

COMPONENT RELIABILITY TESTING OF LONG-LIFE SORPTION CRYOCOOLERS

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This paper summarizes experiments characterizing the ability of critical sorption cryocooler components to achieve highly reliable operation for long-life space missions. Test data obtained over the past several years at the Jet Propulsion Laboratory (JPL) are entirely consistent with achieving ten year life for sorption compressors, electrical heaters, container materials, valves, and various sorbent materials suitable for driving 8 to 180 K refrigeration stages. Test results reported include:

- . A praseodymium-cerium-oxide/oxygen ("PCO/O₂") compressor system, for 65 to 90 K cryocoolers, has accrued over 39,000 hours and 80,000 cycles of maintenance-free operation with no degradation as of January 1994,
- . A Saran carbon/krypton compressor system, for 120 to 140 K cryocoolers, demonstrated 10,000 hours of operation before trace hydrogen chloride left in the saran carbon during the manufacture process led to container material corrosion. Because of subsequent improvements in Saran carbon manufacturing techniques that have enabled reductions in trace hydrogen chloride to negligible levels, this is not expected to be a problem for future systems.
- Extended cycling tests of LaNi_{4.8}Sn_{0.2} and ZrNi hydride compressor systems for 8 to 30 K cryocoolers have been recently initiated,

The additional work needed to demonstrate the reliability of sorption cryocooler technology for future low vibration, lightweight, long-life, spacecraft sensor cooling applications is also discussed,

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Prefer Oral Session