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NASA TECH BRIEF

Manned Spacecraft Center

Leaching of Nitroso Rubber Material Removes Uncured Polymer

A new leaching process removes the uncured polymer from nitroso rubber, an elastomer used in the presence of N_2O_4. The uncured portion is removed by controlled soaking of a polymer slab in Freon TF.

Uncured polymer causes nitroso rubber to adhere to adjoining surfaces limiting its usefulness in either static or dynamic applications. Leaching with Freon TF prevents this adhesion.

Physical Properties

Sample Ident.	Exposure	Tensile Strength $10^6 N/m^2$	(psi)	Elongation Percent	Percent Set	Shore Hardness
A	As Molded	6.49	(940)	250		60
B	As Molded	6.69	(970)	320		60
C	N_2O_4				33.0	65
D	N_2O_4				33.0	61
E	Freon N_2O_4				25.0	61
F	Freon N_2O_4				27.0	62
G	N_2O_4	4.90	(710)	500		57
H	N_2O_4	4.35	(630)	520		57
J	Freon N_2O_4	5.04	(730)	450		56
K	Freon N_2O_4	5.31	(770)	540		56
L	Freon	6.69	(970)	280		61
M	Freon	6.69	(970)	300		61

(continued overleaf)

The results of the leaching process are shown in the table. Samples A and B were tested as molded. Samples C, D, G and H were maintained as a control. Samples E, F, J, K, L and M were soaked in Freon TF for 3.0 hours and then vacuum dried for 3.0 hours at 46 ± 5.5°C (115 ± 10°F) and 127 mm (5 in.) Hg. After the Freon TF exposure samples E and F and control samples (unexposed to Freon TF) C and D were bent double around a 0.32 cm (1/8 inch) diameter rod. These samples along with control samples G and H and treated samples J and K were immersed in N_2O_4, and maintained at 66 ± 5.5°C (150 ± 10°F) for 15 days. Upon completion of the N_2O_4 exposure samples G, H, J and K were allowed to outgas and air dry for 120 hours. Samples C, D, E and F were tested for permanent set within 3 to 5 minutes of end separation and then allowed to outgas and air dry for 120 hours before a shore hardness test was performed.

This technique may be applicable in chemical processing for anti-stick valves, pumps and diaphragms.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Code JM7
Houston, Texas 77058
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Patent status:

No patent action is contemplated by NASA.

Source: Warren A. Bratfisch and Rudy Gonzalez
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