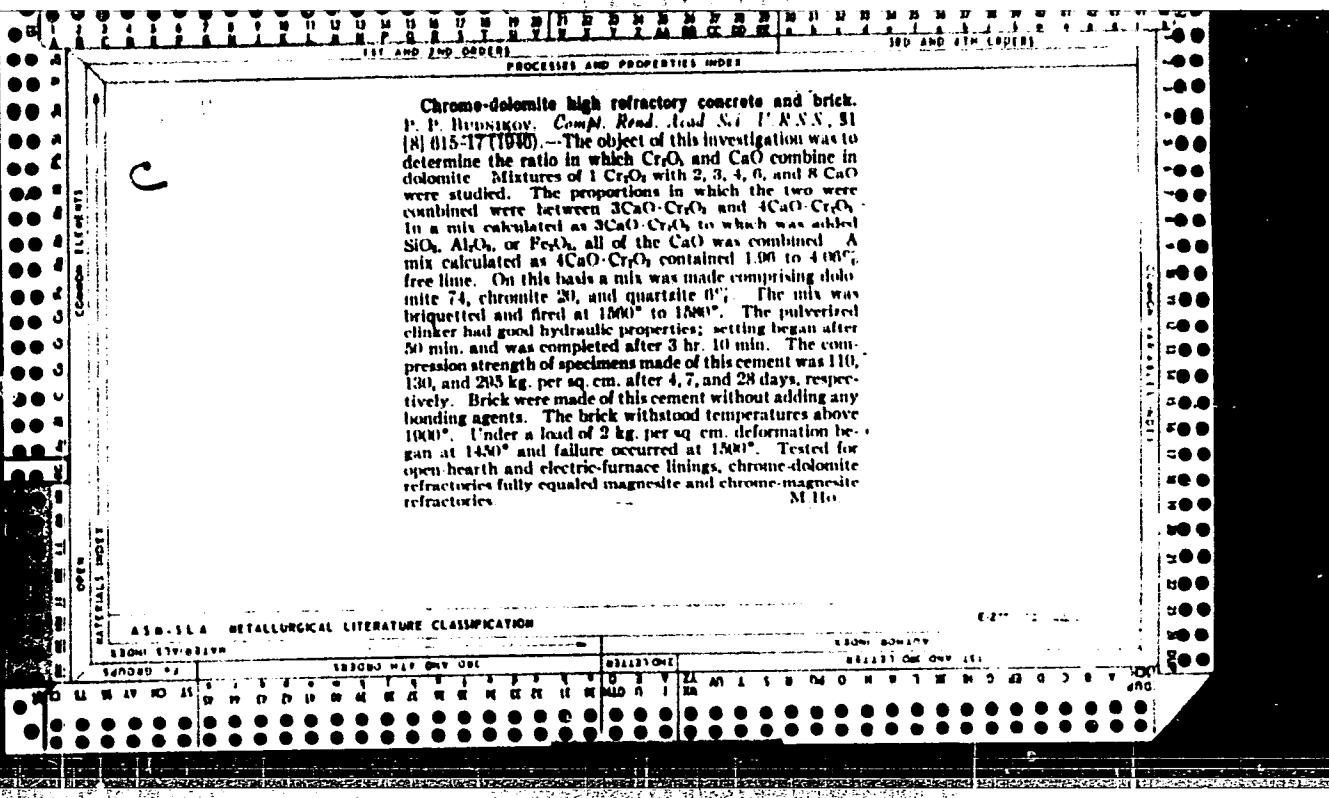
IRON & STEEL

SINTERED MET. CNT. ONE

REFINERY

IRON & STEEL

SINTERED MET. CNT. ONE



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A	B	C	D	E	F	G	H	I	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK							
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PROCESSES AND PROPERTIES INDEX

COMMON ELEMENTS
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*Setting time and strength of α -hemihydrated gypsum
as affected by addition of Sheresh (*Eremurus spectabilis*).
P. P. Budnikov, Compt. rend. acad. sci. U.R.S.S. 52,
325-8(1946); cf. Bachinsky, Compt. rend. acad. sci.
U.R.S.S. 30, 280-3(1941).—The addn. of 0.5-1.0%
dried and crushed sheresh roots to gypsum increased the
setting time several fold as well as the ultimate compression
strength by 20% or more.*
Ernst M. Cohn

Exit abs.

33. 10 Embalming and Conserving

Setting time and strength of α -hemihydrated gypsum as affected by addition of glucom (Erythrus spicatus). P. I. Budnikov (C. R. Acad. Sci. U.R.S.S., 1946, 61, 323-326).—The effect of the addition of 0.1-1.0% of a glue prepared from the roots of *Erythrus spicatus* and containing 27-33% of Ca arabate on the rate of setting and ultimate compression of technical α -hemihydrated gypsum have been studied. The time of setting is increased. Up to 0.8% of glue increases the ultimate compression strength, but a fall occurs at higher concn.

O. D. SALTANOV.

B.L. et. Cuvelier & P. de Blieck
1/1/66

Corrosion of blast-furnace slag cement by mineralized waters.
P. I. Budnikov and V. R. Gusev (*Compt. rend. Acad. Sci. U.R.S.S.*, 1948, **68**, 51-54).—A cement is prepared from blast-furnace slag of wet granulation (18 pts.), anhydrite (1 pt.), and calcined dolomite (1 pt.). It withstands 10% of NaCl and Na₂SO₄ better than does portland cement (compression strength after 3 years reduced by 15.1 and 21%, respectively, as compared with immersion in H₂O; comparative vals. for Portland cement, 48.5 and 100%), but is not superior in regard to 10% aq. MgCl₂ and 10% aq. MgSO₄ (comparative vals. 38.0 and 100%, as against 42.0 and 100%).

S. A. M.

21M16
USSR/Chemistry
Cement
Lime

Sep 1946

"The Chemical Formula of the Limiting Content of Lime
(CaO) in the Portland Cement Domain of a CaO-SiO₂-
Al₂O₃-Fe₂O₃-MgO System," P. P. Budnikov, Corresponding
Member of the Academy of Sciences of the USSR, M. I.
Strelkov, 2 pp

"Comptes Rendus (Doklady)" Vol LIII, No 8

Since the composition of commercial portland cement
is very complicated, studies are first made of cements
containing only one, then two, three and so on, of the
main oxides making up ordinary cement. The chemical
equation relating CaO and the other oxides

21M16
USSR/Chemistry (Contd.)

Lime

Sep 1946

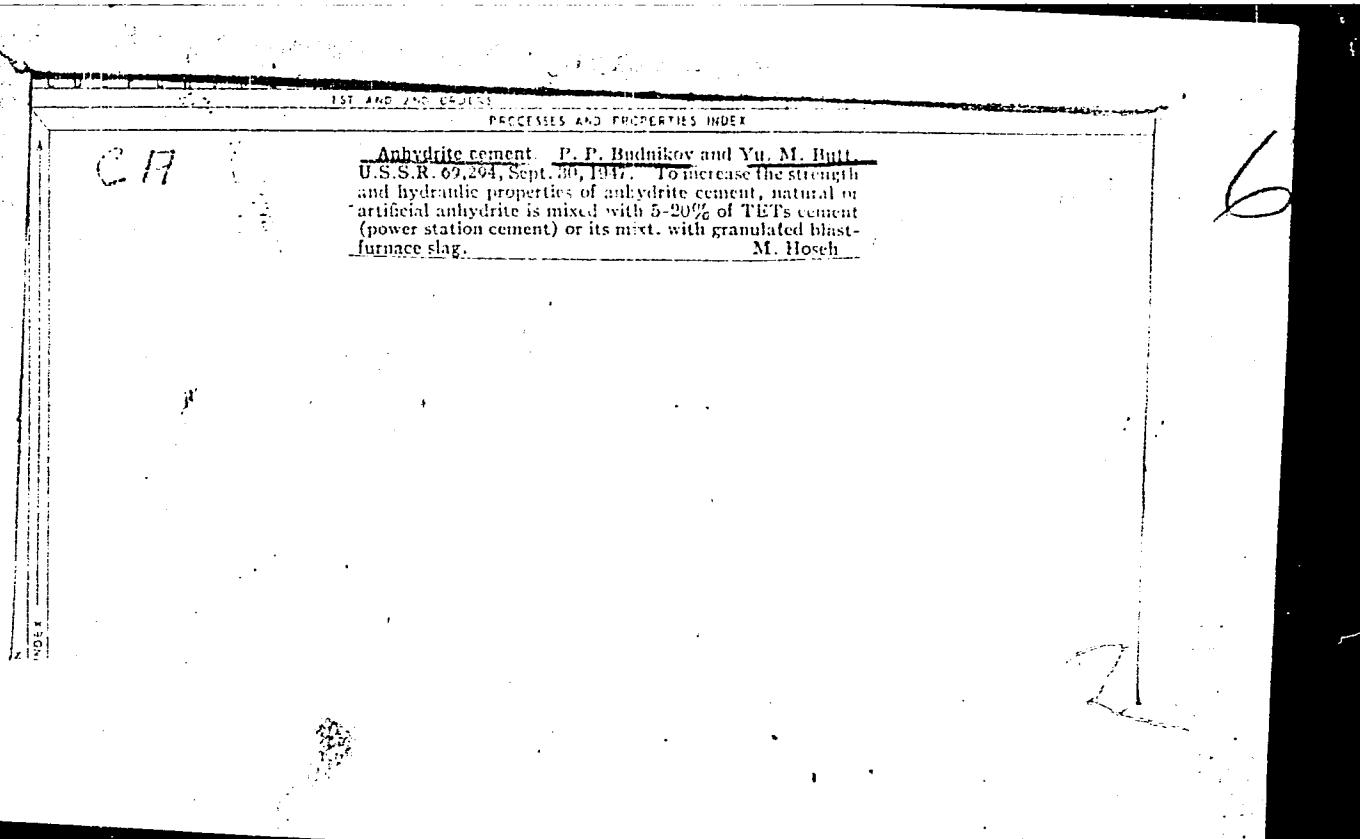
are studied to obtain the "limit" or "asymptotic"
value of CaO as the number of other oxides are in-
creased in the formulas.

21M16

CR

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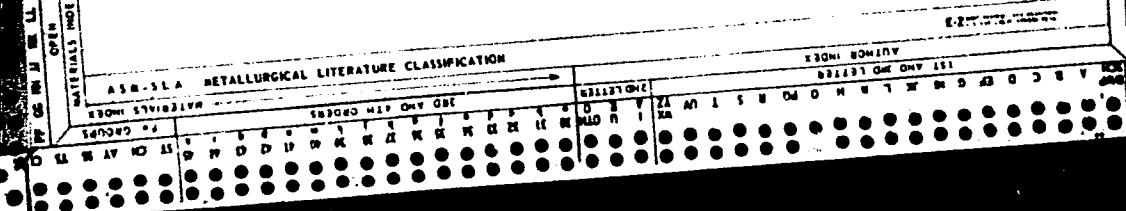
Formula of limit content of lime in the portland cement domain of the $\text{CaO}-\text{SiO}_2-\text{Al}_2\text{O}_3-\text{Fe}_2\text{O}_3-\text{MgO}$ system.
P. P. Budnikov and M. I. Strelkov. *Constr. rend.*, no. 6, p. 723-4 (1940) (in English). The following formula was hypothetically derived: $\text{CaO} = 2.8 \text{ SiO}_2 + (\text{Al}_2\text{O}_3 - 0.64 \text{ Fe}_2\text{O}_3) + 1.4 \text{ Fe}_2\text{O}_3$. Ten exptl. clinkers showed that the CaO limit is $2.8 \text{ SiO}_2 + \text{Al}_2\text{O}_3 + 0.7 \text{ Fe}_2\text{O}_3$ when the Al_2O_3 modulus is above 2; and $2.8 \text{ SiO}_2 + 1.65 \text{ Al}_2\text{O}_3 + 0.35 \text{ Fe}_2\text{O}_3$ when the Al_2O_3 modulus is below 2.
R. A. W.

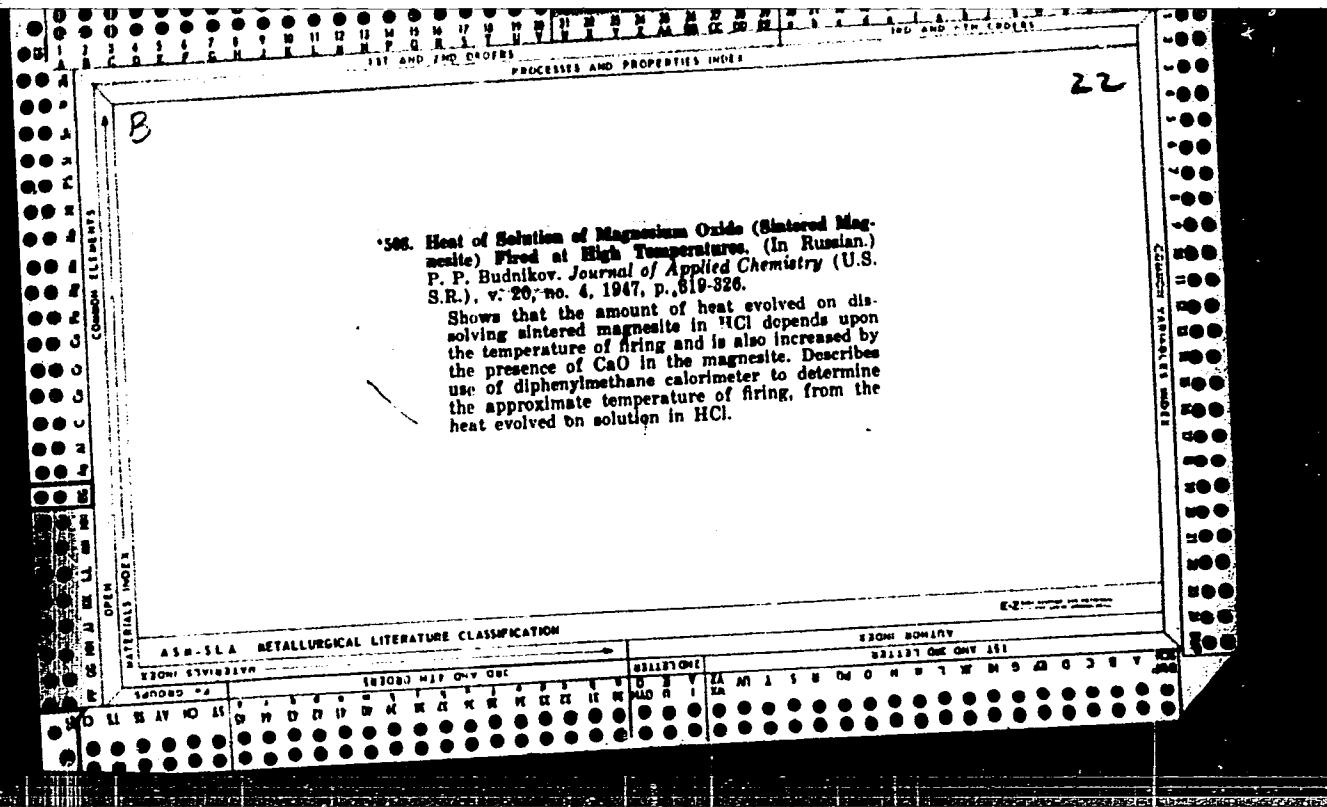


Expanding cement. L. P. Andrijkov. U.S.S.R. 69,-
600, Nov. 30, 1937. An expanding cement is made of a
hydraulic binder and an expanding addn. The latter is
made of a mixt. of clay or kaolin fired at 700-800°, lime,
and portland cement. The last one can be omitted. The
dry ingredients are mixed with water and after hardening
and drying, the mass is ground and mixed with an equal
vol. of gypsum hemihydrate.
M. Hesch

F
712. ASH CEMENTS. Budnikov, P.P. and Butt, Y. M. (Tsement, 1947, vol. 13, (7), 9-11; abstr. in Chem. Abstr., 1949, vol. 43, 1938). Ash from power station boilers in combination with other substances was tested for its suitability as a bonding material. For these tests the ash was mixed with anhydrite or with anhydrite and lime. In addition was also tested a mixture of cement and anhydrite. The mixtures of anhydrite and ash were weaker than anhydrite alone. The addition of up to 10% of lime and keeping the ash content at not over 10% improved the resistance of the mixture.

C.A.





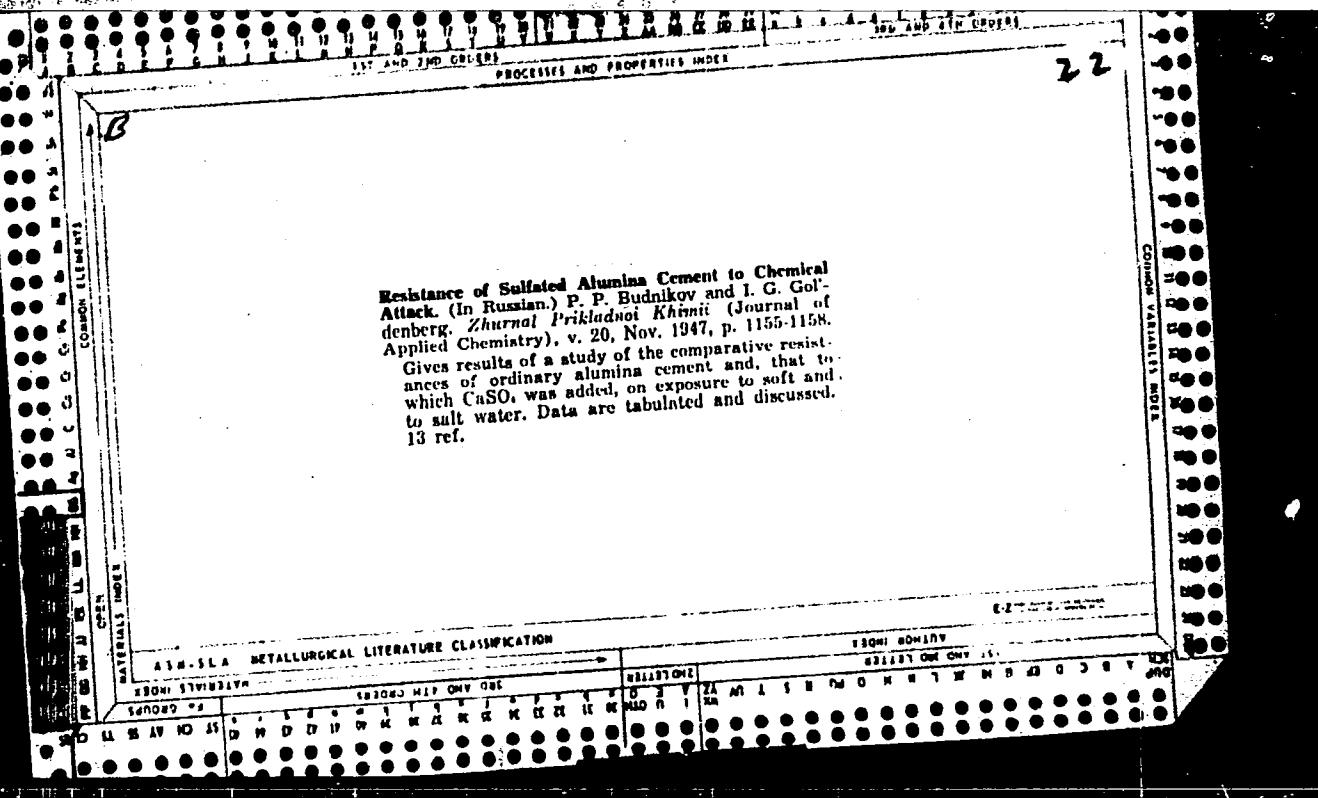
"APPROVED FOR RELEASE: 06/09/2000

CIA-RDP86-00513R000307310003-4

1309. THIRTY YEARS OF SOVIET SCIENCE IN THE FIELD OF SILICATES.
P.P. Budnikov (J. Appl. Chem., U.S.S.R. 20, 1097, 1947). A full
summary of work carried out by Russian scientists in the field of silicate t
technology is given, authors' names are quoted but no references are
given to the sources of their original papers.

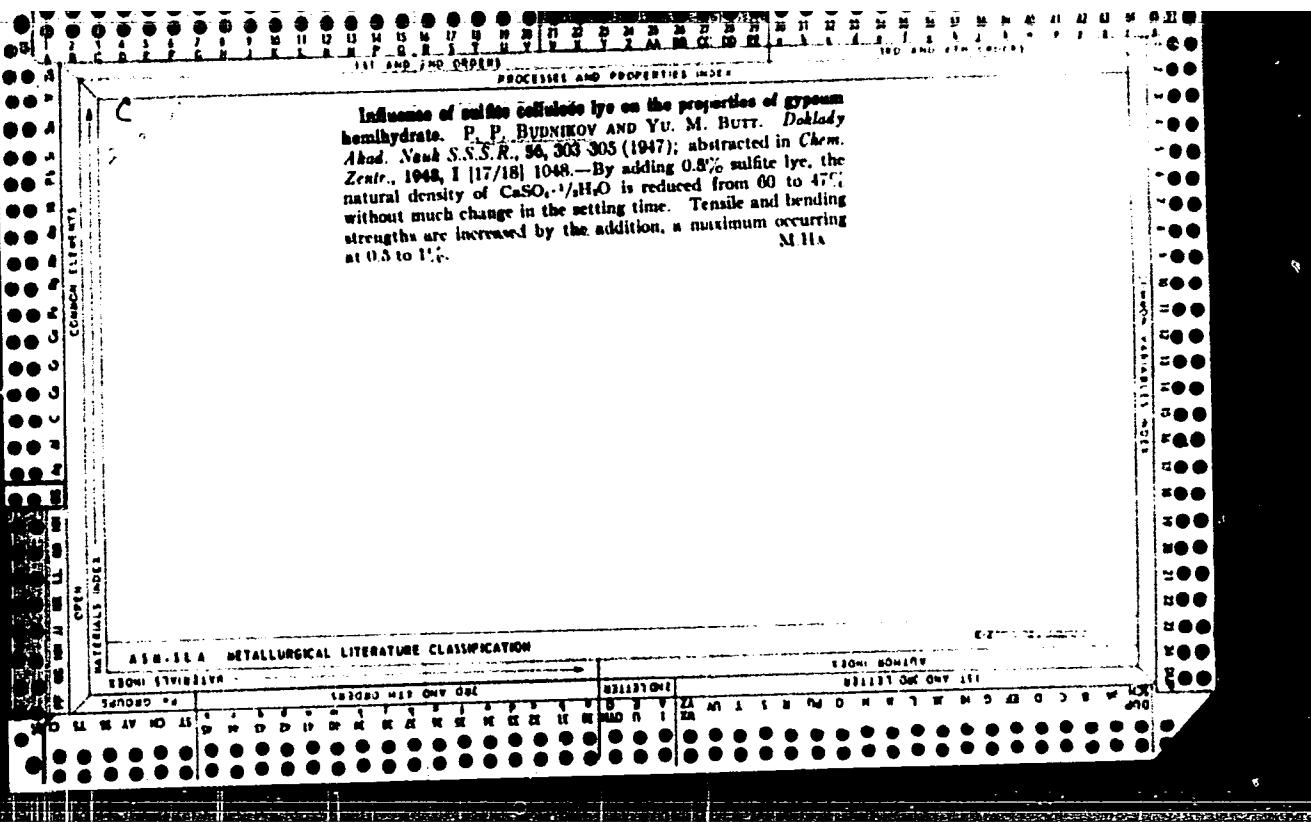
APPROVED FOR RELEASE: 06/09/2000

CIA-RDP86-00513R000307310003-4"



Cement from calcium sulfate, ashes, and lime. P. P.
Budnikov and Yu. M. Butt. *Streitel. Prom.* 25, No. 8,
21-3(1947)(in Russ.). Cements were compounded
from lime, coal-dust ashes (SiO₂ 49.36, Al₂O₃ 37.42, Fe₂O₃
6.69, CaO 3.03, MgO 0.82, SO₃ 1.14, ignition loss 1.42)
and 3 modifications of CaSO₄ (made from natural gypsum,
CaO 33.03, SO₃ 46.01, Al₂O₃ + Fe₂O₃ 0.52, H₂O 19.18,
CO₂ 0.47, insol. 1.02); (I) CaSO₄·½H₂O made by heating
at 160°-70°, (II) anhydrite, obtained by ignition at
700°, 3 hrs., (III) ignited at 900°, 3 hrs. The batches
were made up with 20, 30, 40% ashes, 5, 5, 10% lime and
75, 65, 50% CaSO₄ (I, II, or III). With increasing con-
tent of I, the water requirement decreases (60, 55, 48%,
resp.); it increases slightly with increasing amt. of II (36,
38, 40% H₂O) or of III (35, 40, 42). Setting is slowed
down with decreasing amts. of I or II and is accelerated
with decrease of III. With 40% ashes, after 28 days'
standing, the best samples had the compressive strengths:
with I 115 kg./sq. cm., with II 210 kg./sq. cm., and with
III 120 kg./sq. cm. Addn. of ashes and lime accelerates
the setting of CaSO₄ and increases its waterproofness.
Cements with I are best allowed to set in air or are dried
to const. wt., whereas cements with III harden best in a
moist atm. Best waterproofness is obtained with III.

N. Thon



CA

23

The influence of sulfite pulp liquors on the properties
of gypsum hemihydrate. P. P. Bulinikov and Yu. M.
Hut (Mendeleev Inst. "Chim. Tsvetnoi", Moscow).
Cmpt. rend. acad. sci. U.R.S.S. 56, 801-5 (1947); Chem.
Zentr. 1947, I, 840.—Sulfite pulp liquor from the wastes
from the production of cellulose from wood was added to
gypsum hemihydrate in amounts of 0-5%. The addn. re-
duced the water demand of the gypsum, increased its
hardness, and had no effect on the setting period.
M. G. Moore

AMERICA METALLURGICAL LITERATURE CLASSIFICATION

SEARCHED INDEXED SERIALIZED FILED

SEARCHED INDEXED SERIALIZED FILED

BUDNIKOV, P. P.

PA 9T50

USSR/Building Materials
Gypsum

May 1947

"The Influence of Sulphite Cellulose Lye Upon the Properties of Semi-hydrous Gypsum," P. P. Budnikov, W. Yu. M. Butt, Member Correspondents of the Academy of Sciences, 2 pp

"Doklady Akademii Nauk SSSR" Vol LVI, No 5

Tables showing the consistency of plaster of Paris for varying amounts of the sulphite, which reduces the necessary amount of water and increases strength.

9T50

BUDNIKOV, P.P.

Budnikov, P.P. "Stone ceramic articles," in symposium: Syr'yevyye resursy tonkokeram. prom-sti SSSR i puti ikh ispol'zovaniya, Moscow-Leningrad, 1948. p. 72-78

SO: U-2888, Letopis Zhurnal'nykh Statey, No. 1, 1949

BUDNIKOV, P. P.

USSR/Engineering
Cement

Mar 1948

"Sulphated Hydraulic Slag Cements," P. P. Budnikov, Corr. Mbr., Acad. Sci., USSR, 9 pp.
Izv. Akad. Nauk SSSR, Otdel Tekh. Nauk, No. 3

Details various experiments carried out on sulphated hydraulic slag cement to test its durability. Includes tables showing results of experiments.

39T18

20

Sulfated hydraulic slag cements. P. Budnikov
Invent. Akad. Nauk S.S.R., Odess. Akad. 1950.
423-32. - Granulated blast-furnace slag possess latent hydraulic properties, higher with greater contents of Al_2O_3 , as compared with SiO_2 ; the harmful effect of too much CaO should be offset by correspondingly more Al_2O_3 . Presence of MnO at even as low as 1% lowers the hydraulic properties. The setting of slag cements can be effectively activated by CaSO_4 , with cements contg. 20% Al_2O_3 , CaSO_4 disappears from the liquid phase in 1-2 days, with 10% Al_2O_3 in 3-6 days. As long as CaSO_4 is present in the liquid, practically no Al_2O_3 goes over into it. The complex formed in the interaction between slag and CaSO_4 in $\text{Ca}(\text{OH})_2$ water, are: basic slag [$(\text{CaO} + \text{MgO})/(\text{SiO}_2 + \text{Al}_2\text{O}_3) = 1.01$, SiO_2 , Al_2O_3 , 1.27], $3(\text{CaO}, \text{Al}_2\text{O}_3, 3\text{CaSO}_4, \text{H}_2\text{O} + 2\text{CaO}, \text{Al}_2\text{O}_3, \text{H}_2\text{O} + 1.5 \text{CaO}, \text{SiO}_2, \text{H}_2\text{O}$; acid slag [0.80, 1.72], $3(\text{CaO}, \text{Al}_2\text{O}_3, 3\text{CaSO}_4, \text{H}_2\text{O} + 1.22 \text{CaO}, \text{SiO}_2, \text{H}_2\text{O}$. Setting is at its best in the presence of 0.4-0.5 g./l. CaO in the liquid (not over 1 g./l.) which is attained by adding up to 3% CaO to the slag- CaSO_4 mixture. The amt. of CaO in the liquid ensures best mech. properties, e.g., the curves of compressive strength of 7-day samples in water have a max. (200 kg. sq. cm^{-2}) at about 0.5 g./l. CaO , 28 days under water, max. (300 kg. sq. cm^{-2}) at 0.5 g./l. Examples of prolonged tests: basic slag (SiO_2 , 35.51, Al_2O_3 , 8.01, FeO , 0.00, CaO 45.96, MgO 4.07, MnO 2.12, SO_3 0.56, 8.2.31%), 80% + CaSO_4 (anhydrite), 55% + calcined dolomite 35%, compressive strength after 8 months and 3 years in fresh water, 294 and 324 kg. sq. cm^{-2} in air, 321 and 408; after 1 year in 10% NaCl , 275, in 10% Na_2SO_4 , 272 and 280; after 1 year in 10% Na_2SO_4 , MgSO_4 , NaCl , and MgCl_2 , the sulfated slag cement was stronger than portland cement. The heat

evolved in the setting of the sulfated slag cement is 20-30 cal. g. $^{-1}$ against 30-35 cal. g. $^{-1}$ for portland cement. With basic slags, it is not necessary to add CaO , as enough of it is formed by hydrolysis of the CaS present in the slag. addition of MgO in the form of dolomite fired at 800-900° is beneficial, as illustrated by the following 12-yr tests: slag (SiO_2 , 37.73, Al_2O_3 , 9.07, FeO , 0.11, CaO 17.30, Mg 1.21, Mn 1.80, CaS 2.30, 0.2%, + CaSO_4 (anhydrite) 8%, after 12 yr. under water, tensile strength 31.4, compressive strength 300 kg. sq. cm^{-2} ; slag 90% + CaSO_4 , 5% + MgCO_3 (fired) 5%, 41.4 and 300. In 1-year combined water and air tests, slag 92% + CaSO_4 , 8%, 40.1 and 308; slag 91% + CaSO_4 , 7% + chalk 2%, 32.5 and 338; slag 82% + CaSO_4 , 7% + clinker 10%, 43.5 and 314; slag 90% + CaSO_4 , 5% + MgCO_3 (fired) 5%, 41.8 and 300. Acid slags are less suitable for hydraulic cements than basic slags. However, satisfactory cements can be made from acid slags with addition of CaSO_4 and either CaO + MgO or dolomite fired at not lower than 1000-1100°, e.g., slag (SiO_2 , 30.16, CaO 31.40, Al_2O_3 , 2.25, FeO , 1.20, MgO 1.00, MnO 3.02, SO_3 , 0.35, sulfite 8.1.20, 30% + CaSO_4 (fired at 1000°) 15% + dolomite (fired at above 1000°) 8%, ground to 0.5-0.8%, residue on a 0.00 mesh sq. cm^{-2} , sieve, after 3 months, tensile strength 33.3, compressive 408 kg. sq. cm^{-2} .

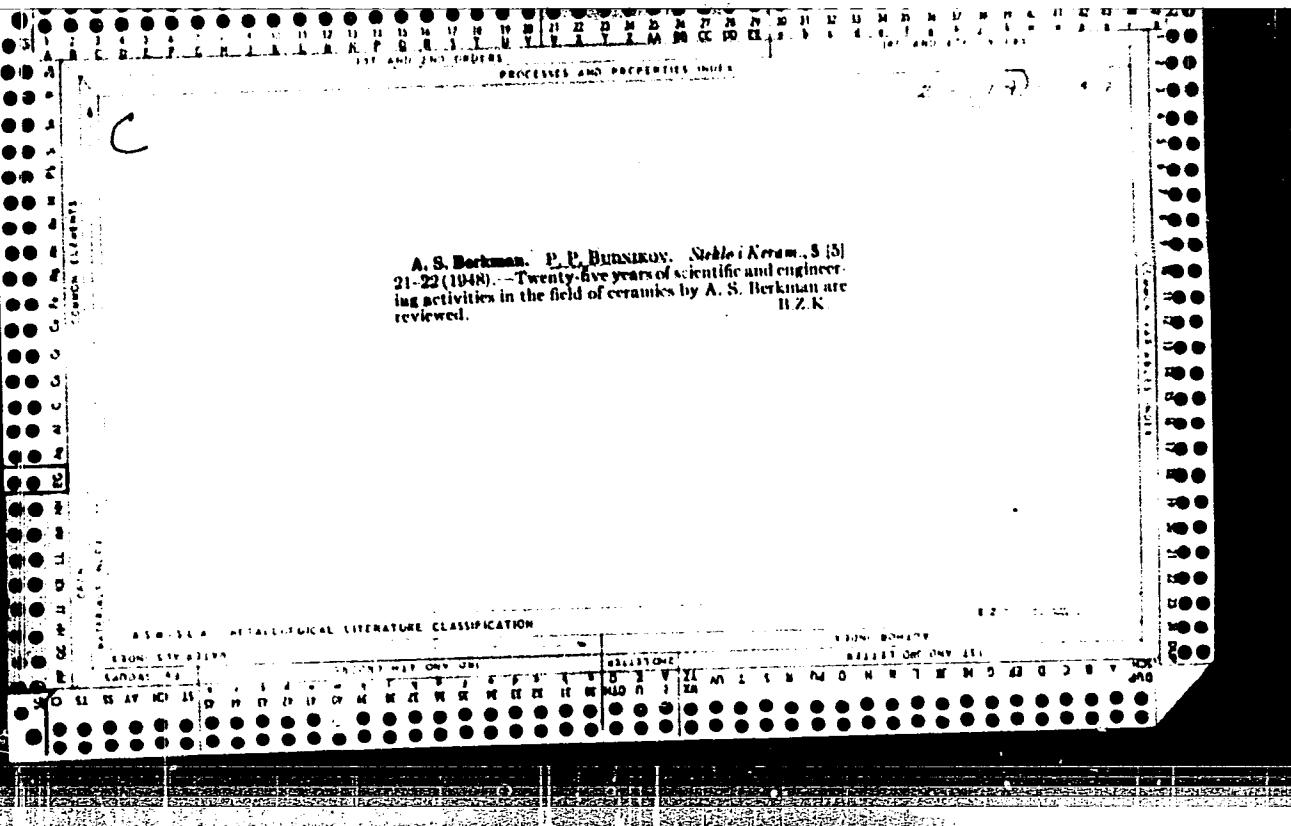
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SULPHATED HYDRAULIC SLAG CEMENTS. P. P. Budnikov.
(Bulletin de l'Academie des Sciences de l'U.R.S.S., 1948,
No. 3, p. 423; British Ceramic Abstracts, 1948, July-Aug.,
p. 250a) Acid open-hearth slag can be mixed with portland
cement to produce lime-slag and gypsum-slag cements. In
the latter case the slag reacts with the gypsum, and portland
cement or slaked lime is added as an alkali component.
Cement produced by this method, however, has poor
mechanical qualities. Sulphated cement with good stability
can nevertheless be produced from open-hearth slag by
activating it with calcium sulphate (especially anhydrite)
and a mixture of CaO and MgO. In place of the latter
components it is possible to use dolomite, burnt at 1000°
to 1100° C.

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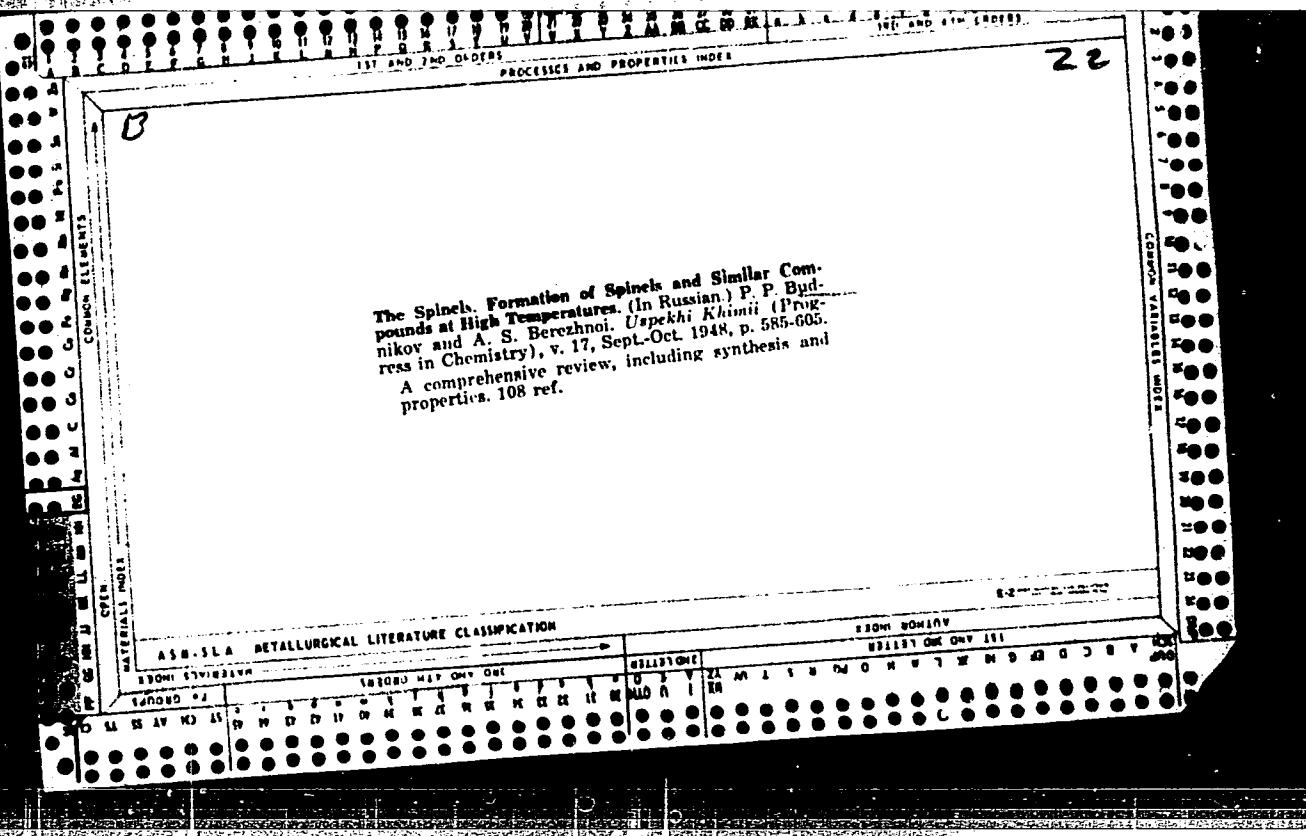
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BUDNIKOV, P. P.

PA 64T1

USSR/Chemistry - Cement
Chemistry - Calcium Sulfate

Jan 1948

"Effect of TeTs-Cement on the Binding Properties of
Various Modifications of Calcium Sulfate," P. P.
Budnikov, Yu. M. Butt, 7 pp

"Zhur Prik Khim" Vol XXI, No 1

Subject cement speeds up hydration of calcium sulfate
and increases its hardness and water resistance.
Hardening of semihydrous and anhydrous cements goes
on best in air media, and takes approximately 7 days.
Humid climates cause setting to take place in about
28 days. Cements containing gypsum set faster than
ordinary cements. Submitted 28 Mar 1947.

64T1

BUDNIKOV, P. P.

Budnikov, P. P. and Zhukovskaia, S. S., The method of determination of silicon by volume in cast iron and steel. p. 959

The checking of the volume method of determining silicon in bakelite vessels on standard sample gave satisfactory results. It was interesting to apply this method to the quick-cutting instruments and other kinds of steel containing tungsten, the presence of which complicates the determination of silicon by the weight method.

April 13, 1948

SO: Journal of Applied Chemistry (USSR) 21, No. 9 (1948)

BUDNIKOV, P. P.

PA 11/49T33

USSR/Chemistry - Silicates
Chemistry - Ceramic Industry Aug 48

"Session on the Progress of Science in the Field of
Silicates," P. P. Budnikov, 3 pp

"Zhur Priklad Khimii" Vol XXI, No 8

Session was held in Oct 47. Organized by All-Union
Sci, Eng and Tech Soc of Silicate Industry and All-
Union Chem Soc imeni D. I. Mendeleev. Reports
speeches made. Submitted 20 Nov 47.

11/49T33

BUDNIKOV, P. P.

PA 11 49T3

USSR/Academy of Sciences
Chemistry

Aug 48

"Twenty Years in the Institute of Physical Chemistry
Imeni L. V. Pisarzhevskiy, Academy of Sciences,
Ukrainian SSR," P. P. Budnikov, 2 $\frac{1}{2}$ pp

"Zhur Priklad Khimii" Vol XXI, No 8

Institute originated from Chair of Electronic Chem
organized by Pisarzhevskiy in 1922 at the Yekater-
inoslav (now Dnepropetrovsk) Mining Inst. Describes
work of Institute during past 20 years.

11/49T3

BUDNIKOV, P.P.; YURKOV, M.I.

Cathodeluminescence of synthetic silicates and aluminates. Dep. AN URSR
no. 4:3-11 '48.
(MLRA 9:9)

1. Diysniy chlen AN URSR (for Budnikov). 2. Ordona Lenina khimiko-tekhnicheskiy institut imeni D.I.Mendelejeva.
(Cathode ray tubes) (Silicates) (Aluminates)

BUDNIKOV, P. P.

PA 43/43T28

USSR/Geology

Clay

Gypsum

Feb 1948

"Gazha [TM: Mixture of Clay and Gypsum] and Its Thermal Dissociation," P. P. Budnikov, Corr Mem, Acad Sci USSR, O. P. Mcchedlav-Petrosyan, 3 pp

"Dok Akad Nauk SSSR, Nova Ser" Vol LIX, No 4

Describes deposits of gazha at Tbilisi, Signakh, Akhaltsikh (Georgian SSR), Erevan, Takhmagan, Leninakan (Armenian SSR), Kirovabad, Lenkoran, Taurz (Azerbaijhan SSR) and others. Tabulates percentage dissociation under different conditions.

43T28

P. P. BUDNIKOV

Thermal dissociation of "gazha." P. P. Budnikov and

A. P. Melikyan-Petrosyan. *Deklady Akad. Nauk S.S.R.*
59, 719-21(1948).—In the production of SO₃ and cement from
"gazha" (a mixt. of lime, sand, gypsum, and related prod-
ucts), special attention must be paid to gazha contg. little
gypsum. If the gypsum content is high (over 30% CaSO₄),
a high temp. is required for thermal dissoci., but the re-
moval of SO₃ is complete in 30-60 min. at 1100°. H. K. Livingston

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BUDNIKOV, P. P.

Gypsum clay and its thermal dissociation. ✓P. P. Budnikov and
V.O. P. Mcchedlov-Petrosyan. Doklady Akad. Nauk S.S.R., 59 14 719-21
(1948).---Thermal dissociation tests were conducted with gypsum clay contain-
ing 20 to 90% gypsum obtained from the largest deposits in the Georgian
S.S.R. When the gypsum content is less than 30%, it is possible to obtain
almost complete liberation of SO₃ by heating at 1100°C. for 0.5 to 1 hr.;
complete expulsion of SO₃ occurs from the melt. Gypsum clay having a low
gypsum content should be utilized for making binders or SO₃.

B.Z.K.

BUDNIKOV, P. P.

PA 77T89

USSR/Minerals
Gypsum
Cement

May 1948

"Research on the Gypsum of the Stalinogorsk Deposit,"
P. P. Budnikov, Corr Mem, Acad Sci USSR, 2 pp

"Dok Ak Nauk SSSR" Vol IX, No 4

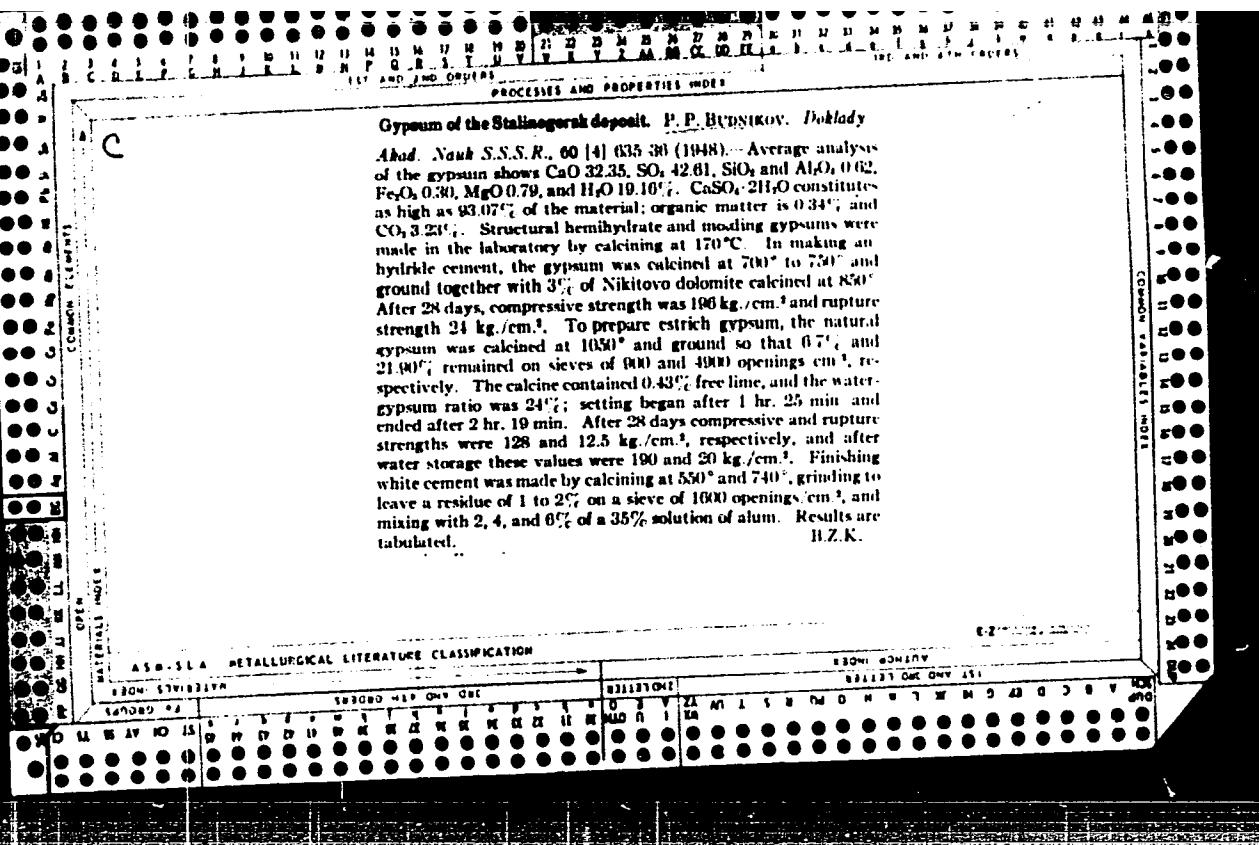
Gives tables of chemical analysis of specimens from
above deposit and properties of various cements pre-
pared from them. Submitted 9 Mar 1948.

77T89

Gypsum of the Stalino-gorsk deposit. P. P. BUDNIKOV. *Doklady*

Akad. Nauk S.S.R., **60** [4] (035-30) (1948).—Average analysis of the gypsum shows CaO 32.35, SO₃ 42.81, SiO₂ and Al₂O₃ 0.62, Fe₂O₃ 0.30, MgO 0.79, and H₂O 19.10%. CaSO₄·2H₂O constitutes as high as 93.07% of the material; organic matter is 0.34%; and CO₂ 3.21%. Structural hemihydrate and mudding gypsum were made in the laboratory by calcining at 170°C. In making an hydraulic cement, the gypsum was calcined at 700° to 750° and ground together with 3% of Nikitovo dolomite calcined at 850°. After 28 days, compressive strength was 190 kg./cm.² and rupture strength 24 kg./cm.². To prepare estrich gypsum, the natural gypsum was calcined at 1050° and ground so that 0.7% and 21.90% remained on sieves of 900 and 4000 openings cm.⁻², respectively. The calcine contained 0.43% free lime, and the water-gypsum ratio was 24%; setting began after 1 hr. 25 min. and ended after 2 hr. 19 min. After 28 days compressive and rupture strengths were 128 and 12.5 kg./cm.², respectively, and after water storage these values were 190 and 20 kg./cm.². Finishing white cement was made by calcining at 550° and 740°, grinding to leave a residue of 1 to 2% on a sieve of 1000 openings/cm.², and mixing with 2, 4, and 6% of a 35% solution of alum. Results are tabulated.

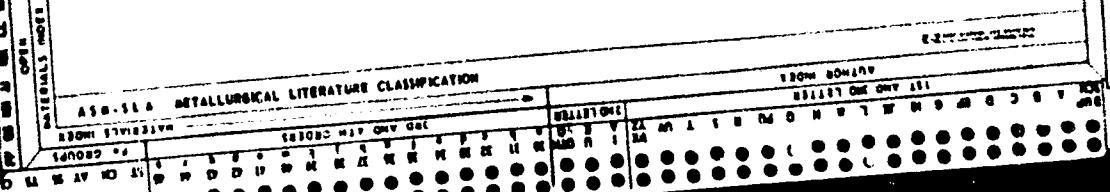
H.Z.K.



Investigation of Stalingorsk plaster. P. P. Budnikov,
Doklady Akad. Nauk S.S.R., 60, 635-6 (1948).—The
 plaster of Stalingorsk is especially well suited for the
 production of building and molding plaster, and also for
 "Estrich Gips" (flooring plaster), anhydrite cements, and
 special white cements. The analyses of the natural raw
 material show a content of 3.23% CO₂ and 0.34% org.
 material; it has a remarkable mech. strength and is gray-
 ish colored. By calcination to 170° the semihydrate is
 formed, the grayish color disappears, and a very good
 plaster is produced which corresponds in every respect
 to the standards (cf. B. V. Gypsum and its Examination,
 1948). For anhydrite cements (cf. B. V. and Sorin, The
 Anhydrite Cement, 1947) the same raw material is calcined
 to 700-750°, finely ground, and 3% dolomite from Nik-
 itowka (calcined at 850°) is added as a catalyst for hard-
 ening. The mech. strengths produced are well above the

standards for air-cured samples. For the production of flooring plaster (cf. Volkenskil, *The Estrik Gips*, 1943) the natural gypsum is calcined at 1050° and very finely ground. The product contains 0.4% free lime. The setting is normal, and the mech. strengths are very satisfactory, especially after moist-curing. A special white cement is produced from gypsum (cf. Elliston, *Special Plaster Products of Highest Strength in Architecture*, 1940) by firing in an oil-fired industrial muffle furnace at 850 and 740° and extremely finely ground. It shows a distinct increase of its mech. strength with increasing grain fineness. The grinding, however, is uneconomical if it is really carried to the highest degrees of fineness, and the tendency of forming lumps on the walls of the ball mills is most troublesome. Nevertheless the standard examin. results are excellent for this calcined product after an addn. of 2-6% alum, corresponding to the famous English "Keene's cement."

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BUDNIKOV, P. P.

Sulfaluminates as a positive factor in preparing expanding cement. Ya. P. Budnikov AND Z. S. KOSYRYA. *Doklady Akad. Nauk S.S.R.*, 61 (4) 881-84 (1948). *Swelling Akad.* is observed only in those cases when there is a concentration of CaO in the liquid phase. When the CaO content is less than 0.4 gm./liter, a small amount of the Ca aluminates goes into solution, the resulting sulfaluminite formed is small, and the strength of the cement is not impaired. When the CaO content is over 1.98 gm./liter, the Ca aluminates do not dissolve and the cement acquires the characteristic of swelling due to the formation of sulfaluminite from the reaction of solid Ca aluminates with dissolved CaO and gypsum. The swelling process was utilized as a positive factor in preparing expanding cement. The hardened products of the reaction of a mixture of activated kaolin (calcined at 800°C.), Portland cement, and lime (or lime alone) with definite amounts of water were immersed in water for 10 days, then dried at 120°C., and ground with a definite amount of gypsum. The addition of this expanding product in amounts of 5 to 15% to cement will cause the cement to expand in a moist medium. The compressive strength of the cement is slightly below that of ordinary Portland cement only during the first period of hardening. The phenomenon of expansion may be explained by the following reaction: $3(2\text{CaO} \cdot \text{Al}_2\text{O}_5 \cdot 7\text{H}_2\text{O}) + \text{CaSO}_4 \cdot 2\text{H}_2\text{O} + \text{aq} =$

$(3\text{CaO} \cdot \text{Al}_2\text{O}_5 \cdot 3\text{CaSO}_4 \cdot \text{aq}) \cdot \text{Al}_2\text{O}_5 \cdot \text{aq}$. The difficulty soluble crystals of Ca sulfaluminite thus formed gradually expand the cement in the colloidal medium of hydrated Ca silicates and aluminate. The formation of inner destructive stresses in the hardened cement does not take place because the formation of the sulfaluminite occurs not through the reaction of $4\text{CaO} \cdot \text{Al}_2\text{O}_5 \cdot 12\text{H}_2\text{O}$ with gypsum but mostly through reaction of the latter with 2CaO · 7H₂O. Optimum compositions of expanding products are (1) kaolin (calcined at 800°) 28%, lime 43%, Portland cement 31%; and (2) kaolin (800°) 35% and lime 68%. The optimum addition of the expanding product is 5 to 10%. This cement; a greater percentage reduces the strength. Cement containing the expansion product and 1% CaCl₂ became impermeable to water after 13 days under a hydrostatic pressure of water of 3 atm. The addition of basic granulated blast-furnace slag to the expanding cement reduced the linear expansion considerably. B.Z.K.

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P. P. BUDNIKOV

COMMON ELEMENTS
OPEN
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PROCESSES AND PROPERTIES INDEX

C.4

Sulfoaluminate as an essential factor in the production of expanding cements. P. P. Budnikov and Z. S. Kosyrev. Doklady Akad. Nauk U.S.S.R. 61, 691-4 (1948).

The generally known expansion effect in hardening cements and concretes accompanying the formation of $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{CaSO}_4 \cdot 3\text{H}_2\text{O}$, by the reaction of excess gypsum, or by CaSO_4 dissolved in industrial waters, etc., with the basic Ca aluminates, e.g. with $4\text{CaO} \cdot \text{Al}_2\text{O}_5 \cdot 13\text{H}_2\text{O}$, can be made helpful if the shrinkage of the hydrated silicate gels in the setting cement is compensated by that expansion effect. The method of Lossier (C.A. 39, 793) for the production of a shrinkage-free mortar or concrete is based on this idea. B and K. recommend the production of an expanding mix by calcining kaolin at 800° , adding hydrated lime with or without an addn. of portland cement, and grinding in water the somewhat hardened mix after drying at 120° , then adding gypsum in definite ratios (e.g. 26 or 35% calcined kaolin; 43 or 65% hydrated lime; 31 or 0% portland cement; 70-75% water, gypsum added to the dried mass in the ratio 1:1). If 5-10% of this strongly expanding mass is added to portland cement, a mix is produced with practically no changes in mech. strength, but with a very low vol. change. For the production of a mortar which is also impermeable to water the addn. of 1% CaCl_2 to the portland cement is advisable. Also, the addn. of granulated blast-furnace slag considerably reduces the vol. changes. W. Eitel

Reaction in Solid Phases (Reaktsiya v tverdykh fazakh)
P. P. RUDNIKOV AND A. S. BIRKZHINOV. Published by Promstroi-
izdat, Moscow, U.S.S.R., 1949. 88 pp. Price 5.65 rubles.
The book sets forth information on reactions in solid phases, de-
scribes polymorphous changes of some oxides which are of impor-
tance in ceramics and the formation of solid solutions, and con-
siders the formation of spinelides.

B.Z.K.

ASH-SEA METALLURGICAL LITERATURE CLASSIFICATION

GINZBURG, D.B., doktor tekhn. nauk; DELIKISHKIN, S.N., kand. tekhn. nauk;
KHODOROV, Ye.I., kand. tekhn. nauk; CHIZHSKIY, A.F., inzh.;
BUDNIKOVA, P.P., red.; SMIRNOVA, I., red.; PANOV, L., tekhn. red.

[Furnaces and drying apparatus for the silicate industry] Pechi i su-
shila silikatnoi promyshlennosti. Pod red. P.P.Budnikova. Moskva,
Gos. izd-vo lit-ry po stroit. materialam, 1949. 483 p.

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(MIRA 15:1)

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K. Vagroso & Styekloperamisye. (V svyaz s Stat'yu V. V. Guncharova
"O Styekloperamisye Kak Osnovnom Metodicheskom" V Zhurn. "Ognyeniy". 1929,
No 4) Ognyeniy, 1929, No 2, C. 393-97, -- Bibliogr: 9 Naev.

SO: "SOTOPIS" No. 34