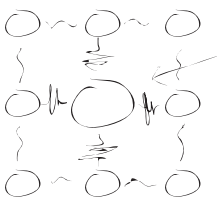
Trace element Partitioning



ε = Strain = relative deformation = $\frac{r_1 - r_0}{r} = \frac{dr}{r}$

σ = Stress = force per area = $\frac{F}{A}$

E = Young's Modulus = $\frac{\sigma}{\varepsilon}$

$$W = F \cdot d = \frac{F}{A} \cdot A \cdot d = \sigma A d$$

Surface area of sphere

$$A = 4\pi r^2$$

Displacement

$$d = r - r_0$$

$$W = E \varepsilon A d$$

$$W = E \frac{dr}{r} 4\pi r^2 (r - r_0)$$

$$W = E 4\pi r (r - r_0) dr$$

$$W = E 4\pi \int_{r_0}^{r_1} r (r - r_0) dr$$

$$W = E 4\pi \left(\frac{1}{3}(r_1 - r_0)^3 - \frac{r_0}{2}(r_1 - r_0)^2 \right) = \Delta G^{ex}_{strain}$$

W is the energy needed to displace (strain) crystal lattice

recall $\Delta G = -RT \ln K$

and $\Delta G \sim -RT \ln D$ ← partition coefficient

↑ function of pressure, T, composition