1 ... Cements

Hydraulic slag anhydrite cement. P. P. Budnikov. *Novosti Tekhniki*, 10 [2] 33-35 (1941); abstracted in *Chem. Zentr.*, 1942, I [21] 2693-94.—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 discover its further application. Good results were obtained by grinding dried basic Martin, Bessemer, and foundry slags with 5 to 10% anhydrite (gypsum fired to 500° 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. Suggestions for the manufacturing process and uses of these clinker free blast furnace anhydrite slag cements are given.

M.V.C.

Budnikov, P.P.

2C

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. Krotsch (*J. Appl. Chem. Russ.*, 1941, 14, 747—754, 755—765; cf. A., 1930, 1211).—I. When the mixture $CaSO_4$ (gypsum) + 4C (lignin 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, max. yields were obtained using soot or lignin 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 (lignin)], 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. N. G.

um 3

A C. S.

Refractories

Interaction of kaolin and coal at high temperatures. P. P. Budnikov and E. Z. Dobhart. *Compt. Rend. Acad. Sci. U.R.S.S.*, 32, 57-58 (1941); *Brit. Chem. Phys. Abs. B*, 1942, I, Nov., 408.—Appreciable quantities of SiC and α-Al_2O_3 were formed when a kaolin and a clay were each heated with 25% of oil-gas coke at 1650° to 2000°.

C-4

3-3-46

Anhydrite cement. P. P. BUDNIKOV. Abstracted in *Visti 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.

3-3116

Improving the building characteristics of alumina cement. P. P. Budnikov and I. G. Gol'denberg. Doklady Akad. Nauk S.S.S.R. Otdel. Tekh. Nauk. 1942, No. 3-4, pp. 73-87.—Defects in concrete blocks made from alumina cement are caused by the heat generated in the formation of $3CaO \cdot Al_2O_3 \cdot 6H_2O$ instead of the usual hydration process: $2(CaO \cdot Al_2O_3) + 10H_2O = 2CaO \cdot Al_2O_3 \cdot 7H_2O + Al_2O_3 \cdot 3H_2O$. 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 preparation 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 640 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 compressive strength of 220 kg./cm.² after 2 days and 144 kg./cm.² after 7 days.

B.Z.K.

Extraction of alumina from kaolin by means of sulfur
dioxide. P. P. BUDNIKOV AND I. I. RIVLIN. *Doklady*
Akad. Nauk S.S.S.R., 37 [3] 121–23 (1942).—Washed
clay (Vladimir) containing 83.34 kaolinite, 7.4 feldspar,
and 8.26% free quartz served as the raw material. Analysis
showed SiO_2 53.02, CaO 0.67, Al_2O_3 32.95, MgO 0.45,
Fe_2O_3 1.70% (loss on ignition 11.44%). The clay was cal-
cined at 700° and 800° and mixed with water; SO_2 was
passed through the mixture for 2 hr. while it was being
stirred in a vessel at 85° and atmospheric pressure. The
liquid was periodically decanted and the residue treated
with SO_2. By repeated leaching it was possible to extract
94.8% of the alumina in the kaolin of the sample calcined
at 700° and 95.4% from the kaolin of the sample calcined
at 800°. Insignificant amounts of Fe and small amounts of
silica were also extracted.

B.Z.K.

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GYPSUM—ITS INVESTIGATION AND USE (GIPS--EGO ISSLEDOVANIE I PRIMENENIE). 3d ed. P. P. Budnikov. Stroiizdat Narkomstroya, 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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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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Production of ammonium sulfate and Portland cement from a mixture of gypsum (anhydrite) and blast-furnace slag. P. P. Budnikov. *Zhur. Priklad. Khim.*, 16 [1 2] 7-9 (1943).—The mixture of blast-furnace slag and gypsum was wet-ground to pass sieves having 4900 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 SiO_2 23.73, Al_2O_3 3.47, Fe_2O_3 2.34, CaO 68.26, MgO 1.10, MnO 0.40, and SO_3 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.

B.Z.K.

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Isolation of S from a mixture of blast-furnace slag and anhydrite and manufacture of cement. P. P. Budnikov and I. I. Rivlin. *J. Applied Chem.* (U. S. S. R.) 16, 11-14 (1943)(English summary).—Isolation of S from molten basic blast-furnace slags by addn. of anhydrite, with and without air blowing, was studied. Anhydrite, 3-15%, was added at 1460-80°; by the use of air blowing, up to 80% S can be isolated. The residue, ground with anhydrite and dolomite, yields satisfactory cement. G. M. K.

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C

Separation of sulfur from a mixture of blast-furnace slag and anhydrite in the manufacture of cement. P. P. Budnikov and I. I. Rivlin. *Zhur. Priklad. Khim.*, 16, 11-14 (1943).—Basic blast-furnace slag (1.34% S and 1.21% SO_3) was molten at 1400° to 1480°, and 5 to 10% of anhydrite was added. The liberated SO_2 was separated from the molten mass by an air stream. Extraction of S was 80.6% with the addition of 8% anhydrite. The slag was ground with 5 to 10% anhydrite and 5% dolomite calcined at 900°. The slag anhydrite cement (1:3) showed a tensile strength of 30 kg./cm.² and a compressive strength of 300 kg./cm.² (water storage). The sulfide S in the slag was increased from the original 1.34% to 2.1%, and this improved the hydraulic properties of the basic blast-furnace slag. B. Z. K.

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Hydraulic cements from acid blast-furnace slags. P. P. Budnikov. *J. Applied Chem.* (U. S. S. R.) 16, No. 11/12, 337-44(1943); *Tsement* 10, No. 2/3, 3-8(1944).—A high-grade hydraulic cement was prod. from granulated, acid blast-furnace slag without adding portland cement. The ratio of CaO to $SiO_2 + Al_2O_3$ should not be less than 0.7 and the ratio of SiO_2 to Al_2O_3 not over 3.2; the MnO content should not exceed 3.5%. As activators for cement made from acid slags were used native or artificial anhydrite approx. 10 and dolomite calcined at 1100-50° 3-7%. The dolomite can be replaced by a corresponding quantity of MgO + CaO. Exptl. results and analyses are tabulated.

M. Hosch

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Hydraulic cement from acid blast-furnace slags. P. P. Budnikov. *J. Applied Chem.* (U.S.S.R.), 16, 337-41 (1943); *Brit. Abstracts*, 1945, March, BI, 102.—Acid slags having $CaO:(SiO_2 + Al_2O_3)$ not less than 0.7 and $SiO_2:Al_2O_3$ not less than 2.2 give, with 10% $CaSO_4$ and 1 to 3% CaO or 3 to 7% CaO + MgO (from dolomite at 1000° to 1150°), hydraulic cements of standard properties. Instead of CaO + MgO, Portland cement clinker can be used.

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No. 1

Problem of production of alite cement. P. P. Budnikov and M. I. Strelkov (Compt. rend. Acad. Sci. U.R.S.S., 1945, 48, [illegible]).—$3CaO.SiO_2$ (I) is most suitably prepared by first calcining a mixture to give $2CaO.SiO_2$ and then calcining this product with the additional required CaO (or $CaCO_3$) at 1400–1500°. The clinker of (I) is lighter (~1.5 times?) than Portland cement, is easily ground, hardens more rapidly than an Al_2O_3–CaO cement, and after 24 hr. has a compressive strength of 400 kg./cm.². The hydraulic [illegible] of (I) decreases with [illegible] of the clinker, which is increased by addition of $3CaO.Al_2O_3$ up to 10%. The best (I) clinker has a min. of admixtures. The [illegible] of the clinker increases with the reducing nature of the atm. of calcination. J. A. S.

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The problem of production of alite cement. P. P. Budnikov and M. I. Strelkov. *Doklady Akad. Nauk S. S. S. R.* 40, 25-6(1943); *Compt. rend. acad. sci. U. R. S. S.* 40, 20-1(1943)(in English).—Alite ($3CaO.SiO_2$) is obtained by first calcining a mixt. of CaO or $CaCO_3$ (I) and SiO_2 to form $2CaO.SiO_2$, then adding the requisite amt. of CaO or I and recalcining at 1450-1800° for 30-45 min. All materials should be finely ground. On admixing Al_2O_3 (II) in amts. up to 10% (calcd. as $CaO.Al_2O_3$) the caking capacity of the clinker and its hardness increased continuously, while the clinker's activity decreased. In the com. manuf. of alite clinker by double calcining, the amt. of such admixts. should be kept to a min. When calcining is carried out in a slightly reducing atm., factors favoring caking (e. g., admixt. of II or MgO) impart a green color to the clinker. J. W. Perry

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e

Production of magnesia from dolomite and its use in the manufacture of refractories. P. P. BUDNIKOV AND I. I. RIVLIN. *Compt. rend. acad. sci. U.R.S.S.*, 41, 210-12 (1943); abstracted in *Mineralog. Abs.*, 9 [5] 91 (1945).—Dolomite calcined at 1200°C. and treated with a saturated solution of NH_4Cl at ordinary temperature yielded MgO = 34.1% in the precipitate and 3.84% in the solution, with CaO = 7.72% in the precipitate and 50.50% in the solution. The product calcined at 1580°C. yielded a good forsterite refractory material. L.R.B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Budnikov, P. P., and Rivlin, I. L. PREPARATION OF
MAGNESIA FROM DOLOMITE AND ITS USE FOR PRODUCING
REFRACTORIES. *Doklady Akad. Nauk S.S.S.R.*, 41,
222-24 (1943); *Compt. rend. acad. sci. U.R.S.S.*, 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 sat
urated solution of NH_4Cl (II) at 15 to 18° for 1 hr. and filter
ing off the undissolved MgO. High calcination tempera-
ture 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 ($3MgO \cdot 2SiO_2 \cdot 2H_2O$) 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.

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No. 9,

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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(1943)(in English).—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 18 mm. In contrast, the semihydrate produced by calcining at 170° is mostly powdr. 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

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No. 9

Production of clinkerless cement with utilization of heat from molten blast-furnace slags for calcining of activating admixtures. P. P. Budnikov. *Compt. rend. acad. sci. U. R. S. S.* 41, 379-81 (1943) (in English).—Heat is conserved by using molten slag to calcine gypsum and dolomite to form slag activators. Tabulated data are given on the setting time and the tensile and compression strengths after 4, 7 and 28 days of setting of cements prepd. by combining 30% of an activator with 65% and 70%, resp., of various slags (Bessemer, open hearth and foundry) and 5% and 0% of gypsum. Retardation of setting rate and loss in strength were observed only after storing the cements for 3 months.

I. W. Perry

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Microcolorimetric determination of V in rocks, minerals and ores by means of benzidine. 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 benzidine in 10 *N* H_3PO_4, whereby an intense yellow coloration results, which can serve to detect V in diln. of 1:5,000,000. The effect of chromates and manganates is eliminated by the use of Mohr salt and $NaNO_2$. The sample is treated with H_3PO_4 alone or together with HF. G. M. K.

Determination of P in limestones 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 $KBrO_3$–KBr soln. G. M. Kosolapoff

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8C C-1

1008. [illegible] Phosphorus in Limestone by [illegible] P. [illegible] and S. C. [illegible] 1944, 17, [illegible]—[illegible]).— The de[illegible] of the combined 8-hydroxyquinoline (I) [illegible] to be accelerated (1—1½ hr. per determination) [illegible] the use of ethyl alcohol. Excess of (I) is determ[illegible]; the preheating necessary for complete formation of the complex P ppt. does not cause loss of (I). The procedure is described in detail.

V. B.

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C

Synthesis of high-strength dental silicate cement. P. P. BUDNIKOV AND I. G. GOL'DENBERG. *Zhur. Priklad. Khim.*, 17 [7-8] 417-21 (1944).—The basis for the dental cement was the charge containing calcined Al_2O_3 23.2, quartz sand 33.3, synthetic cryolite 36.0, and $CaHPO_4$ 7.5%. The charge was ground to pass a sieve of 10,000 openings/cm.² and calcined at 1350°. The smelted and granulated mass was mixed with a special liquid made by dissolving 8 parts of $Al(OH)_3$ and 9 parts of ZnO in 83 parts of boiling H_3PO_4. The cement has good adhesion, hardens completely in 15 to 20 min., and can be polished to give a lustrous surface; the luster, density, and translucence are not impaired after a 2-week immersion in saliva at 37°C. The cement compares favorably with the De-Trey (Swiss) silicate cement.

B.Z.K.

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The theory of solidification of sulfated slag cements. P. P. Budnikov and V. M. Lezhoev. *Compt. rend. acad. sci. U.R.S.S.* 45, 297-9; *Doklady Akad. Nauk S.S.S.R.* 45, 315-18(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 sulfoaluminate ($3CaO.Al_2O_3.3CaSO_4.30H_2O$) which forms in great quantities on solidification 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 sepn. process of Ca hydrosilicates (n $CaO.SiO_2.aq.$) and Ca hydroaluminate ($2CaO.Al_2O_3.7H_2O$), which is stimulated by the formation of sulfoaluminates. 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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Calcined gypsum and dolomite. P. P. Budnikov. U.S.S.R. 64,269, Jan. 31, 1945. Gypsum and dolomite are added to a ladle contg. molten slag at the time when the ladle is 3/4 full. The calcined product is skimmed off the surface of the slag.

M. Hosch

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18

Ammonium sulfate. P. P. Budnikov and K. F. Mukhin. U.S.S.R. 64,670, April 30, 1945. In the production of $(NH_4)_2SO_4$ from gypsum or anhydrite, the sepn. of $CaCO_3$ from $(NH_4)_2SO_4$ by filtration is facilitated by adding to the starting material a suitable quantity of blast-furnace slag, preferably granulated. The mixt. is wet-ground, and the ground product is treated with CO_2 and NH_3. The mixt. of $CaCO_3$ and slag left after filtration is fed into a rotary kiln to produce a *cement clinker*.

M. Hosch

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Dehydration of gypsum during its treatment with steam in an autoclave. P. P. BUDNIKOV, V. I. ENDOVITSKII, AND V. K. DALINKAL. *Sbornik Trudov, Nauch.-Issledovatel. Inst. Gipsovoi 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 $CaSO_4 \cdot 0.5H_2O$. Gypsum from the Artemovsk deposits in the Donets Basin was used, which analyzed SiO_2 1.61, Al_2O_3 0.21, Fe_2O_3 0.13, CaO 31.92, MgO 0.31, SO_3 46.85, 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.

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19

Ceramic stoneware from clays of Efreminsk deposit.—P. P. Budnikov and S. A. Berson. *Stekol'naya i Keram. Prom.* 1945, No. 1-2, 17-18.—Clays from the Efreminsk deposit analyze SiO_2 57.0-60.0, Al_2O_3 24.5-28.0, Fe_2O_3 0.1-3.2, CaO 0.6-1.8, MgO 0.4-2.6, alkali 0.5-1.9, and ignition loss 2.6-8.4%. The gray variety is plastic, has a refractoriness of 1630-1670° and sintering temp. of 1180°, and is suitable for making acid-resisting stoneware. Optimum charges can be prepd. from 50% clay and 50% grog or 65% clay and 35% grog; grog is obtained by calcining clay at about 900°. Optimum grain-size compn. of the grog is 1.5-1.0 mm. 30%, and 0.15-0.00 mm. 70%. Products fired at 1250° met requirements for normal acid-resisting brick and for Raschig rings.

B. Z. Kamich

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

A. E. S.

Dolomite and "sivash" solutions as sources of magnesium oxide. P. P. Budnikov. *Ogneupory*, **1945**, 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.

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Dolomite and "sivash" solutions as sources of magnesium oxide. P. P. Budnikov. *Ogneupory* 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 NH_4Cl. MgO thus obtained can be used for the manuf. of magnesium, magnesite, and forsterite refractories. M. V. Condoide

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C

Physicochemical processes occurring in the stabilization of dolomite with additions of Cr_2O_3. P. P. Budnikov. *Ogneupory*, 10 [11-12] 20-30 (1945). A review of the literature indicates the formation of a whole series of compounds of Cr and CaO when Cr_2O_3 is added to dolomite. Mixtures containing various proportions of CaO and Cr_2O_3 were prepared and fired; the free CaO was determined by the phenol method. The coefficient of binding of CaO by Cr_2O_3 in the case of dolomite is between $3CaO \cdot Cr_2O_3$ and $4CaO \cdot Cr_2O_3$. Microscopic studies were seriously hindered because of the coloration of the specimen by the Cr compounds and because of the lack of reliable optical constants for the compounds of Cr and CaO. Conditions of firing had no effect on the amount of free and reacted CaO. To raise the refractoriness of chrome dolomite clinker, it is necessary to add SiO_2 with the chromite. 24 references.

B.Z.K.

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Acidproof enamels on iron from available materials. P. P. Budnikov and I. G. Gol'denberg. *Khimicheskaya Prom.* 1945, No. 12, 14-15.—Of a no. of enamels tested the 2 that proved most satisfactory were: quartz sand 53.2, 57.0; feldspar 11.8, 10.8; calcined soda 21.0, 16.8; potash 3.0, 3.4; $CaCO_3$ 11.0, 10.0; ZnO 0.0, 2.0%, resp. The chem. compn. was: SiO_2 60.82, 70.20; Al_2O_3 2.25, 2.19; Na_2O 6.54, 10.75; K_2O 3.94, 3.72; CaO 17.90, 10.95; ZnO 0.0 and 2.19%, resp. The 2nd enamel (contg. ZnO) is not suitable for app. in which foods are treated. The m.p. of these enamels is 880-900°. They form colorless glasses adhering well to iron. Their resistance to boiling 20% HCl, 20% H_2SO_4, 30% HNO_3, 10% citric acid, and 10% AcOH was satisfactory. Thermal resistance was tested by heating enameled test pieces to 332° and then plunging them into tap water. The enamels withstood 15 changes (5 is the required no.). The mech. properties of the enamels were good.

M. Hosch

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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C

Role of calcium sulfoaluminate in the exothermal hardening of alumina cement. P. P. Budnikov and I. G. Gol'denberg. *Zhur. Priklad. Khim.*, 18 [1-2] 15-19 (1945).—Exothermal curves were obtained of ordinary alumina cement made from blast-furnace alumina slag and of the same cement with additions of anhydrite. Experiments were conducted at 15°C. under conditions of natural liberation of heat and at 65° to 70° and higher analogous to conditions existing in large concrete blocks. The results show that, for cement hardening at high temperatures, the anhydrite binds the $3CaO \cdot Al_2O_3 \cdot 6H_2O$ into useful products. The mechanical properties of the hardened cement were also improved. B.Z.K.

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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F A

12. CORROSION OF CONCRETE BY MINE AND COAL-WASHING WATERS AND SELECTION OF A MORE RESISTANT CEMENT. Budnikov, P. P. and Gusev, V. K. (J. Appl. Chem. (U.S.S.R.), 1945, 18, 474-82; Chem. Abstr., 1946, 40, 5541).

Examination of resistance of concrete to aggressive waters gave the following gradation of resistance (in descending order): clinkerless cement (90% blast-furnace slag, 5% $CaSO_4$, 5% calcined dolomite), slag-portland cement with 5% anhydrite, pozzuelana portland cement, portland cement. Extensive test results are given in table form.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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F

V

2844. EFFECT OF COAL ASH ENRICHED WITH LIME UPON HYDRATION OF INSOLUBLE ANHYDRITE. Budnikov, 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 "TEZ-cement", which contains 32-40% 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 TEZ-cement are mixed, the lime acting as a catalyst on the hydration of the anhydrite and the calcium sulphate stabilises the volume of the solidifying lime. The reactions involved are discussed. The resulting product is called AT-cement; optimal compression strength was 331 kg/cm^2 and tensile 24.5 kg/cm^2. The authors conclude that the At-cement has a wide application in construction work, and can be produced from local raw materials.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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3RD AND 4TH ORDERS

CA

/NO. 6

20

Effect of coal ash enriched with lime on hydration of insoluble anhydrite. P. P. Budnikov and Ya. M. Butt. *Compt. rend. acad. sci. U.R.S.S.* 48, 420-2(1945).—Coal ash enriched with lime accelerated the hydration of insol. anhydrite (I) and increased the strength and water resistance of the cement. When I was added to TEZ cement, made by burning powd. coal mixed with limestone (Kevesh and Yudovich, *C.A.* 33, 3790[7]) it greatly improved the qualities of the latter and prevented irregular variations in vol. When I was combined with lime-enriched ash a new binding material (called AT-cement) was obtained which may find wide application in rehabilitation work as it is obtained from local raw materials and burned fuel waste products.

Frank Gonet

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Effect of lime-enriched coal ash on the hydration of insoluble anhydrite. P. P. Budnikov and Ya. M. [illegible] *Compt. rend. acad. sci. U.R.S.S.* 48, [illegible] (1945).—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) 89 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.

1ST AND 2ND ORDERS

CA

PROCESSES AND PROPERTIES INDEX

19

Mullite refractory from a mixture of kaolin and alumina. P. P. Budnikov. *Compt. rend. acad. sci. U.R.S.S.* 49, 202-3(1945).—A mullitization process takes place when kaolinite is heated in the range of 950-1100° whereby silica is liberated in the form of cristobalite. $3(Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O) = 3(Al_2O_3 \cdot 2SiO_2) + 6H_2O$; $3(Al_2O_3 \cdot 2SiO_2) = 3Al_2O_3 \cdot 2SiO_2 + 4SiO_2$. 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, diaspore, 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. $Al_2O_3 \cdot 2SiO_2 + 2Al_2O_3 = 3Al_2O_3 \cdot 2SiO_2$. 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 briquets which were then burned at 1600, 1650, and 1670° for 2 hrs., given a petrographic investigation and quantitatively examd. for mullite with 20% H_2F_2. Microscopic examn. showed a homogeneous mass of mullite crystals. The amt. of crystals and the crystal formation were larger in the samples burned at 1670°. Burning temps. and percentages of mullite were: 1600°, 70.2; 1650°, 81.4; 1670°, 83.7. In addn. to mullite and silica glass, 6-10% corundum was always present. A 2-4% addn. of such substances as cryolite, fluorite, $MgCl_2$, P_2O_5, or B_2O_3 will lower the burning temp. so that the viscosity of the glass is decreased and the crystn. of the mullite accelerated. From a kaolin-alumina mixt. with 2% $MgCl_2$ added, a refractory was prepd. by using grains under 0.5 mm., 30%; from 0.5 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 5 cm., and burned at 1500°. Results showed that the mullite refractory prepd. from a mixt. of kaolin and silica is superior, as regards deformation under load, to both the ordinary refractory and kaolin refractory.

R. T. Ramsay

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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CS 3

973. MULLITE REFRACTORY FROM A MIXTURE OF KAOLIN AND ALUMINA.—P. P. Budnikov (*Comptes Rendus Acad. Sci. U.R.S.S.*, 84, 202, 1945). An intimate mixture of finely ground kaolin and alumina ($Al_2O_3 : SiO_2 = 3 : 2$) was made into briquettes which were then burned at 1,600°, 1,650°, and 1,670° C. for 2 hr. Their thin sections under the microscope showed a homogeneous mass of mullite crystals, with a certain amount of corundum (6–10%) and silica glass. The amount of the crystalline component was greater, and the crystals were larger, in the samples burnt at 1,670° C. Refractoriness-under-load tests at 2 kg/cm², showed deformation 100°–150° C. higher than for a semi-acid high quality refractory, an ordinary refractory, or a kaolin refractory.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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C

14

Technology of Ceramic Shapes (Tekhnologiya Keramicheskikh Izdelii). P. P. BUDNIKOV, A. S. BEREZHNOI, V. I. PEREVALOV, AND I. S. SMELYANSKII. Published by Gosstroiizdat, Moscow, 1946. 524 pp., 208 illustrations. Price 30.25 rubles. Reviewed in *Steklo i Keram.*, 5 [11] 23-24 (1948). Part I covers raw materials. Technological properties and the scientific basis are presented in the light of modern physicochemical views. Part II covers structural ceramics; Part III, stone-ceramic shapes, and Part IV, refractory shapes. Parts V and VI are limited to glazes and ceramic colors. Numerous errors in the book are pointed out. It is approved as a text for chemical-technological institutes and faculties by the Ministry of Higher Education.

B. Z. K.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

C A

20

Gypsum hemihydrate. P. P. Budnikov, B. K. Butkevich, and M. O. Yushkevich. U.S.S.R. 63,796, Feb. 28, 1940. The gypsum hemihydrate is obtained by cooking under pressure. To increase its strength, about 1% of alums, $MgSO_4$, or $Al_2(SO_4)_3$ is added to the gypsum.

M. Hosch

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

BUDNIKOV, P. P.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

High-strength plaster of Paris. P. P. Budnikov. U.S.S.R. 66,235, May 31, 1946. 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

1ST AND 2ND ORDERS — PROCESSES AND PROPERTIES INDEX — 3RD AND 4TH ORDERS

CA

20

Hydraulic cement. P. P. Budnikov and Yu. M. Butt. U.S.S.R. 66,238, May 31, 1946. The cement is a mixt. of anhyd. $CaSO_4$, ash resulting from the combustion of powd. coal, and ground limestone or dolomite.
M. Hosch

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CA

20

Slow-setting plaster of Paris. . . P. Budnikov and P. V. Lapshin. **U.S.S.R. 66,230**, May 31, 1946. The setting of gypsum is retarded by adding 5-15% of calcined hydraulic limestone or calcined dolomite, either before or during dehydration. Gypsum thus made begins to set after 8-20 min.

M. Hosch

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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3RD AND 4TH ORDERS

CA

20

Expanding cement. P. P. Budnikov. U.S.S.R. 66,240, May 31, 1946. Argillaceous cement or slag, dehydrated gypsum and quicklime are heated together under a pressure of 1.2-1.4 atm. with const. stirring, and the product is dried at atm. pressure with const. stirring.

M. Hosch

COMMON ELEMENTS

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ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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BUDNIKOV, P. P.

1ST AND 2ND ORDERS

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3RD AND 4TH ORDERS

High-strength plaster of Paris. P. P. Budnikov, P. V. Lapshin, and Ya. Yu. Rotberg. U.S.S.R. 66,330, May 31, 1946. Ground gypsum is treated with approx. 1% of mineral acid and then is heated under pressure.

M. Hosch

P. P. BUDNIKOV

PROCESSES AND PROPERTIES INDEX

C

White hydraulic binder for decorative purposes. P. 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 calcined kaolin. These constituents are added without calcining if waste product from the process of producing $AlCl_3$ from kaolin is used instead of calcined kaolin. M.Ha.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA BB CC DD EE

1ST AND 2ND ORDERS — 3RD AND 4TH ORDERS

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11·(3)·30

C

... ductor of the sulfate type. V. P.

1ST AND 2ND ORDERS

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3RD AND 4TH ORDERS

20

CA

Slow-setting gypsum. P. P. Budnikov. U.S.S.R. 67,572, Dec. 31, 1940. To ground gypsum is added 0.1-1.0% of the plant "Sheresh" belonging to the Liliaceae (*Eremurus* spp.) and the mixt. is cooked under water vapor pressure with stirring. M. Hosch

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

The Refractories Problem in Connection With the Use of Oxygen in the Steel Industry. I. I. Kitaigorodskii and P. P. Budnikov. Henry Brutcher (Altadena, Calif.), Translation No. 2081, 1948, 6 pages. Condensed from *Kislorod* (Oxygen), v. 3, no. 2-3, 1946, p. 29-31.

A general discussion of paper of above title by S. V. Glebov. Includes data on vitrified corundum and zircon cement refractories and refractories of zircon+chromium oxide+calcium oxide for tuyeres in oxygen-blown converters. Gives particulars on a new chrome-dolomite brick for basic O.H. furnaces; its manufacture, properties, and actual performance; test data on cased chrome-dolomite concrete, and on zircon brick, in O.H. furnaces; and details on manufacture of magnesia-spinel refractories and their properties.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

C

PREPARATION AND PROPERTIES OF -GYPSUM HEMIHYDRATE. P. P. Budnikov. Dopovidi Akad. Nauk U.R.S.R., 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 hydration and hardening, it is suggested that lime, TEZ cement, or sheresh (Eremyrus 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. Ceram. Abstracts, 1947, April, p. 82f.

B.Z.K.

METALLURGICAL LITERATURE CLASSIFICATION

F R

4525. CAUSES OF PREMATURE FAILURE OF REFRACTORY LININGS IN LOCOMOTIVE FIREBOXES. Budnikov, P. P. and Matveev, M. A. (Ogneupory, 1946, No.6, 23-5; Chem. Abstr., 1947, 41, 1074).

The causes are: poor installation, use of low grade materials, use of binders which are not suitable for the brick, too rapid drying after installation and mechanical shocks in service.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

Causes of premature destruction of refractory lining in locomotive fireboxes. P. P. Budnikov and M. A. Matveev. *Ogneupory*, 11 [6] 23-25 (1946). Causes of the premature destruction of the refractory lining in locomotive fireboxes are (1) faulty installation of arches, (2) use of low-grade refractories, (3) use of a binder having a different composition from that of the brick, (4) very rapid drying of the arches after installation, (5) leakage of connectors and tubes, and (6) strong jolts in service. The temperature curve of a fuel oil fired locomotive for a 20-hr. period shows sharp variations. Linings for locomotive fireboxes should have a refractoriness not lower than 1730°C. and also high resistance to thermal shock. Compressive strength should be not lower than 120 kg./cm.[2] Initial softening under a load of 2 kg./cm.[2] should be not lower than 1350°C. Additional shrinkage at 1400° should not be over 0.7%. B.Z.K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

2ND AND 4TH ORDERS

2

Reactions in solid phase in silicate systems. P. P. Budnikov and A. S. Berezhnoi. *Uspekhi Khim.* 15, 391-8(1946).—Critical review with 83 references up to 1944. N. Thon

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

B

22

Influence of "Mineralizers" on the Formation of Mullite in Clay, Kaolin, and Synthetic Compositions. (In Russian.) P. P. Budnikov and K. M. Shmukler. *Journal of Applied Chemistry* (U.S.S.R.), v. 19, nos. 10-11, 1946, p. 1029-1036.

The possibilities of manufacturing "mullitized" articles using the above materials, by means of heat treatment at about 1500°C., were investigated.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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C

Graphite-chamotte refractory for lining steel teeming ladles and the mechanism of its wear. P. P. Budnikov and L. A. Tseitlin. *Zhur. Priklad. Khim.*, 19 [1] 30-44 (1946).—A new graphite-grog refractory was compounded particularly for lining ladles used for Hadfield steel. The body was made up of graphite 20 to 30, grog 15 to 40, and clay 40%. Two types of graphite were tested, one from Kyshtyma and the other from Mariupol. The clay was Chasov-Yar, and the grog was made from the same clay. The chemical and size compositions of the components are given. The refractories were molded in a plastic and in a semidry state. The former method gave better results. The refractories were fired in saggers packed with coke at 1400° and kept at this temperature for 6 hr. A method was also worked out for firing without saggers; to prevent the burning off of the graphite the refractories were protected with the following glaze:

K_2O 0.198	Al_2O_3 0.623	SiO_2 4.95
MgO 0.235	Fe_2O_3 0.110	
CaO 0.567		

It comprised Konstantinov clay 80 and feldspar 20%. The properties of the refractories were as follows: total shrinkage 7.6 to 9.1%; apparent porosity 22.4 to 26.8%; true porosity 23.1 to 28.8%; volume weight 1.82 to 1.91; sp. gr. 2.447 to 2.558; coefficient of gas permeability, less than 0.1; abrasion loss 0.73 to 1.10 gm. per sq. cm.; shock resistance 22 changes; temperature of deformation under a load of 2 kg. per sq. cm., softening at 1400° to 1490° and 4% compression at 1480° to 1540°; thermal resistance above 1900°; heat conductivity 3.2 to 4.7 Cal. per m. °C hr. Ladle lining made of this refractory was superior to others commonly used. Generally, the quality of the refractories depended on the properties of the graphite, particularly its state of subdivision, and on its quantity. Free SiO_2 lowered the quality of the refractories. Most resistant were refractories made of Kyshtyma graphite (finer than the other) 30, grog 30, and clay 40%.

M. Ho

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R

F

1210. GRAPHITE-REFRACTORY CLAY LINNINGS OF STEEL CASTING BUCKETS AND THE MECHANISM OF THEIR WEAR. Budnikov, P. P. 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 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.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

Production of Cement with a High Alite Content. P. P. Budnikov and M. I. Strelkov. *Journal of Applied Chemistry* (U.S.S.R.), v. 19, no. 4, 1946, p. 341-347. (In Russian.)

Describes new method for the production of alite (tricalcium silicate) cement. The chief characteristic of this method is double calcination performed in a rotary furnace. First calcination is performed at about 900°C., the second, with addition of alumina and chalk, at 1500°C. Cement obtained is green in color and is characterized by very rapid solidification. Its compressive strength reaches 430 kg./cm².

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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CA

19

Effect of mineralizers on the formation of mullite in clays, kaolins, and synthetic masses. P. P. Budnikov and K. M. Shmukler. *J. Applied Chem.* (U.S.S.R.) 19, 1029-36(1946)(in Russian).—The amt. of mullite formed at 1000-1600° for 1, 3, and 18 hrs. was detd. by dissolving in 20% HF, by x-rays, and microscopically. With clays mullite formation becomes significant above 1000°; Kirov clay (SiO_2 44.06, Al_2O_3 38.77, Fe_2O_3 1.06, TiO_2 0.82, CaO 0.83) heated for 3 hrs. at 1100, 1200, 1500°, showed 31, 38, 47% mullite. At const. temp., the amt. of mullite $u = a \log \tau + b$, where τ = time in min., a and b are consts. depending on the temp.; the max. u reached was 7-15% below the theoretically possible max. (40-50%). Among the mineralizers investigated (feldspar, H_3BO_3, $BaCl_2$, $CuCl_2$, TiO_2, NH_4VO_3, $MgCl_2$, $MnSO_4$, $Fe(OH)_3$), addns. of 4% $MnSO_4$, 4% $CuCl_2$, 4% $MgCl_2$ proved most effective; in the latter case, 0% had less effect. The addn. lowers the temp. of the beginning of mullite formation by 100-200°. In mixts. of SiO_2 + Al_2O_3, held at the specified temp. 3 hrs., the formation of mullite was max. at all temps. in the presence of 2% MnO (4% $MnSO_4$); thus, in a mixt. of SiO_2 28.2, Al_2O_3 71.8, at 1300, 1400, 1500, 1600°, the residual corundum was 30-35, 15, 10, 5%, resp.; the order of decreasing effectiveness of mineralizer addns. was: at 1400°, 4% $MnSO_4$, 1% $MgCl_2$, 2% TiO_2, 4% CaF_2; at 1500°, 4% $MnSO_4$, 2% TiO_2, 4% Cr_2O_3, 4% $MgCl_2$, 4% $Fe(OH)_3$, 2% $CuCl_2$; at 1600°, 4% $MnSO_4$, 2% TiO_2, 4% $MgCl_2$, 4% LiCl.

N. Thon

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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.

Budnikov, P. P., and Tseitlin, L. A. GRAPHITE-CHAMOTTE REFRACTORY FOR LINING STEEL TEEMING LADLES AND THE MECHANISM OF ITS WEAR. *J. Applied Chem.* (U.S.S.R.), 19 [1] 40-44 (1946) — A new graphite grog refractory was compounded particularly for lining ladles used for Hadfield steel. The body was made up of graphite 20 to 30, grog 15 to 40, and clay 40%. Two types of graphite were tested, one from Kyshtyma and the other from Mariupol. The clay was Chasov-Yar, and the grog was made from the same clay. The chemical and size compositions of the components are given. The refractories were molded in a plastic and in a semidry state. The former method gave better results. The refractories were fired in saggers packed with coke at 1400° and kept at this temperature for 6 hr. A method was also worked out for firing without saggers; to prevent the burning off of the graphite the refractories were protected with the following glaze:

$$\left.\begin{matrix} K_2O & 0.198 \\ MgO & 0.236 \\ CaO & 0.567 \end{matrix}\right\} \quad \begin{matrix} Al_2O_3\ 0.625 \\ Fe_2O_3\ 0.116 \end{matrix} \quad \left\{ SiO_2\ 1.95 \right.$$

It comprised Konstantinov clay 80 and feldspar 20%. The properties of the refractories were as follows: total shrinkage 7.6 to 9.1%; apparent porosity 22.4 to 26.8%; true porosity 23.1 to 28.8%; volume weight 1.82 to 1.91; specific gravity 2.417 to 2.558; coefficient of gas permeability, less than 0.1; abrasion loss 0.73 to 1.10 gm./sq. cm.; shock resistance 22 changes; temperature of deformation under a load of 2 kg./sq. cm., softening at 1400° to 1490° and 4% compression at 1480° to 1510°; thermal resistance above 1900°; heat conductivity 3.2 to 4.7 Cal./m. °C. hr. Ladle lining made of this refractory was superior to others commonly used. Generally, the quality of the refractories depended on the properties of the graphite, particularly its state of subdivision, and on its quantity. Free SiO_2 lowered the quality of the refractories. Most resistant were refractories made of Kyshtyma graphite (finer than the other) 30, grog 30, and clay 40%.

PROCESSES AND PROPERTIES INDEX

C

Problem of obtaining cement with a high alite content P. P. Budnikov and M. I. Strelkov. *Zhur. Priklad Khim.*, 19 [4] 343–48 (1946). 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 900°; more chalk and alumina were added to the β-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.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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Ca

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Preparation of cement with high alite (tricalcium silicate) content. P. P. Budnikov and M. I. Strelkov. *J. Applied Chem.* (U.S.S.R.) 19, 343-8(1946).—By means of double calcining the authors prepd. cements with up to 95% content of tricalcium silicate in the clinker. The ingredients used were sand (99.8% SiO_2), chalk, and pure $CaCO_3$, which were finely ground and mixed in the ratio required for formation of tricalcium silicate, then calcined at 900°; the resulting calcium orthosilicate was recalcined at 1450-1500°. The cement thus formed hardens more rapidly than the standard alumina cement giving a higher flexure strength, while reaching a compression strength of 430 kg./sq. cm. in 24 hrs. The presence of tricalcium aluminate in this cement failed to improve its hydraulic properties further. The alite cement as produced has green color if calcining is done in reducing atm. The cement can be produced in rotating kilns. G. M. Kosolapoff

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

CHROME-DOLOMITE HIGH REFRACTORY CONCRETE AND BRICK. P.P. Budnikov. (Comptes Rendus (Doklady) de l'Académie 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.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

Chrome-dolomite high refractory concrete and brick. P. P. Budnikov. *Compt. Rend. Acad. Sci. U.R.S.S.*, 31 [8] 615-17 (1940).—The object of this investigation was to determine the ratio in which Cr_2O_3 and CaO combine in dolomite. Mixtures of 1 Cr_2O_3 with 2, 3, 4, 6, and 8 CaO were studied. The proportions in which the two were combined were between $3CaO \cdot Cr_2O_3$ and $4CaO \cdot Cr_2O_3$. In a mix calculated as $3CaO \cdot Cr_2O_3$ to which was added SiO_2, Al_2O_3, or Fe_2O_3, all of the CaO was combined. A mix calculated as $4CaO \cdot Cr_2O_3$ contained 1.06 to 4.06% free lime. On this basis a mix was made comprising dolomite 74, chromite 20, and quartzite 6%. The mix was briquetted and fired at 1800° to 1500°. The pulverized clinker had good hydraulic properties; setting began after 50 min. and was completed after 3 hr. 10 min. The compression strength of specimens made of this cement was 110, 130, and 205 kg. per sq. cm. after 4, 7, and 28 days, respectively. Brick were made of this cement without adding any bonding agents. The brick withstood temperatures above 1000°. Under a load of 2 kg. per sq. cm. deformation began at 1450° and failure occurred at 1500°. Tested for open-hearth and electric-furnace linings, chrome-dolomite refractories fully equaled magnesite and chrome-magnesite refractories. M. Ho.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

P. P. BUDNIKOV

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

COMMON ELEMENTS

CA

Setting time and strength of α-hemihydrated gypsum as affected by addition of Sheresh (Eremyrus spectabilis). P. P. Budnikov. *Compt. rend. acad. sci. U.R.S.S.* 52, 325-8(1940); 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

Brit. abs.

32-10 Building and Road Making Mat.

Setting time and strength of α-hemihydrated gypsum as affected by addition of shresh (*Eremyrus spectabilis*). P. P. Budnikov (*C. R. Acad. Sci. U.R.S.S.*, 1946, 51, 325—328).—The effect of the addition of 0·1—1·0% of a glue prepared from the roots of *Eremyrus spectabilis* and containing 27—33% of Ca arabiate on the rate of setting and ultimate compression of technical α-hemihydrated gypsum have been studied. The time of setting is increased. Up to 0·5% of glue increases the ultimate compression strength, but a fall occurs at higher concn.

O. D. SALTMARSH.

Corrosion of clinkerless slag cement by mineralised waters. P. P. Budnikov and V. R. Gusev (*Compt. rend. Acad. Sci. U.R.S.S.*, 1946, [illegible], 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 Na_2SO_4 better than does Portland cement (compression strength after 3 years reduced by 15·1 and 21%, respectively, as compared with immersion in H_2O; comparative vals. for Portland cement, 48·5 and 100%), but is not superior in regard to 10% aq. $MgCl_2$ and 10% aq. $MgSO_4$ (comparative vals. 38·0 and 100%, as against 42·9 and 100%).

S. A. M.

FA 21T16

USSR/Chemistry Sep 1946
Cement
Lime

"The Chemical Formula of the Limiting Content of Lime (CaO) in the Portland Cement Domain of a CaO-SiO_2-Al_2O_3-Fe_2O_3-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 21T16

USSR/Chemistry (Contd) Sep 1946
Cement
Lime

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

21T16

PROCESSES AND PROPERTIES INDEX

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CA

Formula of limit content of lime in the portland cement domain of the CaO-SiO_2-Al_2O_3-Fe_2O_3 MgO system.
P. P. Budnikov and M. I. Strelkov. *Compt. rend. acad. sci. U.R.S.S.* 53, 723-4(1946)(in English). The following formula was hypothetically derived: $CaO = 2.8\ SiO_2 + (Al_2O_3 - 0.64\ Fe_2O_3) + 1.4\ Fe_2O_3$. Ten exptl. clinkers showed that the CaO limit is $2.8\ SiO_2 + Al_2O_3 + 0.7\ Fe_2O_3$ when the Al_2O_3 modulus is above 2; and $2.8\ SiO_2 + 1.65\ Al_2O_3 + 0.35\ Fe_2O_3$ when the Al_2O_3 modulus is below 2.
E. A. W.

A S M - S L A METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

CA

6

Anhydrite cement. P. P. Budnikov and Yu. M. Butt. U.S.S.R. 69,294, Sept. 30, 1947. To increase the strength and hydraulic properties of anhydrite cement, natural or artificial anhydrite is mixed with 5-20% of TETs cement (power station cement) or its mixt. with granulated blast-furnace slag. M. Hosch

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000307310003-4"

Expanding cement. P. P. Budnikov. U.S.S.R. 69,600, Nov. 30, 1947. 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. Hosch

CA

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.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

B

22

PROCESSES AND PROPERTIES INDEX

*506. **Heat of Solution of Magnesium Oxide (Sintered Magnesite) Fired at High Temperatures.** (In Russian.) P. P. Budnikov. *Journal of Applied Chemistry* (U.S.S.R.), v. 20, no. 4, 1947, p. 319-326.

Shows that the amount of heat evolved on dissolving sintered magnesite in HCl depends upon the temperature of firing and is also increased by the presence of CaO in the magnesite. Describes use of diphenylmethane calorimeter to determine the approximate temperature of firing, from the heat evolved on solution in HCl.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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.

PROCESSES AND PROPERTIES INDEX

Resistance of Sulfated Alumina Cement to Chemical Attack. (In Russian.) P. P. Budnikov and I. G. Gol'denberg. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, Nov. 1947, p. 1155-1158.

Gives results of a study of the comparative resistances of ordinary alumina cement and, that to which $CaSO_4$ was added, on exposure to soft and to salt water. Data are tabulated and discussed. 13 ref.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Cement from calcium sulfate, ashes, and lime. P. P. Budnikov and Yu. M. Butt. *Streitel. Prom.* 25, No. 8, 21-3(1947)(in Russian).—Cements were compounded from lime, coal-dust ashes (SiO_2 49.50, Al_2O_3 37.42, Fe_2O_3 6.60, CaO 3.03, MgO 0.82, SO_3 1.14, ignition loss 1.42) and 3 modifications of $CaSO_4$ (made from natural gypsum, CaO 33.06, SO_3 46.01, Al_2O_3 + Fe_2O_3 0.52, H_2O 19.18, CO_2 0.47, insol. 1.02): (I) $CaSO_4.{}^1/_2H_2O$, 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% $CaSO_4$ (I, II, or III). With increasing content of I, the water requirement decreases (60, 55, 48%, resp.); it increases slightly with increasing amt. of II (36, 38, 40% H_2O) 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 $CaSO_4$ 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

PROCESSES AND PROPERTIES INDEX

Influence of sulfite cellulose lye on the properties of gypsum hemihydrate. P. P. Budnikov and Yu. M. Butt. *Doklady Akad. Nauk S.S.S.R.*, 56, 303-305 (1947); abstracted in *Chem. Zentr.*, 1948, I [17/18] 1048.—By adding 0.8% sulfite lye, the natural density of $CaSO_4 \cdot {}^1/_2H_2O$ is reduced from 60 to 47% without much change in the setting time. Tensile and bending strengths are increased by the addition, a maximum occurring at 0.5 to 1%. M.Ha

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

23

The influence of sulfite pulp liquors on the properties of gypsum hemihydrate. P. P. Budnikov and Yu. M. Butt (Mendeleev Inst. Chem. Technol., Moscow). *Compt. rend. acad. sci. U.R.S.S.* 56, 803-5(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 amts. of 0-0.5%. The addn. reduced the water demand of the gypsum, increased its hardness, and had no effect on the setting period.

M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000307310003-4"

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

Sulfated hydraulic slag cements. P. P. Budnikov. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1948, 423-32.—Granulated blast-furnace slags 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 3% lowers the hydraulic properties. The setting of slag cements can be efficiently 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 compds. formed in the interaction between slags and $CaSO_4$ in $Ca(OH)_2$ water, are: basic slag [(CaO + MgO)/(SiO_2 + Al_2O_3) = 1.04, SiO_2/Al_2O_3 1.27] $3CaO.Al_2O_3.3CaSO_4.H_2O$ + $2CaO.Al_2O_3.H_2O$ + 1.5 $CaO.SiO_2.H_2O$; acid slag [0.80, 1.72] $3CaO.Al_2O_3.3CaSO_4.H_2O$ + 1.22 $CaO.SiO_2.H_2O$. 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-$CaSO_4$ mixt.; this 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. (300 kg./sq. cm.) at about 0.50 g./l. CaO, 28 days under water, max. (300 kg./sq. cm.) at 0.5 g./l. Examples of prolonged tests: basic slag (SiO_2 35.51, Al_2O_3 8.01, Fe_2O_3 0.90, CaO 45.98, MgO 4.07, MnO 2.12, SO_3 0.56, S 2.31%) 90% + $CaSO_4$ (anhydrite) 5% + calcined dolomite 5%, compressive strength after 6 months and 3 years in fresh water, 284 and 324 kg./sq. cm.; in air, 303 and 408; in 10% NaCl, 267 and 275; in 10% Na_2SO_4, 272 and 250; after 1 year in 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., as against 80-90 cal./g. 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. Addn. 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, Fe_2O_3 0.34, CaO 47.30, Mg 1.21, Mn 1.80, CaS 2.30) 92% + $CaSO_4$ (anhydrite) 8%, after 12 yrs. under water, tensile strength 33.4, compressive strength 300 kg./sq. cm.; slag 90 + $CaSO_4$ 5 + $MgCO_3$ (fired) 5%, 41.4 and 500. In 1-year combined water and air tests, slag 92 + $CaSO_4$ 8%, 40.1 and 308; slag 91 + $CaSO_4$ 7 + chalk 2%, 52.8 and 338; slag 83 + $CaSO_4$ 7 + clinker 10%, 43.5 and 314; slag 90 + $CaSO_4$ 5 + $MgCO_3$ (fired) 5%, 41.5 and 300. Acid slags are less suitable for hydraulic cements than basic slags. However, satisfactory cements can be made from acid slags with addn. of $CaSO_4$ and either CaO + MgO or dolomite fired at not lower than 1000-1100°; example, slag (SiO_2 30.16, CaO 33.40, Al_2O_3 20.25, Fe_2O_3 1.20, MgO [illegible], MnO 3.95, SO_3 0.35, sulfide S 0.23) 80% + $CaSO_4$ (fired at [illegible]°) 15% + dolomite (fired at above 1000°) 5%, ground to 0.5-0.8% residue on a 900 mesh/sq. cm. sieve, after 3 months, tensile strength 33.3, compressive 408 kg./sq. cm.

N. Thon

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 slags 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.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

C

A. S. Berkman. P. P. Budnikov. *Steklo i Keram.*, 5 [5] 21-22 (1948).—Twenty-five years of scientific and engineering activities in the field of ceramics by A. S. Berkman are reviewed. B.Z.K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

22

B

The Spinels. Formation of Spinels and Similar Compounds at High Temperatures. (In Russian.) P. P. Budnikov and A. S. Berezhnoi. *Uspekhi Khimii* (Progress in Chemistry), v. 17, Sept.-Oct. 1948, p. 585-605.

A comprehensive review, including synthesis and properties. 108 ref.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

BUDNIKOV, P. P.

PA 64T1

USSR/Chemistry - Cement Jan 1948
Chemistry - Calcium Sulfate

"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.

[redacted]

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. Mendeleyev. Reports speeches made. Submitted 20 Nov 47.

[redacted]

11/49T33

BUDNIKOV, P. P. PA 11/49T3

USSR/Academy of Sciences Aug 48
Chemistry

"Twenty Years in the Institute of Physical Chemistry Imeni L. V. Pisarzhevskiy, Academy of Sciences, Ukrainian SSR," P. P. Budnikov, 2½ pp

"Zhur Priklad Khimii" Vol XXI, No 8

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

[redacted] 11/49T3

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

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

1.Diysniy chlen AN URSR (for Budnikov). 2.Ordena Lenina khimiko-tekhnologichniy institut imeni D.I.Mendeleyeva.
(Cathode ray tubes) (Silicates) (Aluminates)

BUDNIKOV, P. P.

PA 43/43T28

USSR/Geology
Clay
Gypsum

Feb 1948

"Gazha /TN: Mixture of Clay and Gypsum/ and Its Thermal Dissociation," P. P. Budnikov, Corr Mem, Acad Sci USSR, O. P. Mchedlav-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), Kirovobad, Lenkoran, Tauz (Azerbaydzhan SSR) and others. Tabulates percentage dissociation under different conditions.

[redacted] 43T28

P. P. BUDNIKOV

Thermal dissociation of "gazha." P. P. Budnikov and O. P. Mchedlov-Petrosyan. *Doklady Akad. Nauk S.S.S.R.* 59, 719-21(1948).—In the production of SO_3 and cement from "gazha" (a mixt. of lime, sand, gypsum, and related products), special attention must be paid to gazha contg. little gypsum. If the gypsum content is high (over 30% $CaSO_4$), a high temp. is required for thermal dissocn., but the removal of SO_2 is complete in 30-60 min. at 1100°.
H. K. Livingston

BUDNIKOV, P. P.

Gypsum clay and its thermal dissociation. P. P. Budnikov and O. P. Mchedlov-Petrosyan. Doklady Akad. Nauk S.S.S.R., 59 [4] 719-21 (1948).--Thermal dissociation tests were conducted with gypsum clay containing 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 SO_3 by heating at 1100°C. for 0.5 to 1 hr.; complete expulsion of SO_3 occurs from the melt. Gypsum clay having a low gypsum content should be utilized for making binders or SO_3.

B.Z.K.

PA 77T89

BUDNIKOV, P. P.

USSR/Minerals May 1948
Gypsum
Cement

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

"Dok Ak Nauk SSSR" Vol LX, No 4

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

[redacted] 77T89

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

C

Gypsum of the Stalinogorsk deposit. P. P. Budnikov. *Doklady Akad. Nauk S.S.S.R.*, 60 [4] 635-38 (1948).—Average analysis of the gypsum shows CaO 32.35, SO_3 42.61, SiO_2 and Al_2O_3 0.62, Fe_2O_3 0.30, MgO 0.79, and H_2O 19.16%. $CaSO_4 \cdot 2H_2O$ constitutes as high as 93.07% of the material; organic matter is 0.34% and CO_2 3.23%. Structural hemihydrate and molding gypsums were made in the laboratory by calcining at 170°C. In making an hydride 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 196 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 6.7% and 21.90% remained on sieves of 900 and 4900 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 1600 openings/cm.², and mixing with 2, 4, and 6% of a 35% solution of alum. Results are tabulated. B.Z.K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS PROCESSES AND PROPERTIES INDEX 3RD AND 4TH ORDERS

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Investigation of Stalingorsk plaster. P. P. Budnikov. *Doklady Akad. Nauk S.S.S.R.* 60, 635-6(1948).—The plaster of Stalingorsk is especially well suited for the production of building and molding plaster, anhydrite cements, and "Estrich Gips" (flooring plaster). The analyses of the natural raw special white cements. The analyses of the natural raw material show a content of 3.23% CO_2 and 0.34% org. material; it has a remarkable mech. strength and is grayish 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., *Gypsum and its Examination,* 1943). For anhydrite cements (cf. B. and Sorin, *The Anhydrite Cement,* 1947) the same raw material is calcined to 700-750°, finely ground, and 3% dolomite from Nikitowsk (calcined at 850°) is added as a catalyst for hardening. The mech. strengths produced are well above the standards for air-cured samples. For the production of flooring plaster (cf. Volzhenskii, *The Estrich 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. Blinzon, *Special Plaster Products of Highest Strengths in Architecture,* 1940) by firing in an oil-fired industrial muffle furnace at 550 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 examn. results are excellent for this calcined product after an addn. of 2-6% alum, corresponding to the famous English "Keene's cement."

W. Eitel

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

BUDNIKOV, P. P.

Sulfoaluminate as a positive factor in preparing expanding cement. P. P. Budnikov and Z. S. Kosyreva. *Doklady Akad. Nauk S.S.S.R.*, 61 [4] 681–84 (1948).—Swelling of sulfoaluminate 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 sulfoaluminate formed is small, and the strength of the cement is not impaired. When the CaO content is over 1.08 gm./liter, the Ca aluminates do not dissolve and the cement acquires the characteristic of swelling due to the formation of Ca sulfoaluminate from the reaction of solid Ca aluminates with the 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: $3(2CaO \cdot Al_2O_3 \cdot 7H_2O) + 6CaSO_4 \cdot 2H_2O + aq = (3CaO \cdot Al_2O_3 \cdot 3CaSO_4 \cdot aq) + Al_2O_3 \cdot aq$. The difficultly soluble crystals of Ca sulfoaluminate thus formed gradually expand the cement in the colloidal medium of hydrated Ca silicates and aluminates. The formation of inner destructive stresses in the hardened cement does not take place because the formation of the sulfoaluminate occurs not through the reaction of $4CaO \cdot Al_2O_3 \cdot 12H_2O$ with gypsum but mostly through reaction of the latter with $2CaO \cdot Al_2O_3 \cdot 7H_2O$. Optimum compositions of expanding products are (1) kaolin (calcined at 800°) 26%, lime 43%, Portland cement 31%; and (2) kaolin (800°) 35% and lime 65%. The optimum addition of the expanding product is 5 to 10%. This will produce a 0.17 to 0.19% expansion of the hardened Portland cement; a greater percentage reduces the strength. Cement containing the expansion product and 1% $CaCl_2$ 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.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

…Stalinogorsk deposit. P. P. Budnikov, *Doklady*

P. P. BUDNIKOV

PROCESSES AND PROPERTIES INDEX

COMMON ELEMENTS

C.A.

Sulfoaluminate as an essential factor in the production of expanding cements. P. P. Budnikov and Z. S. Kosyreva. *Doklady Akad. Nauk U.S.S.R.* 61, 681-4(1948).— The generally known expansion effect in hardening cements and concretes accompanying the formation of $3CaO.Al_2O_3.3CaSO_4.31H_2O$, by the reaction of excess gypsum, or by $CaSO_4$ dissolved in industrial waters, etc., with the basic Ca aluminates, e.g. with $4CaO.Al_2O_3.13H_2O$, 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[9]) 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

OPEN
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Reaction in Solid Phases (Reaktsiya v tverdykh fazakh) P. P. Budnikov and A. S. Berezhnoi. Published by Promstroizdat, Moscow, U.S.S.R., 1949. 88 pp. Price 5.65 roubles. The book sets forth information on reactions in solid phases, describes polymorphous changes of some oxides which are of importance in ceramics and the formation of solid solutions, and considers the formation of spinelides.

B. Z. K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

GINZBURG, D.B., diktor 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.; PANOVA, L., tekhn. red.

[Furnaces and drying apparatus for the silicate industry] Pechi i sushila silikatnoi promyshlennosti. Pod red. P.P.Budnikova. Moskva, Gos. izd-vo lit-ry po stroit. materialam, 1949. 483 p.
(MIRA 15:1)

1. Deystvitel'nyy chlen AN USSR (for Budnikova).
(Kilns)

BUDNIKOV, P. P. I BIYU... , L. M.

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K. Voprosu O Styeklokyeramikye. (V svyazi so Stat'yey V. V. Goncharova "O Styeklokyeramikye Kak Ognyeupornom Matyerialye" V Zhurn. "Ognyeupory". 1949, No 4) Ognyeupory, 1949, No 9, C. 393-97, -- Bibliogr: 9 Nazv.

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