Table 2

Additivity Calculation of Physical and Thermodynamic Parameters

Parameter	Spinel $MgO \cdot Al_2O_3$	Garnet $ZnO \cdot Al_2O_3$	Hercynite $FeO \cdot Al_2O_3$	Chrysoberyl $BeO \cdot Al_2O_3$	Magnetite $FeO \cdot Fe_2O_3$	Ilmenite $FeO \cdot TiO_2$
			Oxides			
M/ρ, cm³/mole	36.85/ 38.8	39.94/ 40.0	37.65/ 39.4	33.92/ 34.22	42.25/ 44.3	31.3/ 31.71
ρ, g/cm³	3.86/ 3.64	4.59/ 4.59	4.54/ 4.4	3.73/ 3.70	5.42/ 5.24	4.83/ 4.78
$K \cdot 10^5$, kg/cm²	22.6/ 6.20	21/ —	22/ —	28/ 27	19.1/ 18	19.1/ 18.5
l, (Å)$^{-3}$	8.4/ 8.2	8.2/ 8.3	6.72/ 6.2	9.6/ 9.4	6.07/ 5.7	7.9/ 7.7
b	4.9/ 4.6	4.52/ 4.50	4.8/ 4.4	5.3/ 5.3	4.92/ 4.06	4.74/ 3.8
S°_{298}, cal/ /mole-deg	19.2/ 19.3	23.2/ —	25.0/ 25.4	15.55/ —	34.4/ 35	24.9/ 25.3
ΔZ°_{298}, kcal/ /mole	512.8/ 517.5	452.7/ —	435.1/ 441.9	515.7/ 515.5	235.5/ 242	269.4/ 277.5
$C^\circ_{p_{298}}$, cal/ /mole-deg	27.82/ —	28.50/ —	31.08/ —	24.9/ —	37.2/ 34.2	25.8/ 23.78

Silicates

Parameter	Forsterite $2MgO \cdot SiO_2$	Fayalite $2FeO \cdot SiO_2$	Enstatite $MgO \cdot SiO_2$	Ferrosilite $FeO \cdot SiO_2$	Phenakite $2BeO \cdot SiO_2$	Kyanite $Al_2O_3 \cdot SiO_2$
M/ρ, cm³/ /mole	42.50/ 43.67	44.1/ 46.4	31.95/ 32.5	32.0/ 33	36.6/ 37.2	44.1/ 44.1
ρ, g/cm³	3.32/ 3.22	4.62/ 4.39	3.27/ 3.20	4.1/ 3.99	3.0/ 2.97	3.66/ 3.66
$K \cdot 10^{-5}$, kg/cm²	12.5/ 13	11.5/ 11	11/ 11.0	10.7/ —	21/ —	19/ —
l, (Å)$^{-3}$	7.5/ 7.5	7.2/ 7.0	7.7/ 7.8	7.5/ 7.4	8.5/ 8.7	—
b	4.1/ 4.1	3.9/ 3.9	3.7/ 3.8	3.7/ 3.7	4.87/ 4.9	—
S°_{298}, cal/ /mole-deg	22.8/ 22.7	35/ 34.7	15.4/ 16.2	21.9/ 23	15.7/ 15.4	—
ΔZ°_{298}, kcal/ /mole	472/ 480	317/ 316	336/ 337	258/ 257.7	478/ 470	—
$C^\circ_{p_{298}}$, cal/ /mole-deg	28 4/ 28.2	35/ 31.7	19/ 19.6	21.2/ —	22.7/ 22.8	—

or enstatite and ferrosilite with the ilmenite structure. In that case we should use stishovite (6 : 3 coordination) as the basis. Table 1 gives the results.

It is not important as regards the additivity principle whether a substance occurs in the depths of the Earth as simple oxides or as a compound of spinel, garnet, etc. type; but the chemical composition and the cation coordination (in an oxygen environment) are important. The principle can give reasonably reliable results for the properties of a substance of known composition, provided that we have a clear conception of the stability ranges of oxides and silicates at the P and T prevailing within the Earth.