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IMPROVEMENTS IN OR RELATING TO THE FABRICATION OF SILVER CHLORIDE ELECTRODE ACTIVATED BATTERIES.

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The following specification particularly describes and ascertains the nature of this invention and the manner in which it is to be performed.

This is an invention by DR. PREM BEHARI MATHUR and SHRI RAMASWAMY BALASUBRAMANIAN both of Central Electrochemical Research Institute, Karaikudi-3 (S. R.), India both Indian citizens.

The invention relates to improvements in or relating to the fabrication of Silver Chloride Electrode Activated Batteries.

Hitherto it has been the practice to use metallic grid as a support for the active material silver chloride in negative elecrode in Silver chloride activated cells. The metallic base in individual electrodes subscribes additional weight to the battery and also does not permit the very satisfactory performance of the cells at the very high rates of discharge because of the less adherence of the active material to the grid. The cells thus deliver lower output per unit volume, the lowering in power is largely affected by the volume, occupied by the supporting metallic grid. The other aspects related to the design of the cells which were responsible for the leakage current, inconsistency of the cell voltage over a wide range of current drains etc., needed improvements.

The object of this invention is :

(a) to obviate these disadvantages by avoiding the metallic grid support and to improve ampere hour capacity per unit volume of the cells.

(b) to obviate the difficulties of leakage current and inconsistency of the cell voltage over a wide range of current drains by rendering improvement in the cell design.

According to the present invention, the process for the fabrication of silver chloride activated batteries using silver chloride as the active cathode material, a metal like magnesium, zinc, aluminium as active anode material and paper and nylon cloth as the separator materials in the battery is characterised in that the cathode is made by sintering at an elevated temperature (*e.g.*, 330° to 420° for silver chloride powder mix with 5% to 20% of silver powder) a mixture of silver chloride and silver powders already pressed in the form of plates and pressing two such plates to form a two ply cathode.

The fabrication of magnesium silver chloride battery includes the following steps :

(a) preparation of cathode material mix ;

(b) preparation of silver chloride plates by sintering the cathode mix spread in the form of a plate ;

(c) cutting and trimming of the silver chloride plates and magnesium alloy sheets to size ;

(d) preparation of a wire structure as support and lead for the two ply plate assembly ;

(e) preparation of two ply silver chloride electrode by placing the wire structure support in between two said plates and pressing them ;

(f) soldering the magnesium plates to connecting wire lead ;

(g) insulation of the edges of the plates by means of an insulating plastic paint ; and

(h) assembling the batteries by placing magnesium and silver chloride electrodes alternatively separated by paper and nylon cloth separators, and also by the plastic sleeves at the edges and casing the entire assembly in a plastic material container.

Thus, the fabrication of magnesium-silver chloride battery includes the use of silver chloride cathode, magnesium anode separated by paper and nylon cloth separators and wherein the edges of the electrodes are insulated by plastics paints and the whole assembly is placed in a plastic material container, having holes at the bottom and at a top level for the inflow and outflow of the electrolyte solution as well of the evolved gases, on activation with salt water.

A multi-ply sintered silver chloride cathode may be fabricated by sintering pressed silver chloride powder mix with 5% to 20% of silver powder at an elevated temperature between 330° to 420°C and without making use of any grid support to the powder.

The cathode and anode leads may be two bunches of copper silver or like metals or alloy wires one spread inside the cathode while the other is soldered to the anode.

The electrode leads and the electrode edges are coated with plastic insulating material.

The anode and the cathode are separated from each other by plastic sleeves placed at the vertical edges between the electrode.

Thus the invention involves :

(a) developing a process for the preparation of sintered silver chloride plates without using any metallic grid as the support. The sintered plates being thin, light in weight and strong, result in the reduction in the weight and volume of the negative electrode in relation to the ampere hour capacity of the electrode.

(b) improving the cell design by using an improved type of separator system, insullation over the leads, soldering of the anode plates like the magnesium alloy plates used in silver chloride magnesium cells, thus obviating the leakage currents which result in heating up of the cell system and affecting adversely the cell performance.

EXAMPLE I

Take 80 grams of 80 mesh (BS) of Silver Chloride dried powder mixed with 20 grams of this mixture and spread within a copper frame die of 10 cm. by 6 cm. area placed over a mica sheet kept on a stainless steel or in mild steel plate and the mixture with another mica sheet. The powder is pressed in a press using another die of the same size as the previous one placed over the powder. The pressed plate is placed in a furnace maintained at a temperature of about 350°C for a period of 5 to 15 minutes. The pressed powder in plate form is removed, cooled and cut to proper size of say 10 cm by 3 cm. Two such plates are taken and placed one over another to make multiply cathode. A bunch of copper or silver wires are inserted and spread in between the two sintered plates and pressed and the other ends of these wires are joined together to form the lead. For the fabrication of silver chloride and magnesium cell, 3 magnesium alloy plates of 10 cm×3 cm×.032 cm are taken and the copper leads are soldered to them. The electrode leads edges are coated with plastic insulating material. Two ply silver chloride electrodes are wrapped in a filter paper and then in a Nylon cloth which act as separators. The cell is fabricated by placing 3 magnesium plates and 2 silver chloride plates alternatively, such that the two end plates constitute magnesium electrodes. Each electrode is separated from one another by means of a plastic sleeve placed vertically on the two vertical edges of the plates. All leads emanating from magnesium electrodes are joined together and from silver chloride electrodes together to form the two terminals of the cell. A plastic container having holes at its bottom and also at the top is used to house this assembly. The emanating leads are coated with a plastic material and the leads ends are left bare. The electrodes leads coming out of the plastic containers pass through a rigid washer to avoid twisting effect on the electrodes. This silver chloride magnesium activated cell can be discharged on connecting a load to its terminals and dipping it in salt water or sea water.

We claim :

1. A process for the fabrication of silver chloride activated batteries using silver chloride as the active cathode material, a metal like magnesium, zinc, aluminium as active anode material and paper and nylon cloth as the separator materials in the battery which is characterised in that the cathode is made by sintering at an elevated temperature (*e.g.*, 330° to 420° for silver chloride powder mix with 5% to 20% of silver powder a mixture of silver chloride and silver powders already pressed in the form of plates and pressing two such plates to form a two-ply cathode.

Price : TWO RUPEES.

2. A process as claimed in Claim 1 wherein the fabrication of magnesium silver chloride battery includes the following steps :

(a) preparation of cathode material mix ;

(b) preparation of silver chloride plates by sintering the cathode mix spread in the form of a plate ;

(c) cutting and trimming of the silver chloride plates and magnesium alloy sheets to size ;

(d) preparation of a wire structure as support and lead for the two ply plate assembly ;

(e) preparation of two ply silver chloride electrode by placing the wire structure support in between two said plates and pressing them ;

(f) soldering the magnesium plates to connecting wire lead ;

(g) insulation of the edges of the plates by means of an insulating plastic paint ; and

(h) assembling the batteries by placing magnesium and silver chloride electrodes alternatively separated by paper and nylon cloth separators, and also by the plastic sleeves at the edges and casing the entire assembly in a plastic material container.

3. A process as claimed in Claim 1 or 2 wherein the fabrication of magnesium-silver chloride battery includes the use of silver chloride cathode, magnesium anode separated by paper and nylon cloth separators and wherein the edges of the electrodes are insulated by plastics paints and the whole assembly is placed in a plastic material container, having holes at the bottom and at a top level for the inflow and outflow of the electrolyte solution as well of the evolved gases, on activation with salt water.

4. A process as claimed in any of the preceding claims wherein a multi-ply sintered silver chloride cathode is fabricated by sintering pressed silver chloride powder mix with 5% to 20% of silver powder at an elevated temperature between 330° to 420°C and without making use of any grid support to the powder.

5. A process as claimed in any of the preceding claims wherein the cathode and anode leads are two bunches of copper silver or like metals or alloy wires one spread inside the cathode while the other is soldered to the anode.

6. A process as claimed in any of the preceding claims wherein the electrode leads and the electrode edges are coated with plastic insulating material.

7. A process as claimed in any of the preceding claims wherein the anode and the cathode are separated from each other by plastic sleeves placed at the vertical edges between the electrode.

8. A process for the fabrication of silver chloride batteries substantially as described in the example.

9. Silver chloride battery whenever fabricated by a process substantially as hereinbefore described.

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Dated this 19th day of July 1966.

MGIP Sant.—SL—3 Patent/71—18-6-74—100.