

of the anode by gravity and recycled through the anode for maximum advantage. The bath was composed of a solution of monochloroacetic acid in concentrated hydrochloric acid and could be used continuously for a series of experiments.

Using iodine, ferric chloride, and cyanuric acid as catalysts respectively, current efficiencies of 33 per cent., 68 per cent. and 89 per cent. respectively were obtained at a current density of 0.026 amp. per square cm. at 38° C.

J. C. GHOSH,  
S. K. BHATTACHARYYA,  
M. R. A. RAO,  
M. S. MUTHANNA,  
R. B. PATNAIK.

Dept. of Pure & Appl. Chemistry,  
Indian Institute of Science,  
Bangalore,  
March 15, 1947.

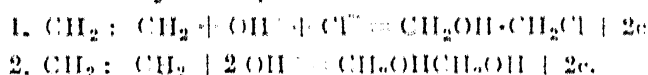
1. Croco and Lowy, *Trans. Electrochem. Soc.*, 1926, 50, 315.

### ELECTROLYTIC REACTIONS ON POROUS CARBON ANODES PART III:

#### The Preparation of Ethylene Chlorhydrin and Ethylene Glycol from Ethylene

ETHYLENECHLORHYDRIN and ethyleneglycol are largely used as industrial solvents in the drug industry. The methods of preparation are based on the reaction between ethylene and hypochlorous acid formed by passing gaseous chlorine into water or by the action of boric acid on a hypochlorite solution. As regards their preparation by electrochemical methods, only three references could be traced.<sup>1</sup>

It has been found that ethylene on electrolytic oxidation on a porous carbon tube as anode in an electrolytic bath of sodium chloride, produces both chlorhydrin and glycol, the yield of each depending on experimental conditions. For example, working with a solution containing 10 per cent. sodium chloride at a flow rate of ethylene of 57 c.c. per hour per sq. cm. of anode surface, and a current density of 0.023 amp. per sq. cm., the current efficiency calculated on the basis of ethylenechlorhydrin has been found to be 91 per cent. at 1° C. and 1.1 per cent. at 91° C.; and calculated on the basis of glycol has been found under identical conditions to be 5.4 per cent. at 1° C. and 16.5 per cent. at 91° C. The reactions may be represented as follows:—



J. C. GHOSH,  
S. K. BHATTACHARYYA,  
M. S. MUTHANNA,  
A. D. PATANKAR.

Dept. of Pure & Appl. Chemistry,  
Indian Institute of Science,  
Bangalore,  
March 15, 1947.

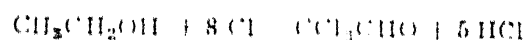
1. *B.P.*, 1916, 140, 831; *U.S.P.*, 1918, 125, 3615; *U.S.P.*, 1919, 1, 308, 797.

### ELECTROLYTIC REACTIONS ON POROUS CARBON ANODES.—PART IV:

#### Preparation of Chloral from Alcohol

CHLORAL is now an important intermediate in the manufacture of D.D.T. Chloral alcoholate obtained by the reaction of dry chlorine with dry alcohol is converted into chloral by sulphuric acid. Koidzumi<sup>1</sup> has done some work on the electrolytic preparation of chloral.

In our experiments the bath was composed of a concentrated solution of sodium chloride in a copper vessel which acted as a cathode. As the alcohol was gradually introduced into the anode compartment through the porous carbon anode it reacted according to the equation:—



The experiments were carried out at 100° C. so that the chloral formed distilled off immediately and was thereby removed from further anodic attack. It was found, that besides chloral and chloral alcoholate, other products like monochloroacetic acid, ethyl acetate, monochloroacetaldehyde hydrate and alcoholate were obtained as by-products; the yields depending on experimental conditions.

Working with a saturated solution of sodium chloride maintained at a temperature of 100° C., at a current density of 0.04 amp./sq. cm. and using porous carbon impregnated with 6.5 per cent. by weight of cyanuric acid, the current efficiency calculated on the basis of chloral has been found to be 33.4 per cent.

J. C. GHOSH,  
S. K. BHATTACHARYYA,  
M. S. MUTHANNA,  
R. K. PARIKH.

Dept. of Pure & Appl. Chemistry,  
Indian Institute of Science,  
Bangalore,  
March 15, 1947.

1. Koidzumi, *Mem. Coll. Sci. Kyoto*, 1925, 8, 155.

### NOTE ON THE ESTIMATION OF CHROMIUM IN CHROMITE ORES

CHROMIUM is generally estimated in chromite ores by fusing the chromite with sodium peroxide in a nickel or a porcelain crucible. Ordinarily a nickel crucible can stand 5-6 peroxide fusions while some of the porcelain crucibles could hardly stand two fusions. Added to this, the nickel peroxide formed during fusion requires long boiling before it is completely dissolved in sulphuric acid. The chief constituent that has to be analyzed in the chromite ore is the chromium oxide ( $\text{Cr}_2\text{O}_3$ ); sometimes iron oxide ( $\text{Fe}_2\text{O}_3$ ) is also wanted. Silica is rarely required. In view of the scarcity and high cost of the nickel crucibles, the following simple method has been standardised employing a glass test tube for the peroxide fusion.

Sodium peroxide (1-2 g.) is introduced into a dry stout-walled test tube and finely divided