in the body; this gives the grog particles some freedom of
displacement in the firing of the brick. (2) As binder, a
clay having a thermal contraction similar to that of the
clay should be used for grog. This prevents the rise of
strains in the fired product. (3) A coarse-grained grog
should be used of a size that still insures the required ten-
sile strength. In the preparation of the body for plastic
molding it is advisable to eliminate the use of a pugmill.
The slag resistance is increased by passing the body 2 or 3
times through an auger machine. Wherever possible,
it is advisable to use all the clay in the form of a slip.
To the slip are first added the small and then the larger
fractions, with constant mixing. For semidry pressing
it is advisable to moisten the grog with a clay slip using a
suspension containing about 15% clay. For heat-re-
sistant brick a grog of 6 to 7 mm. size and the use of moder-
ate pressures are preferred. If at the same time the
brick is required to be slag resistant, it is preferable to use a
smaller size grog, e.g., 3 mm., containing 45 to 50% of
material smaller than 0.5 mm. The pressure in this case
should be higher. Following these conclusions brick were
prepared from Latninsk and from Chasov-Yar clays. The
brick was made of 85% grog and 15% clay, the latter
supplied in the form of a slip. The moisture content of
the body was 18 to 20%. The upper size of the grog was
10 to 15 mm. The brick was semidry pressed under 150
kg. per cm.². The properties of the products from the
Latninsk and Chasov-Yar clays were, respectively, poros-
ity (%), 12 to 14 and 7 to 10; volume weight in gm. per
cc., 2.29 to 2.32 and 2.22 to 2.25; resistance to compres-
sion in kg. per cm.², 376 to 388 and 600 to 1200; thermal
resistance (thermal shocks determined according to
standard 3267), 12 to 17 and 12 to 35; and slag corrosion
(cc. determined according to standard 3270), 172 to 202
and 157.

M. Ho.

KELER, E. K.

Keler, E. K. TESTING REFRACTORY MATERIALS FOR TWIST. *Ogneupory*, 11 [3] 31–37 (1946).—A brief description is given of an apparatus, equipped with a platinum furnace, for testing refractory materials for twist. Diagrams give the deformation for the following cases: (1) constant load, even and continuous rise in temperature; (2) constant load, stepwise rise in temperature; and (3) variable load, stepwise rise in temperature. From the shape of the curves it is assumed that quartz acquires great mobility only for a short period of time while there is a regrouping of the atoms in its crystalline lattice. If the body is strained toward deformation at that moment (about 575°C.), there is considerable displacement of the particles. If the body is heated in the free condition above the critical temperature, the crystalline lattice of the α-quartz acquires stability, and additional deformation does not take place under load (at, e.g., 600°C.). Tests were also made with specimens during both rising and falling temperatures. For the interval 900° to 330°C. the cooling and heating curves almost coincide, but for the interval 330° to 320°C., the process is apparently different. The angle of twist of the specimen in the cold state, determined before and after heating, was the same; the elastic properties of the body, therefore, were not changed during the experiment. Considerable increase in the elasticity of the body during the period of enantiotropic recrystallization of the tridymite and cristobalite (to 300°C.) is accompanied by subsequent consolidation, as a result of which the body reaches (at 700°) its initial rigidity. From 900° on, plastic deformation starts and develops rapidly with increasing temperature. When testing under variable loads and stepwise increases in temperature, the deformation curve has a different shape. From room temperature up to 700°C. there is uninterrupted consolidation of the body. There was no increase in elasticity within the interval 200° to 300°. Above 900°C. plastic deformation was less noticeable.

KELER, E. K.

R

Keler, E. K., and Abramova, V. N. IMPROVING THE PROPERTIES OF GROG PRODUCTS SUITABLE FOR LINING THE SHAFTS OF BLAST FURNACES. *Ogneupory*, 11 [4-5] 18-30 (1946).—Brief accounts are given of research activities at the Leningrad Institute of Refractories to develop methods of testing the abrasion and impact resistance of blast-furnace refractories. The effects of existing Russian methods of manufacture on these two characteristics were also investigated. Two variations of brick manufacture are outlined. One method utilizes Chasov-Yar clay PK to produce brick suitable for lining the upper two-thirds section of the shaft, and the other method uses Latninsk clays (Grade 1) for the lower one-third section. The specifications for brick for the lower section are as follows: (*a*) $Al_2O_3 + TiO_2$ not lower than 30%, (*b*) refractoriness not below 1730°C., (*c*) volume porosity not over 12%, (*d*) gas absorption not over 0.2%, (*e*) compressive strength not less than 400 kg./cm.^{2}, and (*f*) abrasion (Bauschinger) not over 0.10 gm./cm.^{2}; for brick of the upper section the respective values were (*a*) not lower than 24%, (*b*) not below 1630°C., (*c*) not over 10%, (*d*) not over 0.3, (*e*) not less than 400 kg./cm.^{2}, and (*f*) not over 0.10 gm./cm.^{2}

KELER, E..K.

AUTHOR INDEX

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Keler, E. K. METHODS OF DETERMINING ADDITIONAL SHRINKAGE AND ADDITIONAL GROWTH OF REFRACTORIES. *Ogneupory*, 11 [7-8] 23-27 (1946).—K. reports on work started in 1940 at the Institute of Refractories (Leningrad) to refine the methods for determining reheat shrinkage and expansion which was never finished. For most refractories, constancy is obtained after 3 hr. at the final temperature; for chrome-magnesites the dimensions continued to increase during the 3-hr. test so that additional investigation is required to determine the limit. Linear measurement of the brick was found unsatisfactory because of uneven changes of the brick. Determination of volume shrinkage by hydrostatic weighing in mercury was also found unsatisfactory. The volume was determined with sufficient accuracy by hydrostatic weighing in water after a 10-min. saturation with water.

1ST AND 2ND GROUPS

3RD AND 4TH GROUPS

PROCESSES AND PROPERTIES INDEX

C

REFRACTORIES FROM BOROVICHI HIGH-ALUMINA CLAYS FOR HIGH-PRESSURE BOILER FIREBOXES. E. K. Keler. Ogneupory, 12 [10] 461-67 (1947). — Brink were made from (1) clay analysing SiO_2 43.25, TiO_2 2.24, Al_2O_3 38.74, Fe_2O_3 1.17, CaO 0.12, MgO 0.43, SO_3 0.50, K_2O 0.22, Na_2O 0.40, and ignition loss 13.79% and (2) grog made from the above clay at 800°, 1320°, and 1450° C. Clay analysing SiO_2 45.02, TiO_2 Al_2O_3 37.86, Fe_2O_3 2.34, and ignition loss 13.12% was used as binder. Brick were made by plastic molding and by semidry pressing and fired at 1380° and 1450°. The refractoriness of all shapes ranged from 1770° to 1730°. Grog made at 1450° offers no advantages compared with that made at 1320°; at temperature of 1450° is recommended only in those cases in which the brick must have a high dimensional accuracy (constancy). Grog made at 800° C. increases the density and strength of the brick considerably and lowers the thermal stability a little. Semidry pressing is preferred to the plastic method as far as all

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION properties of the brick are concerned. Firing should be conducted at 1380° to 1410°. Firing at 1450° has no advantages as far as porosity, strength, and thermal stability are concerned, but it increases stability under load and improves the reheat shrinkage somewhat. Firing at 1450° is recommended only in those cases in which constant volume and stability under load are of primary importance. Optimum properties are obtainable with (1) a plastic mix of 40% clay and 60% grog made at 1320° and with a grain size up to 5mm. and (2) a semidry mix of 40% clay and 60% grog made at 1320° and with a grain size up to 4 mm. Maximum slag resistance is obtainable with a semidry mix of 30% clay and 70% grog made at 800° and with a grain size up to 4 mm.

B.Z.K.

KELER, E.K.

Keler, E.K. "Methods of determining the thermal properties of ceramic raw material," in symposium: Syr'yevyye resursy tonkokeram. prom-sti SSSR i puti ikh ispol'zovaniya, Moscow-Leningrad, 1948, p. 103-13

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

KELER, E. K., Prof.

Dr. Technical Sci.

"The technical testing of refractory meterials"

Ogneupory, No. 4, 1948

1ST AND 2ND DEGREE

PROCESSES AND PROPERTIES INDEX

e

7

Thermomechanical Properties of Aluminosilicate Refractories (Termomekhanicheskie svoistva alyumosilikatnykh ogneuporov). B. K. Keller. Published by Metallurgizdat, Moscow, 1949. 184 pp., illustrated. Reviewed in *Ogneupory*, 15 [8] 381-83 (1950).—Most of the book dwells upon refractories represented by 8 compositions, starting with semiacid products containing 87 and 92% SiO_2 and ending with high-alumina products (77 and 87% Al_2O_3). Of the 8 compositions, 4 are semiacid materials. The particularly important and large group of fire-clay products is represented by only one composition. A wide range of high-alumina products is represented by 3 compositions containing 61 to 83% Al_2O_3. A special section describes the influence of various production factors on thermomechanical properties; this section is based on published material, some of which is rather limited and not up to date. In general, the book should be of great interest to both producers and users of refractories. It can serve as a reference source in developing refractories of definite characteristics; in this respect, however, it is necessary to take into account the fine-grained structure of the products and also the very high porosity of some of them. B.Z.K.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

MATERIALS INDEX

KELER, E. K.

183T59

USSR/Engineering - Refractories, Raw Material Jun 51

"Thermal Characteristic of Fire Clays," Prof E. K. Keler, Dr Tech Sci, Z. I. Veselova, Sr Engr, Leningrad Inst of Refractories

"Ogneupory" No 6, pp 249-257

Study of clays from 23 major USSR deposits shows only 2 basic mineral types: kaolins and hydromica or monothermic type. Intermediate types are mixts of the 2. Complex thermal anal, conducted as single expt on one working shift, gives complete behavior

LC 183T59

USSR/Engineering - Refractories, Raw Material (Contd) Jun 51

characteristic of material on heating, aiding efficient use of raw materials and correct burning of refractories.

LC 183T59

KELLER, E. K.

USSR/Engineering - Foundry, Equipment Dec 51

"Concerning Standardization of Technical Requirements on Steel Pouring Equipment," Prof E. K. Keller, Dr Tech Sci, M. N. Bluvshteyn, Cand Tech Sci, Leningrad Inst of Refractories

"Ogneupory" No 12, pp 531-539

States insufficient attention to standardization of special refractories and discusses following subjects: nonmetallic inclusions in steels in connection with pouring equipment and chem compn of refractories; relations among various properties of pouring equipment and standardization of its

198T19

USSR/Engineering - Foundry, Equipment (Contd) Dec 51

operational qualities; testing method securing correct evaluation of quality of pouring equipment according to basic requirements of metallurgy.

198T19

C. A.

19

Thermal characteristics of refractory clays. B. K. Keller and Z. I. Veselova (Leningrad Inst. Refractories). *Ogneupory* 16, 240-57(1951).—Tabulated and graphical results of differential thermal analyses of clays and kaolins from 23 important deposits in the Soviet Union are given. Results indicate the existence of only 2 basic mineralogical types: kaolinite clays and hydromicaceous ("monothermite") clays. Intermediate-type clays consist apparently of mixts. of these 2. An endothermal effect for all clays was noted at 610-660°. The first exothermal effect for most clays was observed at 920-940°, for kaolins at 950-970°. A second endothermal effect for kaolins was noted at 1250° and for micaceous low-sintering clays at 1140-1180°. A third (exothermal) effect was noted in only 13 of the 23 materials tested. Thermograms were also obtained of kaolin-clay mixts. With increasing clay content, the endothermal effect decreased (from 158° to 50°) and the peak shifted from 600° for kaolin to 580° for clay. The first kaolinite exothermal effect also decreased steadily (from 110° to 14°); its position was analogous to that of kaolin (970°) and only pure clay showed a small effect at 930°. The second exothermal effect was noted for all samples; its magnitude decreased gradually from clay to kaolin (from 13° to 3°). Addn. of 25% clay did not change its position (1250°); further addn. of clay caused at first a sharp and then a gradual drop in temp. of this effect (to 1140° for clay). Addn. of clay caused distinct and consistent changes in the shrinkage curves of kaolins analogous to changes in the thermograms. Shrinkage during dehydration disappeared gradually and the magnitude and intensity of shrinkage during the first exothermal effect decreased gradually. The initial temps. of sintering were gradually reduced. B. Z. K.

Refractories

BCS

1378. The problem of technical requirements for the standardisation of steel-plant accessories.—E. K. KELLER and M. N. BLUVSHTEYN (*Ogneupory*, 16, 531, 1951). Contradictory statements in the literature on the causes of non-metallic inclusions in steel and the relative merits of siliceous and fireclay runner bricks are discussed. Extensive expts. with grog products showed that thermal stability is not related in any simple manner with porosity, crushing strength, permeability, or Al_2O_3 content. Data are tabulated to show the relationship between the thermal stability and other properties of fireclay products. More expts. are required for the standardisation of the thermal stability, but for the time being the following tests are recommended: (1) 9 samples of runner bricks (3 from each consignment) are tested by the method of the Leningrad Refractories Institute (heating of runners from inside). The time taken by water to penetrate through the cracks formed should be not less than 25 sec. Samples from the 4 main Russian suppliers show values of 90, 78, 71 and 30 sec. (another plant gives 15 sec.). (2) 3 sleeves (one of each of 3 consignments) are dried at 110° C., cooled to room temp. and then suddenly heated (by placing into a hot furnace) to 800° C. The specimens should not be cracked to the extent that they can be pulled apart in the hands. (2 tables.)

KELLER, E. K., Prof.

USSR/Engineering - Refractories, Testing Apr 52

"Standard Equipment for Testing Refractories Under Load at High Temperatures," Prof E.K. Keller, Dr Tech Sci, Leningrad Inst of Refractories

"Ogneupory" No 4, pp 169-172

Testing equipment, designed at Inst of Refractories in 1948, essentially consists of elec Kryptol furnace, loading system and reading device and permits tests at temp up to 1,750°, but, after replacing ordinary corundum tube in furnace by magnesite or high-alumina tube, testing temp may be increased to 1,860-1,900°. Loads on specimens vary from 0.1 to 1.0 kg/sq cm.

220T38

KELER, E.K.; GODINA, N.A.

Interaction in solid phases of zirconium dioxide with magnesium oxide, calcium and barium. Ogneupory 18 no.9:416-426 '53.
(MIRA 11:10)

1.Institut khimii silikatov AN SSSR.
(Zirconium oxides) (Chemical reactions)

1. KELER, E. K., LEONOV, A. I.

2. USSR (600)

4. Kaolin

7. Behavior of kaolin on heating. Usp. khim. 22 no. 3 1953

9. Monthly List of Russian Accessions, Library of Congress, June 1953, Uncl.

KELER E K.

[illegible] 83.2 mm. long and 12 mm. in diam., is placed in a ceramic cup 150 mm. high and 40 mm. inside diam. The junctions of a simple and a differential thermocouple are located inside the cup. A similar sample of inert material (Al_2O_3) is also placed inside the cup. Corundum or porcelain wts. are placed on top of the sample, and dimensional changes are photographically recorded. The loss in wt. is also recorded by suspending a similar sample outside the oven, balancing the 2 samples, and recording the deviations by means of a mirror suspended on the axis. Recorded curves of change [illegible]

USSR

6 2

The existence of kaolinite anhydride [illegible] K. [illegible] A. I. Lasnov. *Doklady* [illegible] (1954). From tests run on [illegible] allophanoid (II) it was concluded that no anhydrate compd. of definite compn. corresponding to kaolinite anhydride existed. II, prepd. from Al(NO$_3$)$_3$ and Na silicate with subsequent removal of Na$_2$O by electrodialysis, showed differential soly. of the Al$_2$O$_3$ and SiO$_2$ constituents in [illegible] 5% NaOH + 5% K$_2$CO$_3$ (III). This difference decreased with the temp. to which II was heated [illegible] a mech. screening effect assocd. with [illegible] decreased porosity. Similar explanations account for the behavior of I. Above 900°, alumina soly. in III falls rapidly because of recrystn. to form γ-Al$_2$O$_3$. C. H. Fuchsman

KELER, E.K., doktor tekhn.nauk; VESELOVA, Z.I., starshiy inzh.-issledovatel'

Device for continuous observation of additional shrinkage processes in refractory materials. Ogneupory 19 no.1:30-34 '54. (MIRA 11:8)

1.Leningradskiy institut ogneuporov.
(Refractory materials) (Measuring instruments)

KELER, E.K., doktor tekhn.nauk, prof.

"Technical control in the manufacture of refractories" K.K. Strelov. Reviewed by E. K. Keler. Ogneupory 19 no.2:93-94 '54. (MIRA 11:8)
(Refractory materials--Quality control)
(Strelov, K.K.)

Keler E. K.

3000

✓ **New data on mechanical characteristics of coke-oven Dinas.** E. K. KELER AND M. N. BLEVSHTEIN. *Ogneupory*, 20 [1] 28–30 (1955).—At 20° to 200°C. there is a sharp drop in crushing strength, at 200° to 800°, it increases, and above 800° to 1000° it drops substantially. Wear resistance drops at 20° to 200° by an average of 30%; it increases above 200° to 500°, and at 800° it exceeds the value at room temperature by 0% (avg.). At 80–90° to 120–170° the angle of twist increases sharply, approximately twice. At 200° to 250° strengthening starts, and at about 500° the angle of twist is again the same as at room temperature. Rise to 1200° shows no change. At 120° to 250° there was a sharp drop in modulus of shear due to the inversion of tridymite and cristobalite; above inversion temperatures, there was a strengthening. Calculations of heat stability show that the most dangerous interval for spalling is 100° to [illegible]. Equipment and procedures are described. — B.Z.K.

MT

MT

①

PM

USSR/Chemistry - Silicates

Card 1/1 Pub. 22 - 20/45

Authors : Keler, E. K., and Godina, N. A.

Title : Mechanism of formation of solid solutions in the Zr O_2-CaO system

Periodical : Dok. AN SSSR 103/2, 247-250, Jul 11, 1955

Abstract : The reactions occurring between ZrO_2 and CaO during heating were investigated. The formation of zirconate as an intermediate phase during the formation of solid solutions in the ZrO_2-CaO system is explained. It is shown that the reaction mechanism leading to the formation of solid solutions is due to the fact that calcium oxide is more active than zirconium dioxide and assumes the role of a so-called covering reagent. The conditions leading to the formation of solid solutions are discussed. Nine references: 5 Germ, 2 USSR and 2 USA (1929-1953). Graphs.

Institution : Acad. of Sc., USSR, Inst. of Chem. of Silicates

Presented by : Academician S. I. Vol'fkovich, February 19, 1955

KELER, E.K.

USSR/Chemical Technology. Chemical Products and Their Application - Silicates. Glass. Ceramics. Binders. I-9

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 12577

Author : Keler E.K., Kozlovskaya Ye.I., Nosikov O.V.

Title : Determination of Resilient Properties of Glass and Fine Ceramics by the Ultrasonic Impulse Method

Orig Pub : Steklo i keramika, 1956, No 5, 7-13

Abstract : Investigations of the resilient properties of glass and fine ceramics have been carried out by the ultrasonic method developed by S.Ya. Sokolov, which is based on periodic emission of short ultrasonic impulses and their subsequent reception after passage over a given distance within the specimen. In the determinations is registered the time t during which the ultrasound covers the distance S, and propagation velocity of the ultrasound is determined. By means of suitable formulas a determination is made of the displacement modulus G, elasticity

Card 1/3

. KELER, E.K.

USSR /Chemical Technology. Chemical Products and Their Application I-12

Silicates. Glass. Ceramics. Binders.

Abs Jour: Referat Zhur - Khimiya, No 9, 1957, 31577

Author : Keler E.K., Bluvshteyn M.N.

Title : Study of Elastic Deformations of Chromomagnesite Refractories by the Method of Torsion at Room Temperature and at High Temperatures

Orig Pub: Ogneupory, 1956, No 5, 217-221

Abstract: Determinations were made of modulus of elasticity in shear G, at temperatures of 20, 300, 600, 900, 1100 and 1200°, and spring-back at the same temperatures, during 15 minutes, on application and removal of load bearing upon the samples (procedure used, see RZhMekh, 1955, 5851). The deter-

Card 1/3

USSR /Chemical Technology. Chemical Products and Their Application

Silicates. Glass. Ceramics. Binders.

Abs Jour: Referat Zhur - Khimiya, No 9, 1957, 31577

minations were carried out with bricks of the following grades: magnesite, 3 chromomagnesite ordinary, 2 bricks for vaults and 2 magnesite-chromite for vaults. In the case of magnesite brick the G remains practically unchanged on heating up to 1200°, while in chromomagnesite it increases with temperature, and in the case of the thermostable vault bricks G undergoes a gradual decrease with rising temperature. The spring-back of different grades of refractories is also different. Determinations were made of σ shear, linear expansion coefficient and thermal stability of the refractories was calculated and compared with the experimental (on

Card 2/3

Card 3/3

[illegible]

КЕЛЕР, Е. К.

Category: USSR / Physical Chemistry - Kinetics. Combustion.
Explosives. Topochemistry. Catalysis. B-9

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 30039

Author : Keler E. K., Glushkova V. B.
Inst : not given
Title : Conditions of Formation of Barium Silicates

Orig Pub: Zh. neorgan. khimii, 1956, 1, No 10, 2283-2293

Abstract: By means of thermal, chemical, x-ray diffraction and microscopic methods of analysis, it was ascertained that on heating of mixtures of different composition, of the system $BaCo_3$ (I) - SiO_2 (II), regardless of the composition of the initial mixture, the interaction between I and II begins only at 700°, with formation of barium metasilicate (III). At temperatures of 800° and above, barium orthosilicate (IV) is formed. In mixtures containing much I, at about 1000°, is formed, in addition to IV, also tribarium silicate. In mixtures containing much II, formation of III is observed only

Card : 1/2

Category: USSR / Physical Chemistry - Kinetics. Combustion.
Explosives. Topochemistry. Catalysis. B-9

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 30039

above 1100°. Formation of $Ba_2Si_3O_8$ and $BaSi_2O_5$ by reactions in the solid phase, does not occur. It was found that decrease in volume of samples of I, which is noted at 600-800°, is due to decrease in porosity as a result of collective crystallization, and not to a polymorphous transformation. Increase in volume of samples of I and II at 1000-1200°, is due to increase in porosity of the samples, as a result of "swelling" of emitted CO_2 in the presence of liquid phase, and due to the fact that the reaction products have a larger molecular volume than the initial substances.

Card : 2/2

KELER, E. K.

✓Interactions of cerium dioxide with oxides of the alkaline-earth metals. E. K. Keler, N. A. Godina, and A. M. Kalinina. *Zhur. Neorgan. Khim.*, 1 [11] 2550-60 (1956).—Cerates of the alkaline-earth metals are excellent dielectrics and are of interest in the electroceramic industry. The chemical phase method and X rays were used in the investigation; the former is based on solution of the material in acid, i.e., the cerates are dissolved in 25% nitric acid but the cerium dioxide is not. In the interaction of cerium dioxide with calcium oxide, a solid solution was observed over a range with limited solubility of CaO in CeO_2. No cerate [illegible] (CeO_2·CaO) was found. In the [illegible]

Chem

Keler, E.K.

RUMANIA/Chemical Technology. Chemical Products and their Application. Glass. Ceramics. Building Materials. J-12

Abs Jour: Referat Zh.-Kh., No 8, 1957, 27698

Author : E.K. Keler, Z.I. Veselova.
Inst :
Title : Determination of Elasticity Modulus of Refractory Materials by Acoustic Method.

Orig Pub: An. Rom.-Sov. Metalurgie si constr. masini, 1956, 10, No 3, 121-133.

Abstract: See translation in RZhKhim, 1957, 5236.

Card : 1/1

USSR/Chemical Technology. Chemical Products and Their Application -- Silicates. Glass. Ceramics. Binders, I-9

Abst Journal: Referat Zhur - Khimiya, No 2, 1957, 5236

Author: Keler, E. K., Veselova, Z. I.

Institution: None

Title: Determination of Elasticity Modulus of Ceramic Materials by the Sonic Method

Original Publication: Ogneupory, 1956, 21 No 1, 21-32

Abstract: The method is based on producing in the samples sonic wave oscillations and measuring the frequency of natural oscillations of the sample. The instrument for measuring frequencies of mechanical oscillations (IChMK-1) is produced by the Electrotechnical Institute imeni Ul'yanov (Lenin). Instrument data: frequency range measured 250-10,000 hertz, power consumption 100 watt, alternating current feed of 100, 127 or 220 volt at a frequency of 50 hertz. As generator of oscillations is utilized a conventional electrodynamic

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USSR/Chemical Technology. Chemical Products and Their Application -- Silicates. Glass. Ceramics. Binders, I-9

Abst Journal: Referat Zhur - Khimiya, No 2, 1957, 5236

Abstract: loudspeaker with a cutdown diffuser. Advantage of the sonic method over the static is speed of determination (1.5-2 minutes) and the possibility to determine the modulus by using integral articles (bricks). By the method under consideration were determined the values of the elasticity modulus of a number of refractories, which were found to be higher than the values of elasticity modulus determined by the static method by 7-44%.

KELER, E.K.; VESELOVA, Z.I.

Linear changes in grog batches in the course of burning and repeated heating. Ogneupory 21 no.3:114-122 '56. (MLRA 9:8)

1. Leningradskiy institut ogneuporov.
(Refractory materials)

Conditions for the formation of solid solutions in the [illegible]

[illegible]

Conditions for the formation of barium silicates. II. Reaction of barium peroxide with silicon dioxide

Distr: 4E2c 7

Conditions for the formation of the [illegible]

III Preparation and [illegible]

a = [illegible] ± [illegible], c/a = [illegible]

$c = 0.89 \pm 0.02$ kX, c/a = 0.48 resp [illegible]

137-58-4-6474

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 20 (USSR)

AUTHOR: Keler, E.K.

TITLE: Modern Thermomechanical Methods of Investigating the Properties and Assessing the Qualities of Refractory Raw Materials and Products (Sovremennyye termomekhanicheskiye metody issledovaniya svoystv i otsenka kachestva ogneupornogo syr'ya i materialov)

PERIODICAL: Tr. Nauchno-tekhn. o-va chernoy metallurgii. M-vo chernoy metallurgii SSSR, 1957, Vol 12, pp 57-61. Diskus. pp 153-169

ABSTRACT: A brief listing and description of the methods employed in engineering testing of refractories is presented: 1) determination of physical constants, 2) special variants of general methods (determination of chemical stability at high temperature, resistance to slags, etc.). A number of ideas are put forth on the improvement and organization of control of the quality of refractories and raw materials for them at industrial establishments.

Card 1/1 S.G.

1. Refractory materials--Properties 2. Refractory materials --Applications

Kotov E.R.

Valek E.K.

[illegible] between [illegible] and [illegible]
[illegible]

ence between these comp. B_2O_3 and [illegible] without it de-
creased. The effect of [illegible]

[illegible]

20-2-16/50

AUTHORS: Keler, E. K. , Kozlovskaya, Ye. I.

TITLE: The Elastic Properties of Glass (Ob uprugikh svoystvakh stekla)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 2, pp. 221 - 224 (USSR)

ABSTRACT: The present paper contains experimental data concerning the modification of the elastic properties of glass in the case of a torsion in dependence on temperature. It is known that glass, below the temperature at which softening begins, is a brittle solid body, and at room temperature it obeys Hooke's law up to the point of fracture. A diagram shows the curve deformation temperature of glass in the case of constant stress as well as the experimental curves of momentary elastic, delayed elastic, and remanent deformation. In the interval between 20° and the temperature T_g of beginning softening there is only a momentaneous, elastic deformation. In the interval between T_g and the temperature of the beginning of the delay of the deformation a delayed-elastic and a remanent deformation were observed. As soon as 720° is attained, the elastic deformations vanish nearly entirely, and instead remanent deformation develops. A second diagram illustrates the curve stress deformation of glass, i.e. the hysteresis loops for different stages of a truly elastic behavior of glass in the interval of temperatures

Card 1/2

20-2-16/50

The Elastic Properties of Glass

of between 20° and T_g. The third diagram illustrates the dependence of deformation on time. The domains of these curves correspond to the following processes: momentary elastic deformation at the moment of stress, delayed elastic deformation, plastic flow, momentary-elastic restoration after removal of stress, delayed-elastic restoration. The experimental data found served as a basis of the determination of the shearing modulus of glass when heated. The dependence of the properties of glass on temperature studied here was observed by several authors in the case of different types of glass such as window glass, various types of optical glass, and in sodium-boron silicate glass. Also pure quartz glass was investigated. In conclusion something was said about the physical-chemical processes upon which the here discussed phenomena are based. There are 4 figures and 1 Slavic reference.

PRESENTED: May 28, 1957, by A. A. Lebedev, Academician

SUBMITTED: July 6, 1957

AVAILABLE: Library of Congress

Card 2/2

KELLER, E. K.

"On the Behaviour of Kaolin During Heating."

paper distributed at the International Clay Mineralogy Congress in Brussels, Belgium, 1 - 5 Jul 58.

Comment: B-3,116,859.

15(2)

AUTHORS: Keler, E. K., Andreyeva, A. B. SOV/131-58-12-5/10

TITLE: The Influence of Admixtures and Additions of Titanium Dioxide Upon the Stabilization Process of Zirconium Dioxide (Vliyaniye primesey i dobavok dvuokisi titana na protsess stabilizatsii dvuokisi tsirkoniya)

PERIODICAL: Ogneupory, 1958, Nr 12, pp 552 - 558 (USSR)

ABSTRACT: Commercial zirconium dioxide (Table 1) and chemically pure zirconium dioxide with a ZrO_2 content of 99.6% served as initial material. Carbonates of magnesium and calcium of the "Ch" type served as stabilizing additions. A decrease in shrinkage and an increase in thermal stability were attained by the use of zirconium dioxide, which was burnt up to a temperature of 1700°, whereas the sintering has become worse. Figure 1 shows the linear changes of samples with a content of 90% ZrO_2 + 10% MgO, and figure 2 presents the linear change of ZrO_2, which was burnt at 1700°, with the characteristic loop of polymorphous transformation. The formation of mixed crystals of ZrO_2

Card 1/3

with calcium oxide at a lower temperature than with magnesium oxide is confirmed also by chemical phase analyses (Table 2). Figure 3 shows the influence which is exercised by 2% TiO_2 upon the stabilization of ZrO_2 in the mixture 90% ZrO_2 + 10% MgO, and that in the mixture 90% ZrO_2 + 10% CaO is given in table 4. Figure 5 shows the linear changes of the samples with a content of 85% ZrO_2 + 15% MgO (mol) at a burning temperature of 1600°. Table 3 presents the chemical phase analysis of samples with pure and commercial ZrO_2. The experimental results can be seen from table 4. Figure 6 shows the linear changes of the samples with 90% ZrO_2 + 10% MgO after burning at 1700°, and those of the samples with 90% ZrO_2 + 10% CaO after burning at 1700°, are given in figure 7. Besides the dilatometric investigations, also some physical and technical data of the samples - shrinking, porosity, breaking strength at pressure, and others - were determined (Table 5). Conclusions: TiO_2 which is to

Card 2/3

The Influence of Admixtures and Additions of Titanium Dioxide Upon the Stabilization Process of Zirconium Dioxide SOV/131-58-12-5/10

be found in commercial ZrO_2 as an admixture or addition, does not exert a positive effect upon the sintering of zirconium mixtures. Furthermore it decreases the stabilization of ZrO_2 and deteriorates the mechanical properties of the products. TiO_2 exerts a more negative effect in the stabilization by means of magnesium oxide than in the stabilization by means of calcium oxide. A TiO_2 admixture of more than 0.3 - 0.5% is regarded as unsuited for the production of dense and solid highly refractory products from stabilized ZrO_2. There are 7 figures, 5 tables, and 10 references, 6 of which are Soviet.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry AS USSR)

Card 3/3

15 (2) SOV/131-59-5-8/12

AUTHORS: Keler, E. K., Leonov, A. I.

TITLE: Inflation of Iron Oxide and Its Compounds in Heating (O yavleniyakh razbukhaniya okisi zheleza i yeye soyedineniy pri nagrevanii)

PERIODICAL: Ogneupory, 1959, Nr 5, pp 225-231 (USSR)

ABSTRACT: In this article, the authors report on the results of investigation of the inflation of iron oxides, mixtures of iron and chromium oxides, as well as copper- and cobalt oxides, at heating in different gases. The shrinking and stretching of the samples in heating was measured by means of the corundum dilatometer (Fig 1) which is subsequently described. Figure 2 shows the change in length of the sample of iron oxide at heating in air, and figure 3 shows the microphotographs of the samples. Figure 4 represents the influence of the oxygen pressure on the linear changes of the samples of iron oxide at 1300°, and figure 5 shows that of a sample of copper oxide in heating to 900°. Figure 6 represents the influence of the oxygen pressure on the stretching of the sample of cobalt oxide in heating to 850° in air. The partial pressure of the oxygen was varied by an addition of argon.

Card 1/3

Inflation of Iron Oxide and Its Compounds in Heating

SOV/131-59-5-8/12

Heating tests of samples with the molecular composition $Fe_2O_3 : Cr_2O_3 = 1 : 2$ were carried out; they were inflated in argon, and shrank in air (Fig 7). Figure 8 shows the stretching of various samples at heating in air, and figure 9 in carbon dioxide and hydrogen. The table indicates the influence of the TiO_2 admixtures on the inflation of the mixtures $Fe_2O_3 - Cr_2O_3$. Conclusions: Inflations, cracks and loss of strength can be observed at the heating of samples of pure oxides and certain mixtures at certain temperatures. An admixture of 10 % TiO_2 to the mixtures $Fe_2O_3 : Cr_2O_3$ at the ratios of 1:1 and 1:2 fully eliminates their inflation at heating in air up to 1800°. Further investigations of the influence of TiO_2 admixtures on the properties of refractory chrome-magnesite products are recommended. There are 9 figures, 1 table, and 8 references, 4 of which are Soviet.

Card 2/3

Inflation of Iron Oxide and Its Compounds in Heating SOV/131-59-5-8/12

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry of the AS USSR)

Card 3/3

SOV/78-4-4-29/44

5(2)

AUTHORS: Godina, N. A., Keler, E. K.

TITLE: The Interaction of Hafnium Dioxide With the Oxides of Alkaline-earth Metals (Vzaimodeystviye dvuokisi gafniya s okislami shchelochnozemel'nykh metallov)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 884-891 (USSR)

ABSTRACT: The reaction of hafnium dioxide with the oxides of alkaline-earth metals was investigated by chemical and radiographic analysis. It was stated that in a boiling HCl solution (1:1) annealed HfO_2 and its solid solutions with CaO and MgO are insoluble, while the compounds $CaHfO_3$, $SrHfO_3$ and $BaHfO_3$ are readily soluble. An intense interaction of HfO_2 with the oxides CaO, SrO, and BaO occurs at 1100° with the formation of compounds of the general formula $M^{II}HfO_3$. The compound $CaHfO_3$ and solid solutions are formed in the system HfO_2-CaO at 1350-1400°. A mixture of HfO_2 and $CaCO_3$ yields 95% $CaHfO_3$ after

Card 1/3

SOV/78-4-4-29/44

The Interaction of Hafnium Dioxide With the Oxides of Alkaline-earth Metals

it has been heated to 1100° for eight hours. The course of the process as a function of time at 1000 and 1100° is given in figure 1. The phase composition of annealed mixtures of HfO_2 and CaO is contained in table 1. The investigation of the kinetics of $CaHfO_3$ formation and the subsequent transition into a solid solution by the interaction with HfO_2 was made by means of a mixture of 80% HfO_2 + 20% CaO at 1100 and 1600°. The results are given in figure 4. The interaction of HfO_2 with MgO begins at temperatures > 1400° with the formation of solid solutions. It was found by chemical and radiographic analysis that no compound is formed at 1400° between HfO_2 and MgO. During the interaction of HfO_2 with SrO and BaO the compounds $SrHfO_3$ and $BaHfO_3$ are formed within the temperature range 1100-1300°. After heating at 1100° for one hour 95% BaHfO are formed. 96% $SrHfO_3$ are obtained by heating at 1300° for one hour. The authors determined the lattice parameters of these compounds as well as the specific weights, which are given in table 2. No solid solutions are formed in the systems HfO_2-SrO and HfO_2-BaO since there are great differences between the

Card 2/3

SOV/78-4-4-29/44

The Interaction of Hafnium Dioxide With the Oxides of Alkaline-earth Metals

ionic radii. The phase composition of annealed mixtures of HfO_2 and MgO (1300°-1600°) is listed in a table. There are 7 figures, 3 tables, and 7 references, 3 of which are Soviet.

ASSOCIATION:	Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)
SUBMITTED:	January 3, 1958

Card 3/3

5(2)

AUTHORS: Keler, E. K., Karpenko, N. B. SOV/78-4-5-30/46

TITLE: The Conditions for the Formation of Barium Titanate (Usloviya obrazovaniya titanatov bariya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 5, pp 1125 - 1137 (USSR)

ABSTRACT: The conditions for the formation of acid barium titanate by the interaction of $BaCO_3$ with TiO_2 in the solid phase were determined. Experiments were carried out with mixtures of the composition of 50 % by mol TiO_2 and more. The initial material was dried at 120° and herefrom pressed objects were produced under a pressure of 700 kg/cm^2 and burned at 1400°. For the purpose of determining the phase composition of the product obtained X-ray-, chemical- and microscopical analyses were carried out. In some cases also the electrical qualities and the density of the samples were investigated. In the system $BaO-TiO_2$ barium titanate was found to exist. The phase diagram of the system $BaO-TiO_2$ was constructed according to data

Card 1/4

supplied by Hase and Roy (Ref 10) and are shown by figure 2. The phase diagram of the system BaO-TiO_2 has been constructed in accordance with data obtained from [illegible] and N. I. Shchepochkina, and is shown by figure 1. Five samples of the composition 50, 51, 52.5, 53.5 and 55 mol-% TiO_2 were investigated. They were burned at 1350 and 1500°. From X-ray examinations it follows that in samples with 53.5% by mol TiO_2 also barium titanate lines occur besides the structural lines after burning at 1350°. The X-ray pictures of samples with 51 and 52.5 mol-% show no barium titanate lines. The samples burned at 1500° were also subjected to an X-ray examination with the result that new lines were found to occur in samples with 55% by mol-TiO_2, which correspond to the structure of rutile. Chemical and microscopical investigations confirm the results obtained by X-ray examination. The synthesis and the properties of barium titanate were investigated. By the burning of a mixture

Card 2/4

of components in the ratio BaO : TiO = 1 : 2 a heterogeneous product is formed after 30 hours, which consists of $BaTiO_3$, $BaTi_2O_5$ and $BaTi_3O_7$. In a mixture of random composition of from 50 to 65% by mol TiO_2, the products $BaTiO_3$ and $BaTi_3O_7$ are formed by burning at a temperature below 1000°, with small quantities of $BaTi_2O_5$. If burning takes place at temperatures of more than 1200° the product contains $BaTiO_3$ and $BaTi_2O_5$. Results show that the velocity of formation of barium titanate is low. Barium titanate crystallizes in form of long, needle-shaped crystals of monoclinic structure. The metals show a high degree of double refraction. The optical character of barium titanate obtained agrees with the data obtained by other authors. The synthesis of barium tri- and barium-tetratitanate were carried out. Mixtures with 70 - 75 mol-% TiO_2 contain barium dititanate and barium trititanate after burning at 1150 and 1230°. Mixtures with 75 - 80 % by mol TiO_2

The Conditions for the Formation of Barium Titanate SOV/78-4-5-30/46

contain barium tri- and tetratitanate. By burning a mixture with 80 mol-% TiO_2 barium tetratitanate is formed. The barium tri- and tetratitanates are optically similar and can therefore be distinguished from each other only with difficulty by microscopical analysis. Barium tri- and tetratitanates are easily distinguishable by means of chemical or X-ray analysis. On the basis of the results obtained a scheme for the phase composition of a mixture of $BaCO_3+TiO_2$ when burned at 1100 - 1350° was constructed. The results obtained are shown by figure 10. There are 10 figures, 5 tables, and 12 references, 4 of which are Soviet.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute for the Chemistry of Silicates of the Academy of Sciences, USSR)

SUBMITTED: February 11, 1958.

Card 4/4

15(2)
S/131/60/000/01/007/017
B015/B001

AUTHORS: Keler, E. K., Bluvshteyn, M. N.

15

TITLE: On the Problem of Lining Blast-furnace Floors

PERIODICAL: Ogneupory, 1960, Nr 1, pp 17 - 23 (USSR)

ABSTRACT: In the beginning of 1958, the Magnitogorskiy metallurgicheskiy kombinat (Magnitogorsk Metallurgical Kombinat) requested the Vsesoyuznyy institut ogneuporov (All-Union Institute of Refractories) to give an expert opinion on the most favorable lining of blast-furnace floors. Thereupon, the authors made experiments; K. A. Bezrukova and A. N. Kaller participated in the experimental part. The results of these experiments are given. The effect of molten cast iron on the refractory lining of various refractories was investigated by means of various kinds of mortar or without mortar, respectively. The characteristics of the refractories used are shown in table 1, the lined coal crucibles in figures 1, 2, and 3. The compositions of the mortars used are shown in table 2. Table 3 and figure 4 show the results of these experiments. Samples (Fig 5) were tested to investigate the creep. The results showed that bricks with an increased alumina content are of

Card 1/2

On the Problem of Lining Blast-furnace Floors S/131/60/000/01/007/017
B015/B001

no advantage as compared with ordinary bricks. In conclusion, the authors mentioned that the final solution of this problem can be brought about only by model tests. The All-Union Institute of Refractories and the Nizhne-Tagil'skiy metallurgicheskiy kombinat (Nizhniy Tagil Metallurgical Kombinat), and Gipromez have already started such experimental investigations.The economic aspect of this problem has also to be taken into consideration. Suitable mortars for the walling of the blast furnaces have to be worked out and produced. There are 5 figures, 3 tables, and 25 references, 23 of which are Soviet.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of the Chemistry of Silicates of the Academy of Sciences, USSR). Vsesoyuznyy institut ogneuporov (All-Union Institute of Refractories)

Card 2/2

Keler, E. K.

82484

S/131/60/000/008/003/003
B021/B058

15.2210

AUTHORS: Zuyeva, L. S., Godina, N. A., Keler, E. K.

TITLE: The Properties of Cerium Dioxide and Its Solid Solutions With Calcium- and Strontium Oxide

PERIODICAL: Ogneupory, 1960, No. 8, pp. 368-371

TEXT: The physical and technological properties of the above-mentioned compounds have not been investigated so far. The results of the authors' studies in this field are shown in the paper under review. The conditions of the synthesis of the solid solutions CeO_2 with CaO and SrO have been investigated earlier. Chemically pure cerium carbonate and -nitrate as well as calcium- and strontium carbonate were used as basic materials. CeO_2 was produced first from the cerium salts by annealing. The product obtained contained 98% CeO_2 and about 2% oxides of other rare-earth elements. Three mixtures of various granulation were prepared from this material: a coarse, medium and fine one, the granular composition of which is mentioned in Table 1. The chemical and granular composition of the masses investigated is shown in Table 2. Samples of the masses investigated were fired in a Kryptol furnace at temperatures of from 1450° to 1600°C in order to select

Card 1/3

82484

the optimum temperature. The shrinkage and apparent porosity may be seen from Table 3. The influence of the granulation on the sintering process of cerium dioxide is shown in a figure. The elasticity was determined by the ultrasonic method and the УЗИС(UZIS) instrument. The investigation of deformation under load was conducted according to ГОСТ(GOST) 4070-48. The investigation results of the fired samples are listed in Table 4. The temperature of the deformation under load of the samples from CeO_2 and solid solutions with CaO is shown in Table 5. The chemical resistance of cerium dioxide and the solid solution CeO_2 with SrO may be seen from Table 6. The authors state in conclusion that sintered highly refractory products with a porosity of up to 0.1% and a compressive strength of up to 2000 kg/cm^2 can be produced from cerium dioxide and its solid solution with calcium- and strontium oxide. In order to obtain well sintered products from pure cerium dioxide, the material must be finely ground. Products from solid solutions of CeO_2 with strontium- and calcium oxide also sinter well with a coarser granulation of CeO_2. Products from CeO_2 and its solid solutions can be fired at a temperature of 1500°C. Samples from CeO_2 and its solid solution with strontium oxide show a high chemical resistance in contact with other highly refractory oxides at temperatures of from 1600° to 1700°C. The fields for the application of refractories from cerium are to be determined by further studies. There are 1 figure, 6 tables, and

KELER, E.K.; ISUPOVA, Ye.N.

Solid phases in the system $BeO - TiO_2$. Zhur.neorg.khim. 5 no.2: 433-436 F '60. (MIRA 13:6)

1. Institut khimii silikatov Akademii nauk SSSR.
(Beryllium oxide) (Titanium oxide)

KELER, E.K.; KARPENKO, N.B.

Interaction of $BaCo_3$ with TiO_2 and ZrO_2 during heating. Zhur. neorg. khim. 5 no.3:668-675 Mr '60. (MIRA 14:6)

1. Institut khimii silikatov AN SSSR.
(Barium carbonate)
(Titanium)
(Zirconium oxide)

GLUSHKOVA, V.B., KELER, E.K.

Conditions of the preparation and rates of formation of barium silicates. Zhur. neorg. khim. 5 no.4:882-890 Ap '60. (MIRA 13:7)

1. Institut khimii silikatov Akademii nauk SSSR.
(Barium silicate)

ISUPOVA, Ye.N.; KELER, E.K.

Interaction in the system BeO - SiO_2. Zhur.neorg.khim. 5 no.5:1126-1131 My '60. (MIRA 13:7)

1. Institut khimii silikatov Akademii nauk SSSR. Laboratoriya sinteza tekhnicheskikh silikatov.
(Beryllium oxide) (Silica)

S/078/60/005/06/12/030
B004/B014

15.2210

AUTHORS: Karpenko, N. B., Keler, E. K.

TITLE: Interaction of $BaCO_3$ With TiO_2 and ZrO_2 on Heating

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 6, pp. 1267 - 1282

TEXT: By way of introduction, the authors discuss publications concerning the above subject, and mention P. Z. Tandura, T. N. Verbitskaya, T. N. Burakova, G. A. Smolenskiy, A. I. Avgustinik, and N. S. Antselevich. Fig. 1 offers a comparison of the data supplied by P. Z. Tandura and T. N. Verbitskaya for the parameters of the unit cell of the solid $BaTiO_3$-$BaZrO_3$ solutions with the data obtained by the authors. The authors had already investigated the interaction of $BaCO_3$ with TiO_2 and ZrO_2 in an equivalent ratio of the components (Ref. 4), and had worked out a method for the quantitative determination of the various phases by X-ray, optical, and chemical analysis. The present paper deals with

Card 1/4

the interaction at various ratios among the components (Fig. 2). The samples were continuously annealed up to 1,200°C, then constantly at 1,200, 1,250, 1,300, 1,400, 1,500, and 1,600°C. Thermograms were taken by means of a device designed by E. K. Keler and A. K. Kuznetsov (Ref. 7), which permitted the simultaneous recording of the thermal differential curve, the curve of weight loss, and the curve of volume change. Fig. 3 shows such thermograms. For comparison, Fig. 4 illustrates the thermograms for TiO_2, ZrO_2, $BaCO_3$, and the binary mixtures $BaCO_3+TiO_2$ and $BaCO_3+ZrO_2$. The endothermic effect observed between 1,000 and 1,100°C was explained by a redistribution of BaO in the titanate and zirconate on the establishment of equilibrium in the solid solutions, which was confirmed by the thermogram (Fig. 5) of $BaZrO_3$ + + TiO_2. Experimental data are given in Tables 1,2. Figs. 6,7 show the composition of the phases for different mixtures of $BaTiO_3$ + ZrO_2 and $BaZrO_3$ + TiO_2 at temperatures between 1,200 and 1,600°C. The interaction between the oxides of the system BaO - TiO_2 - ZrO_2 proceeds in a

Interaction of $BaCO_3$ With TiO_2 and ZrO_2 on Heating

S/078/60/005/06/12/030
B004/B014

different way, depending on temperature and composition of the mixture. The formation of the solid solution $BaTiO_3$-$BaZrO_3$, which takes place only above 1,200°C, is determinant for the subsequent processes. The components which do not enter the solid solution, form barium dititanates and barium trititanates below 1,300°C, barium tetratitanate at 1,300 - 1,400°C, and zirconium titanate above 1,400°C. If the mixture has a high TiO_2 content, a new compound is formed, which corresponds to one of the compounds $Ba_2Ti_5O_{12}$ or $Ba_2Ti_9O_{20}$ given by G. H. Jonker and W. Kwestroo (Ref. 5). The processes took place at different rates in the system investigated. Inhibited, retarded reactions occur for a part (formation of the solid solution below 1,200°C, formation of barium dititanate) which do not attain equilibrium with the usual technical burning times. Hence, the phase compositions found do not correspond to equilibrium states, but to stable, relatively invariant states. These phase diagrams can therefore be valuable in the field of electroceramics of barium titanate and other compounds. There are 7 figures, 2 tables, and 8 references: 7 Soviet and 1 American.

14

15

Card 3/4

Interaction of $BaCO_3$ With TiO_2 and ZrO_2 on Heating

S/078/60/005/06/12/030
B004/B014

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences, USSR)

SUBMITTED: January 12, 1960

Card 4/4

85626

15.2142
15.2210

S/078/60/005/012/010/016
B017/B064

AUTHORS: Godina, N. A., Keler, E. K., and Rudenko, V. S.

TITLE: Reaction of Hafnium Dioxide With Titanium Dioxide

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 12, pp. 2795-2797

TEXT: The solid-phase reaction in heating mixtures of hafnium dioxide and titanium dioxide was studied. HfO_2 had a purity of 99%, and TiO_2 a purity of 99.7%. The oxide mixtures were pressed to tablets under a pressure of 500 kg/cm^2, and burned at 1350 - 1650°C. The burned samples were subjected to an X-ray phase analysis. Fig. 1 shows the X-ray pictures of the mixtures of 50% HfO_2 + 50% TiO_2 and the combustion product of this mixture obtained at 1650°C. Hafnium titanate $HfTiO_4$ forms in the reaction of HfO_2 with TiO_2. Fig. 2 compares the X-ray pictures of zirconium titanate and hafnium titanate. The X-ray pictures of hafnium titanate obtained at 20, 1200, and 1400°C are given in Fig. 3. The solubility of TiO_2 in HfO_2

Card 1/2

85626

Reaction of Hafnium Dioxide With Titanium Dioxide

S/078/60/005/012/010/016
B017/B064

is limited, at 20% TiO_2 the X-ray picture shows the intensive lines characteristic of hafnium titanate. The dependence of the lattice spacings of the HfO_2 lattice on the TiO_2 concentration, and the dependence of the lattice spacings of the TiO_2 lattice on the HfO_2 concentration were studied. The results are graphically shown in Figs. 4 and 5. Apart from hafnium titanate, solid solutions form in the system HfO_2 - TiO_2. The limit of the solid solution of TiO_2 in monoclinic HfO_2 lies at 12 to 13 mole % of TiO_2. At 1600°C, the solubility of HfO_2 in TiO_2 is $\sim$ 15 - 16 mole %. There are 5 figures, 1 table, and 3 references: 1 Soviet and 2 US.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: September 1, 1959

Card 2/2

KELER, E.K.; BLUVSHTEYN, M.N.

Lining the hearth bottom of blast furnaces. Ogneupory 25 no.1: 17-23 '60. (MIRA 13:6)

1. Institut khimii silikatov AN SSSR (for Keler). 2. Vsesoyuznyy institut ogneuporov (for Bluvshtein).
(Blast furnaces) (Refractory materials)

KELER, E.K.; ANDREYEVA, A.B.

Additional data on solid solutions in the ZrO_2-TiO_2 system.
Ogneupory 25 no.7:320-324 '60. (MIRA 13:8)

1. Institut khimii silikatov A.N.SSSR.
(Dielectrics)

ZUYEVA, L.S.; GODINA, N.A.; KELER, E.K.

Properties of cerium dioxide and its solid solutions with calcium and strontium oxides. Ogneupory 25 no.8:368-371 '60. (MIRA 13:9)

1. Institut khimii silikatov AN SSSR.
(Cerium)

87999

S/131/61/000/001/002/004
B021/B058

15.2210 1142, 1273, 1136

AUTHORS: Keler, E. K. and Andreyeva, A. B.

TITLE: Effect of Titanium Dioxide on the Sintering and Stabilization of ZrO_2 in Zirconia - alumina and Spinel-zirconium Compositions

PERIODICAL: Ogneupory, 1961, No. 1, pp. 25-31

X

TEXT: A study has been made of the mineralizing effect of titanium dioxide on compositions containing zirconium dioxide as well as magnesium oxide and calcium oxide respectively, besides alumina. The following compositions were examined: with (mol %) Al_2O_3 = 100; $Al_2O_3 + ZrO_2 = 90 + 10$; $ZrO_2 + MgO + Al_2O_3 = 33.3 : 33.3 : 33.3$; $ZrO_2 + CaO + Al_2O_3 = 33.3:33.3:33.3$ with admixtures of up 4% TiO_2. In all specimens, TiO_2 improved sintering and reduced the temperature of complete sintering from 1700°C to 1500°C. The physico-technical properties of the fired specimens, their coefficient of linear expansion, phase composition, spinel formation, and chemical

Card 1/3

87999

Effect of Titanium Dioxide on the Sintering and Stabilization of ZrO_2 in Zirconia-alumina and Spinel-zirconium Compositions

S/131/61/000/001/002/004
B021/B058

composition as well as their refractoriness were determined. It is stated that an addition of titanium dioxide greatly reduces the sintering temperature of aluminiferous and zirconium-alumina compositions. In a similar way, titanium dioxide affects the sintering of the triple equimolecular mixture $ZrO_2 : MgO : Al_2O_3$. The specimens from 90% Al_2O_3 + 10% ZrO_2 and $ZrO_2 : MgO : Al_2O_3 = 1 : 1 : 1$ have a better thermal stability than those from alumina and zirconium dioxide, which is stabilized by magnesium oxide and calcium oxide, respectively. The coefficient of linear thermal expansion of the equimolecular mixtures $ZrO_2 - MgO - Al_2O_3$ and $ZrO_2 - CaO - Al_2O_3$ is much smaller than that of the corresponding mixtures without alumina. The two-component compositions $Al_2O_3 - ZrO_2$ and three-component compositions $MgO - Al_2O_3 - ZrO_2$ possess high refractoriness, satisfactory thermal stability, and good stability under pressure at high temperatures. They may be used as highly refractory masses. There are 4 figures, 6 tables, and 12 references: 8 Soviet, 2 US, and 2 German.

Card 2/3

23968
S/131/61/000/006/001/003
B105/B206

15 2230 3209, 3309, 3009

AUTHORS: Keler, E. K., and Andreyeva, A. B.

TITLE: Effect of the admixture of silicon dioxide on the sintering and stabilization of zirconium dioxide

PERIODICAL: Ogneupory, no. 6, 1961, 276-281

TEXT: The effect of silicon dioxide on the behavior of zirconium dioxide during firing is investigated. Pure and commercial zirconium dioxide were used as initial materials. Shrinkage, weight of unit volume, open porosity and physicomechanical properties were investigated for various mixtures, admixtures, and firing temperatures. Table 4 shows the effect of SiO_2 admixtures on the formation of the solid solution ZrO_2- MgO during firing. The thermal expansion of samples from 90 mole % of ZrO_2 + 10 mole % of CaO is shown graphically for various firing temperatures and admixtures. Fig. 6 shows such curves of thermal expansion for samples from 90 mole % of ZrO_2 + 10 mole % of MgO, fired at $1,500^{\circ}C$. It was

Card 1/5

23968
S/131/61/000/006/001/003
B105/B206

Effect of the admixture of silicon ...

established that pure zirconium dioxide sinters much worse than commercial one. Its complete stabilization with an admixture of 10% of MgO is not even obtained during firing of up to 1,700°C. The admixture of silicon dioxide hinders stabilization of zirconium dioxide in solid solution in mixtures of 90 mole % of ZrO_2 + 10 mole % of MgO and 90 mole % of ZrO_2 + 10 mole % of CaO. In the presence of 3-4% of SiO_2, almost the entire magnesium oxide is bound by silicon dioxide, zirconium dioxide is not stabilized, and the samples become flawy; in the zirconium-calcium mixture the formation of the solid solution proceeds at lower temperature and part of the calcium oxide is bound by zirconium dioxide. An admixture of silicon dioxide is described as being undesirable for the production of highly refractory products from stabilized zirconium dioxide, and its content must be restricted by technical requirements. The silicon-dioxide content in industrial zirconium dioxide should not exceed 1%, nor 0.5% for the manufacture of especially important products. There are 7 figures, 4 tables, and 9 references: 4 Soviet-bloc and 5 non-Soviet-bloc. The reference to the English-language publication reads as follows: Geller and Jaworsky. I. Research. Nat. Bur. Stand. 1945. 35 [1].

Card 2/5

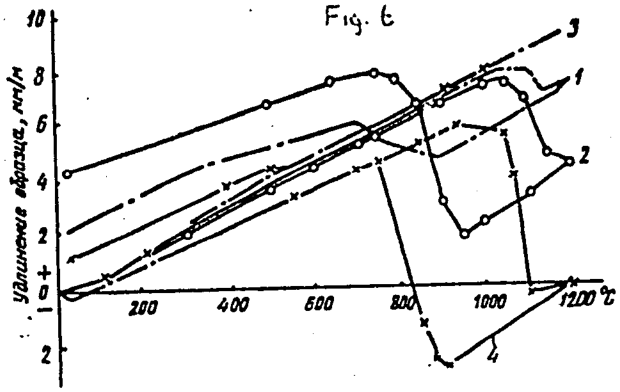
23968

S/131/61/000/006/001/003
B105/B206

Effect of the admixture of silicon ...

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry, AS USSR)

Fig. 6



Legend to Fig. 6:
1) with pure ZrO_2; 2) ditto with addition of 1% SiO_2;
3) with industrial ZrO_2;
4) sample 1 after 50 hr glowing at 1200°C

Card 3/5

23968
S/131/61/000/006/001/003
B105/B206

Effect of the admixture of silicon ...

№ образца 1	2 Состав образцов, вес. %			TABLE Добавка SiO_2 % 4	4 Температура обжига °C 5	6 После обработки HCl (1:1), %			
	ZrO_2*	MgO	примеси 3			нерастворимый остаток 7	в растворе		сумма 9
							MgO	прочие 8	
9	94,8	3,60	1,60**	—	1400	95,64	3,10	1,25	99,99
10	93,8	3,56	1,56	1	1400	96,20	2,30	1,30	99,80
11	93,0	3,54	1,57	2	1400	96,33	2,55	1,00	99,88
12	92,0	3,50	1,55	3	1400	96,47	2,29	1,07	99,83
13	96,4	3,60	—	—	1400	96,10	3,50	0,45	100,05
14	94,8	3,60	1.60	—	1600	98,20	1,08	0,60	99,88
15	93,0	3,54	1,57	2	1600	96.00	2,26	0,90	99,16
16	92,0	3,50	1.55	3	1600	96,40	—	—	—
17	96,4	3.60	—	—	1700	97,4	1,05	1,20	99,65
18	95,4	3.56	—	1	1700	96,00	1,63	1,35	98.98
19	94,5	3,54	—	2	1700	95,00	2,74	1,32	99,06
20	93,6	3,50	—	3	1700	94,40	3,19	1,70	99,29

Card 4/5

23968

Legend to Table 4: 1) no. of sample; 2) composition of the sample, % by weight; 3) admixtures; 4) addition; 5) firing temperature; 6) after treatment with HCl (1:1), %; 7) insoluble residue; 8) others; 9) sum

X

26902
S/131/61/000/009/001/001
B101/B208

15.2230

AUTHORS: Godina, N. A., and Keler, E. K.

TITLE: Stability of solid solutions in the systems ZrO_2 - MgO; ZrO_2 - CaO; HfO_2 - MgO and HfO_2 - CaO

X

PERIODICAL: Ogneupory, no. 9, 1961, 426 - 431

TEXT: The authors investigated the stability of solid solutions of ZrO_2 and HfO_2 with MgO and CaO. The starting materials were HfO_2 (97.2% pure), ZrO_2 (98.45% pure), and chemically pure alkaline-earth carbonates. The chemical phase analysis of the pressed samples consisting of 80% HfO_2 (or ZrO_2) and 20% alkaline-earth oxide which were annealed at 1750°C for 2 hr disclosed the formation of solid solutions in all samples. After additional annealing at 1200°C for 24 hr the solid solutions which contained MgO were decomposed. In order to study the kinetics of this decomposition,

Card 1/3

26902
S/131/61/000/009/001/001
B101/B208

Stability of solid solutions...

samples of solid solutions were heated at 1200°C for various lengths of time. X-ray analysis and phase analysis confirmed the instability of the solid solutions in the systems ZrO_2 - MgO and HfO_2 - MgO, and a higher stability of the solid solutions with CaO. In the radiograph, the decomposition becomes manifest by the appearance of a monoclinic HfO_2 or ZrO_2 phase. On the assumption that the impurities contained in ZrO_2 and HfO_2 may influence the decomposition of solid solutions, special ZrO_2 and HfO_2 reagents of particularly high degree of purity were prepared (98.5 - 99.8 ZrO_2; 99.5 HfO_2). After annealing of these reagents with 20 mole% MgO or 20 mole% CaO no difference was found as compared with the initially used samples (98.45% ZrO_2, 97.2 HfO_2). After heating at 1200°C, X-ray analysis and chemical phase analysis disclosed, however, a higher stability of the solid solutions which had been prepared from high-purity reagents. While at 1200°C the solid ZrO_2-MgO solutions from commercial ZrO_2 (98.3% pure) completely decomposed into their components already after 15 - 20 hr, only

Card 2/3

26902
S/131/61/000/009/001/001
B101/B208

Stability of solid solutions...

30% of the solid solution prepared from 99.8% ZrO_2 were decomposed after 200 hr. There was no substantial difference between the solid solutions of ZrO_2 and HfO_2 with MgO and CaO. There are 6 figures, 4 tables, and 8 references: 5 Soviet and 3 non-Soviet. The two references to English-language publications read as follows: C. E. Curtis et al., Journ. Amer. Cer. Soc., 1954, no. 10, 458; P. Duwez et al., Journ. Amer. Cer. Soc., 1952, no. 5, 107.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry AS USSR)

X

Card 3/3

28267
S/062/61/000/010/001/018
B117/B101

15.2100

AUTHORS: Keler, E. K., Godina, N. A., and Savchenko, Ye. P.

TITLE: Reactions of silica with oxides of rare earths (La_2O_3, Nd_2O_3, Gd_2O_3) in solid phases

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 10, 1961, 1728 - 1735

TEXT: The authors studied the conditions for the formation of rare-earth silicates in solid-phase reactions. The systems La_2O_3-SiO_2, Nd_2O_3-SiO_2, and Gd_2O_3-SiO_2 were studied by X-ray analysis, chemical phase analysis, and microscopically. The initial reagents were analytically pure amorphous silica, 99% lanthanum and neodymium oxides, and 98.2% gadolinium oxide. Oxide mixtures were pressed to tablets and annealed in Silit or Kryptol furnaces. Mixtures of lanthanum oxide and silica were prepared in ratios of 3:1, 2:1, 1:1, 2:3, 1:2, and 1:3 and kept at 1100 - 1650°C for different times. X-ray analysis of a series of reaction products disclosed that two phases, $La_2O_3 \cdot SiO_2$ and $2La_2O_3 \cdot 3SiO_2$, mainly the ortho-

Card 1/4

21207
S/062/61/000/010/001/018
B117/B101

Reactions of silica with...

silicate phase, are formed in the temperature range of 1200 - 1400°C, irrespective of the oxide ratio in the initial mixture. Up to 1300°C the roentgenograms of the reaction products remain unchanged. When the temperature is raised, only the content of initial components in the samples decreases. Pyrosilicates are formed only at 1500 - 1650°C owing to the interaction of the resulting orthosilicates with silica. In $1La_2O_3 + 3SiO_2$ which contains more silica, pyrosilicate formation may be observed already at 1400°C. Orthosilicate remains the intermediate phase. In mixtures having a higher content of lanthanum oxide (3:1, 3:2, 2:1), X-ray analysis disclosed the formation of $La_2O_3\cdot SiO_2$ and $2La_2O_3\cdot 3SiO_3$. In samples of the composition $2La_2O_3 + 3SiO_2$, three phases were found: $2La_2O_3\cdot 3SiO_2$, $La_2O_3\cdot SiO_2$, and $La_2O_3\cdot 2SiO_2$. The orthosilicate is unstable and decomposes into pyrosilicate and oxyorthosilicate. Pure orthosilicate could not be obtained from the solid-phase reaction. Prolonged annealing and temperature increase to 1500 - 1650°C always resulted in orthosilicate decomposition. Lanthanum silicates obtained at 1200 - 1350°C are finely crystalline. Microscopic examination of these samples yields no definite

Card 2/4

28267 S/062/61/000/010/001/018
B117/B101

Reactions of silica with...

results. These products were studied by the chemical method with respect to their solubility in ammonium acetate; their resistance to the action of boiling ammonium acetate was compared with that of silicates obtained at 1600 - 1650°C. It was found that the compositions annealed at 1600 - 1650°C, which correspond to the pyrosilicate and orthosilicate, are sparingly soluble in ammonium acetate, while the oxyorthosilicate is markedly soluble. The solubility kinetics of silicates obtained at 1350°C is equal for all three compositions. On the basis of the experiments performed, a phase diagram of annealed mixtures could be plotted (Fig. 4). The reactions of neodymium oxide and gadolinium oxide with silica, studied by the same methods, showed similar conditions of silicate formation as in the case of La_2O_3-SiO_2. The formation of the compounds $La_2O_3 \cdot SiO_3$ and $Nd_2O_3 \cdot SiO_2$, respectively, was confirmed by the crystallo-optical properties of the compositions $1La_2O_3 + 1SiO_2$ and $1Nd_2O_3 + 1SiO_2$ annealed at 1500 - 1650°C. The papers by N. A. Toropov, I. A. Bondar' (Izv. AN SSSR, Otd. khim. n. 1959, 554); N. A. Toropov, F. Ya. Galakhov (ibid., 1961, 000); N. A. Toropov, T. P. Kiseleva (Tr. Leningradskogo tekhnol. in-ta im. Lensoveta, no. 52 (1961)) are mentioned. There are 6 figures, 3 tables,

Card 3/4

23267 S/062/61/000/010/001/018
B117/B101

Reactions of silica with...

and 6 references: 4 Soviet and 2 non-Soviet. The reference to the English-language publication reads as follows: J. Warshaw, R. Roy, Bull. Amer. Cer. Soc. 38, N 4, 169 (1959).

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: May 4, 1961

Fig. 4

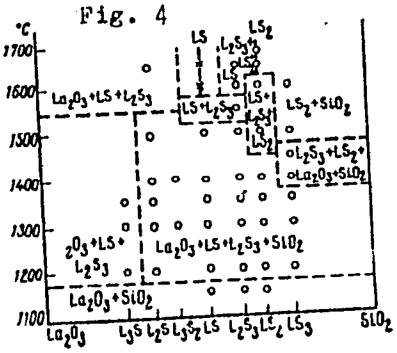


Fig. 4. Phase composition of annealed mixtures of La_2O_3 and SiO_2 ($L = La_2O_3$; $S = SiO_2$).

Card 4/4

28268
S/062/61/000/010/002/018
B117/B101

15.2100

AUTHORS: Keler, E. K., Godina, N. A., and Savchenko, Ye. P.

TITLE: Reactions of silica and praseodymium oxide in solid phases

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 10, 1961, 1735 - 1741

TEXT: The authors studied the conditions of silicate formation through interaction of Pr_2O_3 and Pr_6O_{11} with silica. The reaction products were investigated by X-ray analysis and chemical phase analysis. The initial reagents were 95% praseodymium oxide Pr_6O_{11} and analytical-grade amorphous silica. Experiments in hydrogen medium were performed in a Silit tubular furnace. When hydrogen was passed through at 1200°C, Pr_6O_{11} was reduced up to Pr_2O_3 within two hours. Mixtures with Pr_2O_3/SiO_2 ratios of 1:1, 1:1.5, and 1:2 were used in the experiments. The orthosilicate $2Pr_2O_3 \cdot 3SiO_2$ was found to be formed at 1200°C, as shown by X-ray analysis for all three compositions. At 1300°C, the orthosilicate was found again, but also

Card 1/4

X

28268 S/062/61/000/010/002/018
B117/B101

Reactions of silica and...

oxyorthosilicate was formed from $1Pr_2O_{3.66} + 1SiO_2$. Further experiments at higher temperatures were made in air medium. Pr_6O_{11} was found to dissociate gradually. A comprehensive thermal analysis of this praseodymium oxide was carried out using a device designed by E. K. Keler and A. K. Kuznetsov (Ref. 7: Pribor dlya kompleksnogo termicheskogo analiza (Device for comprehensive thermal analysis), no. 2, VINTI, 1960). Oxygen absorption during cooling in the temperature range of 1100 - 1000°C was found to be accompanied by a marked growth of the sample. In order to obtain praseodymium silicates, mixtures of Pr_6O_{11} and silica were pressed to tablets and annealed together with a praseodymium-oxide tablet in a Silit, Kryptol, or reverberatory furnace at 1200 - 1650°C, and the content of active oxygen was determined. On annealing in air medium, the oxygen content remained unchanged at 1400°C. At 1500 - 1650°C, it dropped from 3.35% to 3.0 - 2.9%. In the air medium, praseodymium oxide was found to react with silica already at 1200°C while forming silicates. Like in experiments in hydrogen medium, the orthosilicate $2Pr_2O_3 \cdot 3SiO_2$ is formed by reaction of $2Pr_2O_{3.66} + 3SiO_2$ and $Pr_2O_{3.66} + 2SiO_2$. In $1Pr_2O_{3.66} + 1SiO_2$

Card 2/4

the oxyorthosilicate $Pr_2O_3 \cdot SiO_2$ is formed in addition to the orthosilicate. In samples with a higher content of praseodymium oxide ($2Pr_2O_{3.66}$ + $1SiO_2$) oxyorthosilicate is the only reaction product. At higher temperatures (in the range of 1400 - 1650°C), the orthosilicate is unstable and decomposes into $Pr_2O_3 \cdot SiO_2$ and $Pr_2O_3 \cdot 2SiO_2$. The pyrosilicate formed at these temperatures is the result of an interaction of subsilicates formed in the primary reaction stage with silica. At temperatures of 1600 - 1650°C, oxyorthosilicate is obtained in nearly pure condition, containing only small orthosilicate impurities. A phase diagram (Fig. 5) of annealed samples of the Pr_2O_3-SiO_2 system could be plotted on the basis of the studies performed. There are 5 figures, 4 tables, and 7 references: 3 Soviet and 4 non-Soviet. The three most recent references to English-language publications read as follows: R. E. Ferguson, E. Daniel Guth, L. Eyving, J. Amer. Chem. Soc. 76, 3890 (1954); E. Daniel Guth, H. R. Holden, N. C. Baenziger, Le Roy Eyring. J. Amer. Chem. Soc. 76, 5239 (1954); I. Warshaw, R. Roy, Bull. Amer. Cer. Soc. 38, N 4, 169 (1959).

20253

S/062/61/000/010/002/010
B117/B101

Reactions of silica and...

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: May 4, 1961

Fig. 5. Phase composition of annealed mixtures of praseodymium oxide and silica; $x \leqslant 1.83$; $P = Pr_2O_{3.66}$; $S = SiO_2$.

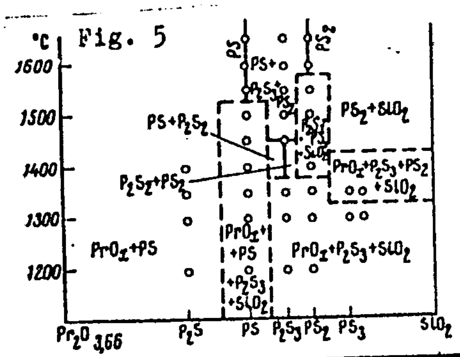


Fig. 5

Card 4/4

29514
S/062/61/000/011/001/012
B119/B138

15.2220

AUTHORS: Leonov, A. I., Rudenko, V. S., and Keler, E. K.

TITLE: Reaction between Ce_2O_3 and SiO_2 at high temperatures

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 11, 1961, 1925-1933

TEXT: Silicates of trivalent Ce were synthesized in a hydrogen atmosphere, as Ce_2O_3 is unstable in an oxygen-containing atmosphere. 99.1% CeO_2 and analytically-pure SiO_2 were made to react between 1200 and 1650°C in the molecular ratios $Ce_2O_3:SiO_2$ = 2:1, 1:1, 2:3, 1:2, 1:4, and 1:8. The calcined products were analyzed by the X-ray diffraction method. The Ce_2O_3 X-ray diffraction pattern was interpreted on the basis of data by B. F. Ormont (Ref. 5: Struktura neorganicheskikh veshchestv. (Structure of Inorganic Substances) M.-L., 1950, str. 455). The refractive index, dielectric constant, dielectric loss (these two measured by I. S. Yanchevskaya),

Card 1/3

29514
S/062/61/000/011/001/012
B119/B138

Reaction between Ce_2O_3 and SiO_2 at ...

X

and specific weight were also determined. To identify the products yielded, they were oxidized by heating in air and their oxygen absorption was gravimetrically determined. (The individual Ce^{III} silicates have different decomposition temperatures on heating in air.) Results: The compounds $Ce_2O_3 \cdot SiO_2$, $2\ Ce_2O_3 \cdot 3\ SiO_2$, and $Ce_2O_3 \cdot 2\ SiO_2$ could be proved. Crystalline $Ce_2O_3 \cdot 2\ SiO_2$ was obtained from an initial mixture of $1\ Ce_2O_3 + 2\ SiO_2$. $Ce_2O_3 \cdot SiO_2$ and $2\ Ce_2O_3 \cdot 3\ SiO_2$ are unstable and could not be obtained from their stoichiometric initial mixtures in a purely-crystalline phase. The decomposition temperatures in air are between 300 and 500°C for $Ce_2O_3 \cdot SiO_2$, between 600 and 700°C for $2\ Ce_2O_3 \cdot 3\ SiO_2$, and at 900°C for $Ce_2O_3 \cdot 2\ SiO_2$. Among others, papers by N. A. Toropov and I. A. Bondar' (Ref. 1: Izv. AN SSSR, Otd. khim. n. 1959, 554) and I. A. Bondar' (Ref. 1: Sb. "Khimiya i prakticheskoye primeneniye silikatov", L., 1960, str. 5-9) are mentioned. There are 6 figures, 8 tables, and 5 references: 2 Soviet and 3 non-Soviet. The two references to English-language publications read as follows:

Card 2/3

29514
S/062/61/000/011/001/012
B119/B138

Reaction between Ce_2O_3 and SiO_2 at ...

I. Warshaw, R. Roy, Amer. Ceram. Soc. Bull. 38, N 4, 169 (1959); Alphabetical and Numerical Indexes of X-Ray Diffraction Patterns. ASTM, 1953.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: May 22, 1961

X

Card 3/3

29990
S/131/61/000/012/002/002
B105/B101

15.2670

AUTHORS: Keler, E. K., Andreyeva, A. B.

TITLE: Decomposition of calcium zirconate in the presence of some oxides during heating

PERIODICAL: Ogneupory, no. 12, 1961, 581 - 586

TEXT: The authors investigate the thermal resistivity of calcium zirconate as a refractory material in the presence of the oxides of elements of the fourth group and of alumina. For the synthesis of calcium zirconate at 1350, 1500, and 1600°C, they used industrial zirconium dioxide with a content of 98.4% ZrO_2 and calcium carbonate, as well as ZrO_2, TiO_2, SiO_2, ThO_2, and Al_2O_3. Specimens from calcium zirconate react at 1350°C in contact with silica and titanium dioxide. Up to 1450°C this reaction did not take place with zirconium dioxide, thorium dioxide, and alumina. Calcium zirconate in an equimolecular mixture with ZrO_2, SiO_2, TiO_2, and Al_2O_3 decomposes during heating up to 1500°C: (1) with SiO_2 into calcium silicate and monoclinic zirconium

X

Card 1/2

29990
S/131/61/000/012/002/002
B105/B101

Decomposition of calcium...

X

dioxide; (2) with ZrO_2 into the solid solution ZrO_2 - CaO and some undecomposed zirconate is left; (3) with Al_2O_3 into the solid solution ZrO_2 - CaO and calcium aluminate; (4) with TiO_2 into the triple compound $ZrO_2 \cdot CaO \cdot 2TiO_2$ and a residue of $CaZrO_3$. With ThO_2, calcium zirconate does not decompose during heating to 1600°C. There are 6 figures, 4 tables, and 8 references: 5 Soviet and 3 non-Soviet. The two references to English-language publications read as follows: M. K. Hadler, E. C. Fitzsimmohs. Journ. Amer. Cer. Soc., 1955, No. 6, p. 214; L. W. Coughanour, R. S. Roth, S. Marzullo, F. E. Sennett. J. of Research N.B.S., 1955, v. 54, No. 4.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry AS USSR)

Card 2/2

KELER, E.K.; ANDREYEVA, A.B.

Effect of an admixture of silica on the sintering and stabilization of zirconium dioxide. Ogneupory 26 no.6:276-281 '61.
(MIRA14:7)

1. Institut khimii silikatov AN SSSR.
(Zirconium oxide)
(Silica)

GODINA, N.A.; KELER, E.K.

Stability of solid solutions in the following systems: ZrO_2-MgO_2, ZrO_2-CaO, HfO_2-MgO, and HfO_2-CaO. Ogneupory 26 no.9: 426-431 '61. (MIRA 14:9)

1. Institut khimii silikatov AN SSSR.
(Refractory materials) (Zirconium oxide)
(Hafnium oxide)

S/080/61/034/001/017/020
A057/A129

15.2100 1142, 1273, 1153
21.1310

AUTHORS: Sergeyeva, V.I., Glushkova, V.B., Keler, E.K.

TITLE: Physical and Technical Properties of Barium and Strontium Silicates

PERIODICAL: Zhurnal Prikladnoy Khimii, 1961, Vol. 34, No. 1, pp. 212-214

TEXT: Synthesis and sintering of single barium and strontium silicates with mineralization admixtures were investigated, and the physical and technical properties of the sintered samples were determined. Concretes containing these silicates have a greater resistance to sea water, they are heat-resistant and have X- and gamma-ray shielding properties. Besides, these silicates are used for special ceramics and phosphors. Nevertheless they are insufficiently studied. Hadley et al. [Ref.2: J.Applied Physics,27,11,1384 (1956)] briefly reported on some physical properties of barium orthosilicate. The present authors determined in previous investigations [Ref.3: ZhNKh,1,10,2283 (1956), Ref.4: ZhPKh,30,4,517 (1957)] formation conditions of barium- and strontium-silicates. In the present work the silicates were synthesized from dry silicic acid and barium- as well as strontium-carbonate in silite ovens

Card 1/6

22532
S/080/61/034/001/017/020
A057/A129

Physical and Technical Properties of Barium and Strontium Silicates

at 1,200°-1,400°C. The sintered material was milled by batches after each 4 hrs of sintering, briquetted (at 200 atm pressure) and sintered again to accelerate synthesis of the components. Duration of the total sintering process was 32-56 hrs. The synthesized silicates were sieved and articles were pressed at 500 atm adding 7-10% of kerosene by weight to decrease lamination of the material. The articles were fired at different temperatures, and the physical and mechanical properties were determined. In order to obtain samples of small porosity, mineralizers (Na_2CO_3, $BaCl_2$, ZnO, $SrCl_2$, MgF_2, B_2O_3, and Al_2O_3) in amounts of 1-1.5% of weight were mixed with the synthesized silicates. The strongest influence have Al_2O_3 and B_2O_3 admixtures (the latter on Ba_2SiO_4). They form a liquid phase at 1,350°-1,400°C by melting of the eutectic in this ternary system. According to these results Al_2O_3 and B_2O_3 admixtures were used to prepare sintered samples. Physical and technical properties of the investigated samples demonstrate (see Table) that additions of Al_2O_3 and B_2O_3 in the amount of 1-1.5% by weight decrease porosity, increase mechanical strength (except Ba_2SiO_4 + 1% B_2O_3) and the modulus of elasticity and bending. Al_2O_3 admixtures practically do not change the heat-re-

Card 2/

S/080/61/034/001/017/020
A057/A129

Physical and Technical Properties of Barium and Strontium Silicates

sistance of the material. The dielectric constant increases with BaO- and SrO-content in the silicate. Barium silicates have a lower temperature coefficient of dielectric constant. The present investigation demonstrates that improvement and increase in mechanical properties of barium- and strontium-silicates were effected by sintering with admixtures of mineralizers. There are 1 table and 4 references: 2 Soviet-bloc, 2 non-Soviet-bloc.

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X

Card 3/6

S/080/61/034/001/017/020
A057/A129

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Table:

Physical and technical characteristics of the samples:

① silicate, ② content of mineralizer (in % of weight), ③ sintering temperature in °C, ④ water absorption according to kerosene in %, ⑤ apparent porosity in %, ⑥ true porosity in %, ⑦ weight by volume in g/cm³, ⑧ setting in %, ⑨ physical and technical values, ⑩ coefficient of expansion, ⑪ Poisson's ratio, ⑫ coefficient of shear $G \cdot 10^{-5}$ in kg/cm², ⑬ modulus of elasticity $E \cdot 10^{-5}$ in kg/cm², ⑭ compression strength σ in kg/cm², ⑮ number of heat changes until rupture, ⑯ dielectric constant ε, ⑰ dielectric losses tg δ, ⑱ temperature coefficient of dielectric constant $t_{v\varepsilon} \cdot 10^6$, ⑲ melting point, ⑳ no admixture.

① Силикат
$BaSi_2O_5$ $d = 3.75$ ⑲ т. пл. 1420°
$BaSiO_3$ $d = 4.40$ ⑲ т. пл. 1605°
Ba_2SiO_4 $d = 5.44$ ⑲ т. пл. 1750°
$SrSiO_3$ $d = 3.63$ ⑲ т. пл. 1580°
Sr_2SiO_4 ⑳ $d = 4.57$ т. пл. > 1750°

Card 4/6

S/080/61/034/001/017/020
A057/A129

Physical and Technical

Table (continued)

② Содержание минерализатора (в вес. %)	③ Температура обжига (в °C)	④ Водопоглощение по керосину (%)	⑤ Кажущаяся пористость (в %)	⑥ Истинная пористость (в %)	⑦ Объемный вес (в г/см³)	⑧ Усадка (в %)	⑩ Коэффициент пластичности
⑳ Без добавки	1320	12.4	31.6	32.0	2.65	3.22	12.8
Al_2O_3 — 1	1320	1.8	5.9	—	3.27	8.7	—
⑳ Без добавки	1500	7.8	25.3	26.1	3.23	4.6	15.5
Al_2O_3 — 1	1450	0.3	1.2	—	3.75	11.7	—
⑳ Без добавки	1600	1.4	6.9	11.9	4.8	7.6	14.6
B_2O_3 — 1	1200	0.69	3.0	—	4.68	9.3	—
⑳ Без добавки	1450	9.9	2.7	33.4	2.72	3.4	11.3
Al_2O_3 — 1	1450	0.2	0.7	—	3.18	7.8	—
⑳ Без добавки	1450	7.0	23.6	27.2	3.32	5.9	12.7
Al_2O_3 — 1	1450	3.1	11.4	—	3.63	8.8	—

Card 5/6