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NASA TECH BRIEF

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Nongassing NiCd Battery Cell

Hermetic sealing is essential for NiCd battery cells used on spacecraft, as it prevents the loss of electrolyte and the resulting loss of performance. Hermetic sealing is also desirable in other applications of NiCd cells because it extends their life and reduces maintenance costs. There is, however, some risk associated with hermetic sealing in that it can cause excessive gas buildup in the cells, and the resulting increase in internal pressure may rupture the casings. A new way of constructing NiCd cells prevents this pressure increase and allows hermetic sealing to be used to extend battery life.

Two gases can be evolved in NiCd cells: oxygen and hydrogen. Oxygen is evolved at the positive plate; its rate of formation increases with the increasing state of charge of the positive active material. Thus accidental overcharging can cause rupture. In the nongassing cell, the ratio of positive active material to negative active material is approximately 1.7, which makes the cell negative limited. This means the capacity for charge in the cell is limited by the amount of negative (cadmium) active material on the negative plates. Also, sufficient extra positive active material is provided to ensure that the state of charge of the positive electrode will remain low enough to minimize oxygen formation.

The negative plates contain grid materials which exhibit high hydrogen-overvoltage characteristics. As the battery is charged to its capacity, these materials cause a sudden rise in cell voltage. This sharp rise is then used as a signal to stop the charging process, and thus stop the formation of hydrogen.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP75-10174

Patent status:

NASA has decided not to apply for a patent.

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Categories: 01 (Electronics - Components and Circuitry)
04 (Materials)