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NASA TECH BRIEF

Cobalt Improves Nickel Hydroxide Electrodes for Batteries

When they contain 20 mole % of cobalt hydroxide, positive nickel hydroxide electrodes are more efficient than when impregnated to the same degree by weight with nickel hydroxide alone. The cobalt-containing electrodes are made by impregnation of plates under vacuum with solutions of $Ni(NO_3)_2 \cdot 6H_2O$ containing 20 mole % of $Co(NO_3)_2 \cdot 6H_2O$. The nitrate is converted to the active hydroxide by reaction with potassium hydroxide.

Comparison in sealed cells with plain positive nickel hydroxide electrodes (the controls) shows that the cobalt electrodes are little different as a function of depth of discharge. At high rates, the cobalt electrodes must be discharged to 0.6 v for them to perform as well as control electrodes discharged to 0.9 v; at lower rates both types perform equally well when discharged to 0.9 v. Charge-acceptance and oxygen-evolution tests (both are measures of the efficiency of positive electrodes) indicate that, at all rates of charge, the cobalt electrodes are more efficient than the controls.

There are indications that the better performance of the cobalt electrodes reflects (1) greater reactivity because of small particle size and the concomitant increase in surface area; and (2) their more-efficient charge-acceptance—for the same coulombic input, the cobalt plates are at a higher state of charge than are the controls. Cells having cobalt positive electrodes can better withstand the rigors of cycling with great depth of discharge than cells equipped with control electrodes.

Note:

No further documentation is available. Technical questions may be directed to:

Technology Utilization Officer
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Patent status:

No patent action is contemplated by NASA.

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