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Spontaneous Decomposition Temperatures of Potassium Chlorate-Iron Oxide Mixtures

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This method is in actual use at the present time. It has been found that by modifying this treatment a zeolite with greater water softening power is obtained. The sand is first treated with a concentrated calcium chloride solution, and subsequently with a concentrated sodium chloride solution. The sand is then rapidly heated to a temperature of about 800°C and is then quenched in a salt solution.

A COMPARISON OF GRADES IN CHEMISTRY WITH THE SAME AND WITH DIFFERENT INSTRUCTORS

F. E. BROWN AND KENNETH L. BIRD

An analysis of 10453 enrollments in freshman chemistry was made. Of these 3648 had the same instructor in recitation and laboratory, and 6805 had different instructors. 5.4% of those having the same instructor failed; 8.3% of those having different instructors failed. 3.1% of those having the same instructor received a grade of 95% or above; only 1.9% of those having different instructors received a grade of 95% or above. Taking 80% as the dividing point, of those having the same instructor 41.6% were below and 58.4% above. Of those having different instructors 48.9% were below 80% and 51.1% above. The test and final examination grades are not so uniform as these final grades but in general the better grades are received by those who have the same instructor in recitation and laboratory.

SPONTANEOUS DECOMPOSITION TEMPERATURES OF POTASSIUM CHLORATE — IRON OXIDE MIXTURES

F. E. BROWN AND W. C. O. WHITE

Potassium chlorate and the oxides of iron were mixed in varying proportions and the spontaneous decomposition temperatures of the mixtures determined. Fe_3O_4 prepared at high temperatures exerted very little catalytic effect and no rapid evolution occurred below 374° in a mixture whose composition was $KClO_3$: Fe_3O_4:: 1 : 1. A monohydrate of Fe_3O_4 prepared by precipitation was magnetic as precipitated. A 1 : 1 mixture of this oxide with $KClO_3$ suffered spontaneous decomposition at 294°. A freshly prepared sample of Fe_2O_3 was used with $KClo_3$. Spontaneous decomposition occurred at 235°. A sudden evolution of Cl_2 occurred at 120°. The Cl_2 evolved at 120° was from NH_4Cl

remaining in the Fe_2O_3. When iron oxides are heated they lose their catalytic effect on the decomposition of $KClO_3$.

THE EFFECT OF PRESSURE ON THE RATE OF DECOMPOSITION OF POTASSIUM CHLORATE-MANGANESE DIOXIDE MIXTURES

F. E. BROWN AND H. M. McLAUGHLIN

It has been believed that pressure has no effect on the rate of decomposition of potassium chlorate. At 125° oxygen is evolved from a mixture of $MnO_2 : KClO_3 :: 1 : 2$ if the pressure is below 0.1 mm. of mercury but not at atmospheric pressure. At 175° oxygen is evolved from the same mixture at 2-3 mm. pressure of mercury but not at atmospheric pressure. At 300° the same mixture decomposes almost explosively at atmospheric pressure but will remain 90% undecomposed after seven hours at 320° if the pressure is above 300 atmospheres.

ACTION OF NATURAL ALKALI WATERS ON PORTLAND CEMENT

GEO. W. BURKE

Of the salts common to alkali bearing waters those of magnesium are the most active on cement. Magnesium sulphate solution in intimate contact with cement reacts very rapidly with practically all the calcium of the latter producing calcium sulphate and an insoluble compound of magnesium. The reaction results in a material increase in the weight and volume of the cement. Magnesium chloride rapidly reacts with cement replacing practically all the calcium by magnesium. Chemically equivalent amounts of calcium and magnesium are involved in the exchange. Slight decreases in the weight and volume of the cement accompany this reaction. The salts of sodium are less active than the corresponding ones of magnesium.

STUDIES ON THE COMMERCIAL PREPARATION OF CHLORATES

H. A. CHRISTOPHERSON

Sodium bicarbonate may be obtained very cheaply from the base of the Solvay tower, after the removal of the ammonium