Leaching of Glasses by Ultra-pure water.

PTRSGT

① Temperature dependence.

Schott Duran (8330). Samples kept in Milli-Ro water for 36 d. 18h. at temperatures of 45, 60 & 75°C. Water changed at 12 d. & 24 d. All samples in pairs, to check consistency.

		$\downarrow$ *dry*	
45°C	181 cm² lost	16.7 mg.	⟶ 2.5 . 10^{-6} g. /cm²/d.
65°C	212 " "	57.8 "	⟶ 7.4 . 10^{-6} " " "
75°C	193 " "	91.1 "	⟶ 12.8 . 10^{-6} " " "

Agrees roughly with doubling for each 10°C temp. rise. More closely, rate of solution increases by a factor of 1.75 for each 10° increase in temp.

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② Comparison of different glasses

Specimens cut from various glass samples. All immersed in Milli-Ro water at 60°C for various periods. Water changed time

Glass	Area cm²	Mass loss mg	Time d.	Loss rate at 60°C 10^{-6} g/cm²/d	Loss rate at 10°C 10^{-6} g/cm²/d
Schott 8245	294	9.2	36.8	0.55	0.052
Pyrex	304	25.1	22.8	3.6	0.22
Soveral 801	602	119.1	36.8	5.4	0.32
Schott 8330	212	57.8	36.8	7.4	0.45
B 47.2	675	962.9	36.8	38.8	2.4

③ Effect of Surface Finish.

Bulb blown from B 47.2. Immersed at 75°C for 7d, followed by 16.6 d.
Area 83 cm². Mass loss in 7d. 53.8 mg, followed by further loss of 81.9 mg in 16.6 d.
Loss rate at 75°C thus. 92.10^{-6} g/cm²/d + 59.10^{-6} g/cm²/d
Reduced to 10° these give 2.42.10^{-6} g/cm²/d + 1.55.10^{-6}
Compare these with disc results (with ground faces) above, of 2.4.10^{-6} g/cm²/d. ?

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(4) Schott 8246

This was only available initially as a small amount. It was therefore reduced by pestle & mortar & sieved to be $> 75\mu$ & $< 150\mu$

Five samples immersed in Milli-Ro water at 55°C for 32 d. Samples all lost similar fractions of their initial mass. In total, 93 mg were lost from 14.7825 gm.

For crude area estimate, assume glass in cubes of side 100μ & density (borosilicate) $= 2.23$ gm cm^{-3}.

Then surface area is approx 400 cm^2 & rate of loss at 55°C $= 0.73 . 10^{-6}$ g/cm^2/d

Corrected to 10°C this gives $0.06 . 10^{-6}$ g/cm^2/d, comparable with Schott 8245 (see previous table)

~8246