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NASA TECH BRIEF



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Effects of Helium and Nitrogen as Pressurants in Nitrogen Tetroxide Transfer

A determination is required as to the effects of helium and nitrogen on a mass of nitrogen tetroxide during their use as pressurants to transfer the N_2O_4 from one vessel to another at a higher elevation. It is desired to study the thermodynamics of N_2O_4 plus the solubility and effervescence of He and N_2 in N_2O_4 , MMH, and Aerozine 50. Special attention is given to the effects of pressure and temperature on the interrelation.

In the study of thermodynamic properties of N_2O_4 , experimental data and thermodynamic correlations are employed. Temperature-entropy, temperature-enthalpy, and temperature-pressure-volume plots are developed. A method is also developed to predict thermodynamic properties of compounds that dissociate.

In the investigation to determine solubility of He and N_2 in N_2O_4 , MMH, and Aerozine 50 as a function of temperature and propellant gas pressure, Henry's law is used. Increase of solubility with temperature and as a function of similarity ($N_2O_4-N_2$) are observed.

Notes:

1. These data may contribute to creation of new environmental systems: improved oxygen solubility in water to promote fish life; use of helium in breathing to control gas effervescence from blood during decompression.
2. Inquiries concerning these studies may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B67-10083

Patent status:

No patent action is contemplated by NASA.

Source: Frank Bizjak and D. J. Simkin
of North American Aviation, Inc.
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Category 03