# **NASA TECH BRIEF** Goddard Space Flight Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

## **Devolatilization of Polymer Resins**

#### The problem:

Under conditions of high temperature and low pressure, certain substances containing polymer resins emit volatile materials, making them unsuitable for space flight use.

#### The solution:

A commercial silicon resin was devolatilized by vacuum distillation at  $150^{\circ}$ C for 24 hours at 1 x  $10^{-6}$  Torr. The resultant product passed the test for outgassing criteria (acceptably low percentage of volatile materials), and it is cured at room-temperature.

A white paint with acceptable physical properties was made using the devolatilized resin.

### How it's done:

The silicon binder, a linear polydimethylsiloxane, was heated at  $150^{\circ}$ C for 24 hours in a starting vacuum of 1 x  $10^{-6}$  Torr. The resin height was one-half inch (1.25 cm).

In this particular application, a white paint (P-764-1A) was prepared using 240 parts by weight Zn0 mortared with 100 parts devolatilized resin, then mechanically stirred with 200 parts reagent grade toluene and one part SRC-05 catalyst.

A representative sample of cured paint passed the GSFC Micro-VCM (Volatile Condensable Materials) test. The paint adhered well to primed aluminum and epoxy fiberglass surfaces, both before and after thermal cycling.

#### Notes:

- 1. The GSFC Micro-VCM Test consists of subjecting a material to  $125^{\circ}$ C at  $1 \times 10^{-6}$  Torr for 24 hours with the condensate being collected at  $25^{\circ}$ C in the same system. The criteria for passing the test are a maximum 1% weight loss and a maximum 0.1% of volatile condensable materials.
- 2. Suggested applications of the devolatilized resin are potting compounds and conformal coatings.
- 3. Requests for further information may be obtained from:

Technology Utilization Officer Goddard Space Flight Center Code 207.1 Greenbelt, Maryland 20771 Reference: B72-10280

#### Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, non-exclusive license for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to:

> Patent Counsel Goddard Space Flight Center Code 204 Greenbelt, Maryland 20771

Source: Benjamin Seidenberg, J. Park and C. Clatterbuck Goddard Space Flight Center (GSC-11358)