

# Proceedings of the Iowa Academy of Science

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Volume 31 | Annual Issue

Article 58

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1924

## Studies on the Commercial Preparation of Chlorates

H. A. Christopherson

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### Recommended Citation

Christopherson, H. A. (1924) "Studies on the Commercial Preparation of Chlorates," *Proceedings of the Iowa Academy of Science*, 31(1), 277-278.

Available at: <https://scholarworks.uni.edu/pias/vol31/iss1/58>

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remaining in the  $\text{Fe}_2\text{O}_3$ . When iron oxides are heated they lose their catalytic effect on the decomposition of  $\text{KClO}_3$ .

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### 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  $125^\circ$  oxygen is evolved from a mixture of  $\text{MnO}_2 : \text{KClO}_3 :: 1 : 2$  if the pressure is below 0.1 mm. of mercury but not at atmospheric pressure. At  $175^\circ$  oxygen is evolved from the same mixture at 2-3 mm. pressure of mercury but not at atmospheric pressure. At  $300^\circ$  the same mixture decomposes almost explosively at atmospheric pressure but will remain 90% undecomposed after seven hours at  $320^\circ$  if the pressure is above 300 atmospheres.

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### 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.

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### 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

chloride. This process seeks to utilize the bicarbonate by treating it with chlorine to form sodium chlorate.

The reaction between chlorine and sodium bi-carbonate at the proper temperature forms sodium chlorate and sodium chloride. The chlorate is recovered from the liquor by virtue of the difference in solubility between sodium chlorate and sodium chloride in the hot and cold. The salt and carbon dioxide are again used in the soda process.

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## SOME OBSERVATIONS ON THE EFFECT OF IODINE ADMINISTRATION UPON SHEEP

JOHN M. EVVARD, ALVIN R. LAMB, AND W. G. GAESSLER

On account of the occasional incidence of goitre and death of lambs produced on the experiment station farm, an experiment on the administration of potassium iodide to the pregnant ewes was carried on in 1917-18. Three lots of four on the same ration were fed from 2 to 15 grains potassium iodide daily. Results on the prevention of goitre in the young were not conclusive, but the passage of the iodine into the milk of the ewes was demonstrated, and pronounced unfavorable results from too large a dose of iodine were obtained, especially in the lots receiving the larger allowances. These unfavorable effects were not particularly in the vigor of the new-born and the lack of resistance to disease.

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## STRUCTURAL EVIDENCES OF AN IRON-CARBON EUTECTOID

H. E. FLANDERS AND ANSON HAYES

Photographic evidence is presented which shows that there is produced in the critical range a large number of small carbon spots throughout the ferrite matrix. Since the spots are not present above the range or in pearlite or solid solution areas they are considered to be the result of the precipitation of carbon and ferrite at the iron-carbon eutectoid. The details of the mechanism of  $\text{CO} \times \text{CO}_2$  acting as catalysts to break down cementite is presented from the standpoint of cementite being metastable. When this is the case a pressure gradient will exist for CO from the cementite toward the temper carbon and a similar gradient will exist for  $\text{CO}_2$  in the opposite direction. It is concluded that the gases do not transport carbon from cementite to the primary temper carbon spots under ordinary conditions of graphitization.