Use of Antimony in Lead-acid Batteries

What is lead antimony used for?

Due to the soft nature of pure lead,lead antimony alloys are used in the preparation of lead battery grids. Small amounts of elements like arsenic and selenium are usually added to the lead antimony alloys to improve the grain refinement,fluidity and age hardening of the grids.

How does antimony work in a battery?

However, the unavoidable corrosion of the positive grid liberates antimony out of the grid which acts in two different ways in the battery: on the one hand, antimony stabilizes the active material of the positive electrode.

Why is antimony used in electrode grids in lead-acid cells?

Introduction Antimony is widely used as an alloying elementfor electrode grids in lead-acid cells. In addition to beneficial effects,mainly in the production 0378-7753/87/$3.50 Elsevier Sequoia/Printed in The Netherlands 302 of lead-acid cells,antimony also lowers the hydrogen-overvoltage at the negative electrode - a known disadvantage.

What are lead acid batteries used for?

Lead acid batteries are the most widely used battery system in several applications . The ability of lead batteries to supply high surge currents at relatively lost cost makes it attractive for use in several applications especially in automobiles,where high current is required for the motors to start .

Does antimony reduce hydrogen overvoltage?

In addition to beneficial effects,mainly in the production 0378-7753/87/$3.50 Elsevier Sequoia/Printed in The Netherlands 302 of lead-acid cells,antimony also lowers the hydrogen-overvoltage at the negative electrode- a known disadvantage. Antimony,which is found in negative active masses,comes primarily from the positive electrodes [1].

How is antimony deposited in an electrolyte?

Antimony (V) anions are released into the electrolyte by anodic corrosionof the positive grids and can then be transferred to the negative electrode,where they are reduced first to Sb (III) and subsequently to metallic antimony deposited on the electrode .

Antimony content has definitive role in deciding the cycle life and self-discharge properties of the lead acid batteries (Brennan et al., 1974; Berndt and Nijhawan, 1976). Antimony makes the battery easy to charge with good cycling properties, but needs regular inspection and makeup of the electrolyte volume because of the increased water loss.

It is well known that antimony, which is alloyed in the grids of the lead-acid battery to improve their castability, corrosion resistance, and strength, affects the properties of the battery in various ways. Of

particular interest is its apparent beneficial effect on the cycle life of the positive plate. It has been suggested that antimony is responsible for maintaining a minimum concentration ...

Lead-acid batteries use antimony in their plates, while lead-calcium batteries use calcium. This means that lead-calcium batteries are more resistant to corrosion, which can decrease battery capacity and efficiency. Energy Efficiency. Lead-calcium batteries are more energy efficient than lead-acid batteries. This is because they have a lower ...

To remove antimony, arsenic, and tin more thoroughly, an additional refining process using the anodic polarisation of lead in molten sodium hydroxide has been proposed [30][31][32].

The most common type of water used in batteries is distilled water. Other types are deionized water and water from reverse osmosis. Ordinary tap water should not be used because it may contain an excessive amount of impurities that will degrade battery performance. (See Table 1 for acceptable maximum allowable impurities in water for battery use).

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Lead-antimony alloys have been used in lead-acid batteries for many years because they improve the battery"s performance by increasing its efficiency and reducing its self-discharge rate. However, lead-antimony alloys have some drawbacks, such as reduced cycle life and increased water loss. This is where lead-calcium batteries come in. Calcium

Lead-acid batteries are made of lead plates and sulfuric acid electrolyte, while lead-calcium batteries use calcium alloy instead of antimony in the lead plates. Lead-calcium batteries have a longer lifespan and require less maintenance, but they are also more expensive and less tolerant to overcharging.

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At one time almost all lead acid batteries were made with lead antimony grids, and the original antimony alloy concentrations were in the 8-12% range. (Today the more common concentration levels we see in batteries using lead antimony alloys are in the 4-6% range.)8 Identifying the Problem The use of lead antimony alloys spurred the growth of the battery industry and ...

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Lead-acid batteries are used in a wide variety of fields, such as automobiles and industrial applications, and the quality and reliability required of these batteries are critical. Recently, there ...

In this study, the effect of antimony in positive active-material (PAM) on the performance of batteries with Pb-Ca-Sn alloy grids is investigated. The corrosion layer of Pb-Ca-Sn positive grids with conventional leady oxide discharges before the PAM discharges.

Using the selenium additive a very fine grain structure is achieved which improves castability and grid-quality to a great extent. The tendency to coarse dendritic solidification which gives rise to hot cracks and brittleness of the castings and usually occurs when alloys with low antimony content are used is not observed with these alloys.

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