November 1967

brought to you by X CORE

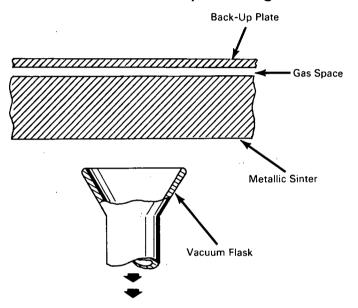
Brief 67-10436

NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Fuel Cell Life Improved by Metallic Sinter Activation After Electrode Assembly Welding



The problem:

To improve the service life of fuel cell electrodes. Current techniques of welding activated metallic sinter (a porous metal structure) to the metal backup plate of the electrode generally results in undesirable porous welds. In addition, the metallic sinter has frequently had a high corrosion rate that can cause a drastic performance loss and possible failure of the fuel cell.

The solution:

Perform the welding before the metallic sinter is activated, and then activate by depositing finely divided metal within the sinter structure from a solution that also contains corrosion inhibiting ions. Since there are several welding techniques that can produce satisfactory welds between the nickel backup plate and unactivated metallic sinter, the major part of this problem solution is the activation of the metallic sinter by flowing an appropriate activator solution through the porous sinter while attached to the backup plate.

How it's done:

One side of the metallic sinter is attached to a sheet metal backup plate by means of, but not limited to, electron beam welds. The activation procedure consists of cleaning the sinter, passing an activator solution through the sinter, and recleaning the sinter. The initial electrode cleaning is done by soaking 5 minutes in deionized water, and then removing the entrapped water by applying a vacuum (from the open end of a vacuum filter flask) to the exposed side of

(continued overleaf)

This document was prepared under the sponsorship of the National Aeronautics and Space Administration. Neither the United States Government nor any person acting on behalf of the United States Government assumes any liability resulting from the use of the information contained in this document, or warrants that such use will be free from privately owned rights. the sinter. The activator solution (including the corrosion inhibitor), is allowed to flow into an opening between the sinter and backup plate surfaces (e.g., the gas passage area in fuel cell assemblies). The solution is forced through the sinter either by gravity force or by a vacuum applied to the exposed face of the sinter (as was done in the initial cleaning operation).

The relative amount of sinter activation is noted by the change in sinter color. If the color is near black, a longer activation time is used before applying the vacuum. The electrode is then cleaned by forcing deionized water to flow through the sinter into a vacuum flask. The residue collected in the vacuum flask by the last two vacuuming operations is weighed, and this weight is subtracted from the initial weight of activator particles to give the weight of the activator entrapped by the metallic sinter. The electrode is then dried at $235^{\circ}F \pm 35^{\circ}$ for two hours.

Note:

Inquiries concerning this innovation may be directed to:

> Technology Utilization Officer Manned Spacecraft Center Houston, Texas 77058 Reference: B67-10436

Patent status:

No patent action is contemplated by NASA.

Source: W. A. Taylor of Pratt and Whitney under contract to Manned Spacecraft Center (MSC-10965)