

Permeation Time (@1000°C)									
Ion	Diffusion Coefficient D (cm <sup>2</sup> /sec)	Covalent Radius A	Heat of Vaporization	Thickness of Quartz					
				5mm	3mm	2mm	1mm	0.5mm	0.1mm
Na	7.00 x 10 <sup>-6</sup>	1.54	97.6	20 min	7.2 min	3.2 min	48 sec	12 sec	0.5 sec
Li	1.00 x 10 <sup>-6</sup>	1.23	145.9	2.6 hrs	57 min	25 min	6.3 min	1.6 min	3.8 sec
Ag	7.00 x 10 <sup>-7</sup>	1.34	250.9	3.7 hrs	1.4 hrs	36.2 min	9 min	2.3 min	5.4 sec
Ca	2.00 x 10 <sup>-8</sup>	1.64	153.9	5.5 days	1.98 days	21 hrs	5.3 hrs	1.3 hrs	3.2 min
K	1.00 x 10 <sup>-8</sup>	2.03	79.9	11 days	3.96 days	42.2 hrs	10.6 hrs	2.6 hrs	6.3 min
Al	1.00 x 10 <sup>-13</sup>	1.18	293.4	3010 years	1084 years	482 years	120 years	30 years	1.3 years
P	8.00 x 10 <sup>-14</sup>	1.06	12.12	3763 years	1355 years	602 years	151 years	38 years	1.5 years
Ni	1.00 x 10 <sup>-15</sup>	1.15	370.4	300K years	110K years	48K years	12K years	3K years	120 years
Au	5.00 x 10 <sup>-16</sup>	1.34	334.4	600K years	220K years	96K years	24K years	6K years	241 years
As	1.00 x 10 <sup>-16</sup>	1.2	34.7	3000K years	1100K years	480K years	120K years	30K years	1204 years
B	1.00 x 10 <sup>-17</sup>	0.82	489.7	11000K years	11000K years	4800K years	1200K years	300K years	12K years

Source: 1) "Handbook of Glass Properties", N.P. Bansal and R.H. Doremus, Academic Press, Inc. (1986) p.28 2) D.R. Collins, D.K. Schroder and C.T. Sah, Applied Physics Letter, 8 (1966) p.323

\*Typical data are average data and actual values may vary. Typical data value should not be used as specifications.

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