

face area of 35.6 m²/g. The product contained 48.1% of Al, corresponding to an overall glass/alumina composition of about 9/91.

EXAMPLE 2

Alumina was coated with biologically active glass by substantially the method of Example 1, with the following changes: The alumina was calcined "Alcoa" C333B Al₂O₃·3H₂O; the quantities were 600 g of alumina, 180 ml of solution I, 180 mL of solution II, and 25.2 ml of formic acid; after mixing with the liquid, the treated alumina was air-dried overnight and then fired at 1200° C. for one hour.

Loose aggregates were broken up in a blender cup to give a particulate glass-coated alumina that had a surface area of 7.4 m²/g. A representative sample was fractionated sequentially through sieves of increasing fineness and showed the following particle size distribution: on 80-mesh screen 2%; through 80, on 200, 13%; through 200, on 325, 45%; and through 325, 35%.

EXAMPLE 3

An aqueous solution of a biologically active glass having the following composition was made without formation of a precipitate: 40% SiO₂, 5% B₂O₃, 6% P₂O₅, 24.5% CaO, and 24.5% Na₂O. The two precursor solutions contained the following reagents.

Solution I

2.4 g NaO₂CH
56.9 g Ca(O₂CH)₂
Final volume: 600 ml (water).

Solution II

140.7 g 37.1% solution Na₂O·3.38 SiO₂
13.6 g Na₂B₄O₇·10H₂O
32.1 g Na₃PO₄·12H₂O
Final volume: 600 ml (water).

The mixing of Solutions I and II was accomplished as follows. Formic acid (0.5 ml) was added with 5 ml of water to Solution II. Then 5 ml of I was added fast with agitation. This gave a clear solution that did not gel until after 3 days at room temperature.

The powdered alumina was coated as follows: first, Alcoa C-331 Al₂O₃·3H₂O (gibbsite) having a size classification of

94 to 99% less than 30 microns,
85 to 93% less than 20 microns,
56 to 67% less than 10 microns, and
20 to 40% less than 5 microns,
was calcined at 400° C.

The alumina (100 g) was then ground with a solution of the biologically active glass made from 25 ml of Solution I, 3 ml of formic acid, and 25 ml of Solution II. The wet solid was air dried, then fired in a platinum dish at 1200° C. for 30 min to give 102 g of free flowing solid. This powder (75 g) was retreated using 15 ml of Solution I, 1.8 ml of formic acid, and 15 ml of Solution II. The final product was a white powder (80 g). This powder in water raises the pH to about 10.

EXAMPLE 4

Two solutions were prepared as follows:

(I) 237.6 g of calcium formate, 114.4 g of sodium formate, and enough distilled water to give 4 liters of solution.

(II) 158.4 g of Na₄P₂O₇·10H₂O, 1,448.8 g of 37.1% Na₂O·3.38 SiO₂, and enough water to give 4 liters of solution.

To 720 ml of Solution I containing 160 ml of formic acid in a blender cup was added with vigorous stirring 720 ml of Solution II. This final solution was spray-dried to a fine white powder.

The powder contained water and formates that were removed as follows. To a 1 liter 3-necked flask fitted with a paddle stirrer, thermocouple, and slow nitrogen purge was added 25 g of the powder with heating and stirring. The particles gassed vigorously at 350° to 400°. More powder was added using hot powder as a diluent. As drying progressed, powder was added more quickly. The final product (214 g from 409.6 g of spray-dried powder) was heated at 800° C. in a muffle furnace and then ground to a powder. When further heated to 920° C. the dark gray product was a porous, easily crushed glass foam of composition corresponding to the 53.0% SiO₂, 12.8% CaO, 23.0% NaO and 6.3% P₂O₅ of U.S. Pat. No. 4,171,544.

EXAMPLE 5

This Example was carried out in a manner similar to that of Example 4.

Solution I

2.4 g of sodium formate,
56.9 g of calcium formate,
enough water to give 600 ml.

Solution II

140.7 g of 37.1% Na₂O·3.38 SiO₂ in water,
13.6 g of Na₂B₄O₇·10H₂O,
32.1 g of Na₃PO₄·12H₂O,
enough water to give 600 ml.

To prepare the solution for spray drying, 720 ml of Solution I and 100.8 ml of formic acid were put in a blender cup and stirred vigorously while adding 720 ml of Solution II. The solution was then spray dried and heated and stirred as described in Example 4. After the heat was raised to 1050° C., the resulting product was a friable white solid easily crushed in a mortar and pestle to a white powder. Based on the amounts of material used, this product had this composition by weight: Na₂O, 23.7%; CaO, 24.8%; P₂O₅, 6.0%; SiO₂, 40.5%; and B₂O₃, 5.0%.

EXAMPLE 6

Calcined Al₂O₃·3H₂O (Alcoa C30BF) was coated with glass. Particle size distribution was as follows: 80 to 85% pass through a #325 sieve, i.e., are less than 45 m, and 97 to 99% pass through a #200 sieve, i.e., are less than 75 m.

Two solutions were made up as follows: Solution I contained 56.9 g of calcium formate, 6.1 g of sodium formate, and enough water to make 500 ml of solution; its pH was 6.6. Solution II contained 32.0 g of Na₃PO₄·12H₂O, 158.5 g of Na₂O·(SiO₂)_{3.38} as an aqueous 37.1% solution, and enough water to make 500 ml of solution; its pH was 10.9.

To 50 ml of Solution I was added 7 ml of formic acid, and the resulting solution was added rapidly with good stirring to 50 ml of Solution II. The combined solution was added slowly to 200 g of alumina in a mortar as the mixture was stirred with a pestle. Stirring was continued until the mixture was uniform. The product was