United States Patent Office

2,717,237

Patented Sept. 6, 1955

2,717,237

PRODUCTION OF CHLORINE DIOXIDE

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No Drawing. Application June 25, 1952, Serial No. 295,551

4 Claims. (Cl. 204—101)

This invention relates to an electrolytic process for the production of chlorine dioxide substantially free from chlorine.

Chlorine dioxide is produced by a number of different processes, one of which is the electrolysis of an aqueous solution of a chlorite in the presence of a chloride. This process is subject to certain disadvantages when used for large scale production since, if the chlorite is fed to the electrolytic process in insufficient quantities, or if the feed of chlorite is unexpectedly interrupted, there is a danger of the chlorite present in the electrolytic cell being exhausted so that chlorine is developed instead of chlorine dioxide. If the electrolysis takes this course, it may be disadvantageous or even hurtful for certain fields of applications, since chlorine dioxide is very often used to treat substances which are not stable to chlorine.

It has now been found that practically chlorine-free chlorine-dioxide is obtained by electrolysis of an aqueous solution of a chlorite, such as an alkali metal chlorite, for instance, sodium chlorite, by carrying out the electrolysis in the presence of a water-soluble sulfate, such as an alkali metal sulfate.

Accordingly, the present invention provides a process for the production of substantially chlorine-free chlorine dioxide by electrolysis of an aqueous solution of a chlorite, such as sodium chlorite, wherein the electrolysis is carried out in the presence of a water-soluble sulfate.

The process of the invention has the advantage that substantially chlorine-free chlorine dioxide is produced while the electrolysis proceeds normally, and that if the feed of chlorite solution decreases or even stops, the evolution of chlorine dioxide simultaneously also decreases or stops, without any quantity of chlorine being evolved as the electrolysis proceeds.

The process of the invention may be carried out in an electrolytic cell consisting substantially of a platinum

anode, a diaphragm and a lead cathode. The heat evolved in the anode compartment is preferably dissipated by a cooling device. The chlorine dioxide, developed in the anode compartment during electrolysis, is expelled and diluted by a controlled quantity of an inert gas, for instance air, which is introduced at the bottom of the anode by means of a distributor device. A feed solution containing controlled amounts of a chlorite and a sulfate is continuously introduced into the anode compartment by means of an automatic contrivance, while an appropriate quantity of caustic soda solution is discharged from the cathode compartment through an overflow. The desired concentration of chlorine dioxide is varied and adjusted by regulating the air supply within a predetermined range.

The invention is further illustrated by the following example:

Example

The anode compartment of an electrolytic cell is charged and subsequently fed at a rate of 25 ccs. per hour, with a solution containing per litre 200 grams of $NaClO_2$ and 80 grams of Na_2SO_4. A current of 1.25–1.4 amperes at a voltage of 6.15–6.25 volts is passed through the cell, and the air flow is 25 litres per hour. In this way a gas with a chlorine dioxide content of between 3.2 and 4.1 per cent by volume is obtained. The amount of chlorine dioxide thus formed is about 2.3–3 grams per hour. The content of Cl_2 is between 0.04 and 0.09 per cent by volume.

What is claimed is:

1. In the process for the production of substantially chlorine-free chlorine dioxide by electrolysis of a chlorite, the improvement which comprises electrolyzing an aqueous solution of a chlorite in the presence of a water-soluble metal sulfate.

2. Improvement according to claim 1, in which said chlorite is an alkali metal chlorite and said sulfate is an alkali metal sulfate.

3. Improvement according to claim 2, in which said alkali metal chlorite is sodium chlorite and in which said alkali metal sulfate is sodium sulfate.

4. In the process for the production of substantially chlorine-free chlorine dioxide by electrolysis of a chlorite, the improvement which comprises electrolyzing an aqueous solution consisting essentially of 200 grams of sodium chlorite per liter in the presence of 80 grams of sodium sulfate per liter.

References Cited in the file of this patent

UNITED STATES PATENTS

2,163,793 Logan ---------- June 27, 1939