A1/C12 Molten Salt Battery

The problem:
Many large, electrically powered devices, such as electric vehicles, require a compact energy source which is capable of providing the relatively large amount of energy necessary for operation.

The solution:
An aluminum chloride, molten salt battery has been developed with a theoretical energy density of 5.2 J/kg (650 W-h/lb). The battery, which operates at 150°C, can be used in the primary mode or as a rechargeable battery.

How it's done:
The battery has an aluminum anode and a chlorine cathode. The electrolyte is a mixture of AlCl3, NaCl, and some alkali metal halide such as KCl. With KCl, the electrolyte composition is 66-20-14 mol % of AlCl3, NaCl, and KCl, respectively.

The chlorine cathode is made corrosion resistant by using porous carbon as the substrate. The carbon is machined to a cylinder, 4.5 cm in length with a 1.9 cm diameter. An internal concentric hole (diameter 0.3 cm) is drilled to within 0.8 cm of the base of the cylinder. The highest current density is achieved when chlorine bubbles slightly, under a pressure of 1.7 x 10^5 N/m^2 (10 psig).

The aluminum electrode is a 5.3-cm high, 4.3-cm wide cylinder that fits concentrically around the carbon electrode.

The cell provides 20 mA/cm^2 at a cell potential of 1.8 V.

Note:
Requests for further information may be directed to:
Technology Utilization Officer
NASA Headquarters
Code KT
Washington, D.C. 20546
Reference: TSP72-10527

Patent status:
No patent action is contemplated by NASA.

Source: Jose Giner of Tyco Laboratories Inc. under contract to NASA Headquarters (HQN-10696)