Table 1 Damage to silvered Teflon caused by exposure to humidity

Experiment no.	Time,hr	Humidity, % 97	92	87	76	55
	1	0	0	0	0	0
	2	0.1	0	0	0	0
1	3.5	1	0	0	0	0
	6	2	0	0	0	0
	24	7	3	0	0	0
	96	10	3	0	0	0
	1.5	0	0	0	0	0
2	2.5	20	0	0	0	0
	5	20	0	0	0	0
	48	60	0.5	0.5	0	0
3	24	12	2	5		
4	48	6			0	0

Under these conditions, it was found for both sets that the aluminized Mylar and aluminized Kapton suffered no deterioration; however, the silvered Teflon was severely damaged. This damage took the form of a gentle separation of the silver film from the Teflon. The separation was made manifest by the appearance and growth of white patches over approximately 50% of the surface area observable from the Teflon side. There was no visible effect on the silvered side. Flexing of the material or a gentle contact then caused the silver film to fracture in these areas.

A subsequent test was made on the silvered Teflon with the sea-water solution replaced by distilled water. The occurrence of damage of the same type and magnitude indicated that the water vapor alone, not the dissolved salts, was responsible for deterioration.

Effect of Humidity on Silvered Teflon

In order to determine the range of humidity over which silvered Teflon would deteriorate, samples of the material were suspended above aqueous solution of LiBr in sealed containers. LiBr in water lowers the vapor pressure by a known amount[3] without contributing to the vapor itself.

Table 1 gives the results of these tests in terms of the percent of the surface area damaged. In experiments 1 and 2, samples were exposed to humidities of 97, 92, 87, 76, and 55% at 24°C and observed after specified time periods. In experiments 3 and 4, several other samples were observed after 24 and 48 hr, respectively.

There is considerable variation in the measurable damage for different samples exposed to identical conditions. However, it can be noted that severe damage will occur after only a few hours at the higher humidities. Ninety percent humidity at 24°C appears to be the marginal condition under which some damage, but not severe damage, can occur.

It is obvious that the amount of water vapor present, at a given temperature, determines the degree of damage. Table 2 gives the equivalent humidities, i.e., same water vapor content, at temperatures other than those studied. This chart can be used to predict the degree of damage to be expected under the conditions given. Conditions such as those shown in the second column will produce moderate to severe damage

Table 2 Equivalent humidity vs temperature for occurrence of damage to silvered Teflon

Temperature, °C	Equivalent humidity: Severe damage, >5%	Marginal damage, 0.1–5%	Negligible damage, 0.1%
18			100-78
21		100	92-66
24	97	92-87	76-55
27	82	78-74	65-47
29	71	67-64	58-40
32	66	57-54	48-34
35	51	49-46	41-29
38	44	42-40	35-25

(>5%). The third column presents conditions that produce marginal damage (0.1–5%), whereas the last presents conditions that yeild negligible damage (<0.1%). The validity of this table has been verified by testing samples under conditions of 100% humidity at 18°C and 55% humidity at 14°C.

Acknowledgment

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References

[1]Uhlig, H.H., ed., *The Corrosion Handbook*, Wiley, New York, 1948, p. 1121.

[2]MacIntyre, F., "The Top Millimeter of the Ocean," *Scientific American*, May 1974.

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Errata

Noninteger Transfer Orbits for Circular Orbit Phasing Maneuvers

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THE correct caption for Table 2 is:

Results using the noninteger transfer scheme

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