for the cristobalite
PO$_4$, AlAsO$_4$ also
A decrease of the

$n**$ $B) X_2$	Per cent*** difference
.45	+ 3.6
.42	
.41	
.19	
.06	− 1.8
.07	+ 1.7
.00	
.93	− 1.7
5.41	+ 2.6
5.24	
7.75	+ 3.5
7.49	
7.36	+ 3.4
7.12	
3.15	+ 2.5
7.95	
7.56	+ 4.7
7.22	
9.90	+ 2.8
9.63	
8.46	−12.2

comparative values
ting the average re-

pounds. Rm normally

he quartz polymorph

same order is evident for the glass-quartz forms of GeO$_2$. In all of these compounds the A and B cations are tetrahedrally coordinated by the anions although the polyhedra may be more or less distorted and are differently packed. The constant differences between the different structural arrangements of the tetrahedra demonstrate the sensitivity of the refractivity data in reliably describing the "efficiency of packing" of the ions, even where primary coordination is not disturbed. The effect of a change from 4 to 6 coordination is brought out very clearly in the densities, refractive indices and molar refractivities of the quartz and rutile forms of GeO$_2$. Relative to the quartz form, the density of the rutile is 48 per cent greater, and the average refractive index 18 per cent greater. The molar refractivity decrease, on the other hand, amounts to only 12.2 per cent. However, since this value is *three times* the maximum change noted for the various forms differing only in secondary coordination, such a change is correlatable with an integral change of primary coordination. In addition, the additive nature of Rm is especially important as it allows the calculation of the refractivities of components in complex compounds and thereby provides a tool for testing the coordination of various cations of a multicomponent system. SAFFORD and SILVERMAN[9] give values which they obtained for Al$_2$O$_3$ with Al in 4 and 6 coordination as 12.30 and 10.53 cm^3/mole. These values differ by 14 per cent in the same direction as for the GeO$_2$ quartz-rutile pair. ROY[10] has calculated values for MgO with Mg in 4 and 6 coordination, 5.18 and 4.54 respectively, which also differ by 12 per cent[11]. Thus one may generalize with caution that, if the molar refractivity "contribution" of an oxide increases by 12 ± 2 per cent, a change of coordination from 6 to 4 may be predicted.

The usefulness of molar refractivity in supporting our conclusions reached via infra-red data that the cations in coesite (SiO$_2$ and BeF$_2$) are tetrahedrally coordinated, is evident. It also supports indirectly

[9] H. W. SAFFORD and A. SILVERMAN, Alumina-silica relationship in glass. J. Am. Ceram. Soc. 30 (1947) 203—211.

[10] RUSTUM ROY, Magnesium in fourfold coordination in glass. J. Am. Chem. Soc. 72 (1950) 3307.

[11] These authors and others (N. J. KREIDL and K. FAJANS, personal communications) also list values of Rm for many minerals and their glasses where no significant changes in cation coordination are expected, and these respective values differ by only one or two per cent.