NASA TECH BRIEF

Ames Research Center

Improved Elastomer for Use with Oxygen Difluoride

The problem:

To improve the resistance of *cis*-1,4-poly(butadiene) elastomers to attack by oxygen difluoride at low temperatures; preliminary experiments had shown that silica reinforcements in conventional elastomer compositions provide a site for progressive attack by the strong oxidant.

The solution:

Replace the silica reinforcement with less reactive substances, for example, alumina.

How it's done:

The elastomer is compounded with a fumed alumina, that is, alumina particles produced by condensation of alumina formed in a vapor phase reaction. The interaction of alumina with oxygen fluoride probably leads to formation of a protective film of thermally stable aluminum fluoride which passivates the surface of each filler particle exposed to the propellant or limits the rate of attack.

Dynamic tests (tensile strength and elongation at break in propellant) showed the elastomer compound to be especially rugged, even at −78.5°C. Long-term compatibility tests showed that both relaxed and stressed elastomer compound did not undergo significant degradation in oxygen difluoride and, moreover, the compound had a very low permeability coefficient at −78.5°C. The coefficient was still smaller at −95°C (where semielastomeric properties were observed).

The properties of the improved elastomeric compound suggest its use in bladders, diaphragms, valves, O-rings, and seals where low-temperature performance and resistance to oxygen difluoride is mandatory.

Notes:

1. The following documentation may be obtained from:

   National Technical Information Service
   Springfield, Virginia 22151
   Single document price $3.00
   (or microfiche $0.95)
   Reference:
   NASA CR-115902 (N71-14986), Study of Advanced Bladder Technology, OF_2/Diborane.

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

   Technology Utilization Officer
   Ames Research Center
   Moffett Field, California 94035
   Reference: B72-10027

Patent status:

No patent action is contemplated by NASA.

Source: J. W. Martin and
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TRW Systems Group, TRW, Inc.
under contract to
Ames Research Center
(ARC-10528)

Category 04