

The observed refractive indices of the compacted glass are recorded in column 5 of Table I while the density data are given in column 6. In the last report, the density data were evaluated from a plot of refractive index and density of crystalline silica, it being assumed that values of the compacted glass will fall on this smooth curve. Over this period, calibration of the liquid density columns have been completed for the density range 2.0 to 3.0 g/cc. For silica, therefore, density could be determined directly. In Fig. 1, the density-refractive index relationship for the compacted glass is seen to follow the smooth curve as assumed previously. No density column has yet been prepared to cover the range 4.0 to 5.0 g/cc, and so the density results for germania were still evaluated from the measured refractive index.

It is observed in Table I that, for germania, glasses of density equal to that of the crystalline phase have now been prepared. For silica, however, the highest density observed was 2.56 as compared to the density of 2.65 for crystalline quartz.

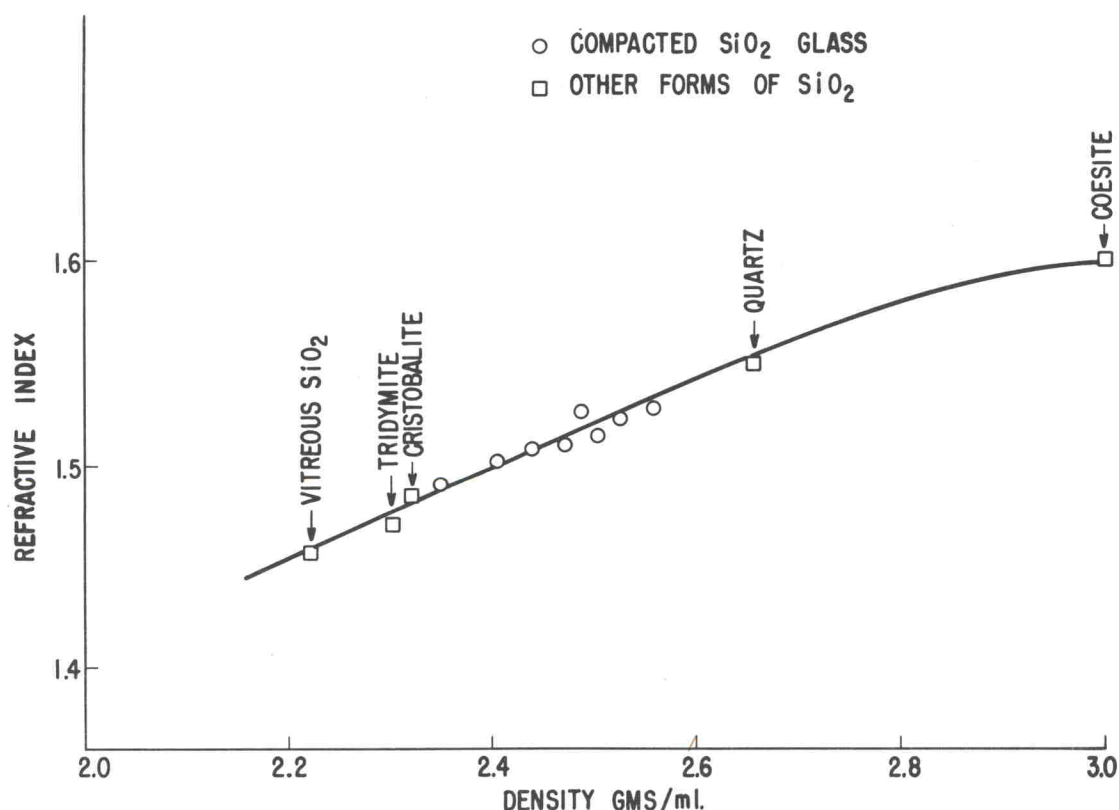


Fig. 1 Density-refractive index relationship for crystalline and compacted silica.

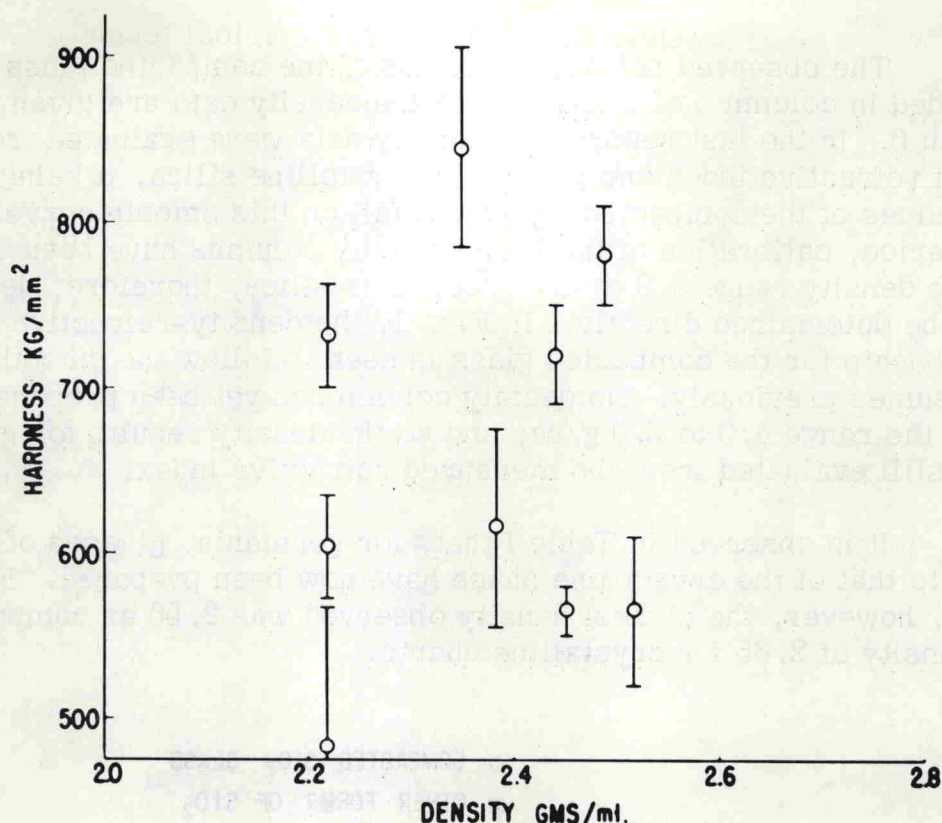


Fig. 2 Hardness-density relationship for some compacted silica.

HARDNESS MEASUREMENTS

In view of the large increases observed of the density and refractive index of the glasses, it was thought that the hardness of the samples might show a similar variation. The hardness of compacted silica of various densities were accordingly measured with a Kentron microhardness tester. Samples of suitable size and surface were uncommon because of the small dimensions of the pressure cell. The results obtained on nine samples are shown in Fig. 2. It is seen that both the deviations and scatter were too large to warrant any conclusion. Hardness measurements of this type will therefore not be carried out again in the coming period.

SOLUBILITY IN HF SOLUTIONS

Coes (1953) had demonstrated that the solubility of ordinary vitreous silica and all the known modifications of crystalline silica in dilute hydrofluoric acid is a direct function of density. This is not known