

Chapter 11

Pb #1.
$$U_{\text{Total}} = U_{\text{att.}} + U_{\text{rep.}} = -\alpha \frac{ke^2}{r} + \frac{B}{r^m}$$

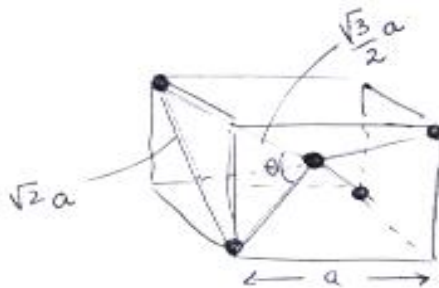
at equilibrium $U_{\text{Total}} = U_0$ and $\frac{dU}{dr} = 0$

$$\Rightarrow \frac{\alpha ke^2}{r_0^2} - \frac{mB}{r_0^{m+1}} = 0 \Rightarrow B = \frac{\alpha ke^2}{m} r_0^{m-1}$$

$$\Rightarrow U_0 = -\alpha \frac{ke^2}{r_0} + \frac{\alpha ke^2}{m} \frac{r_0^{m-1}}{r_0^m}$$

$$U_0 = -\frac{\alpha ke^2}{r_0} \left(1 - \frac{1}{m}\right)$$

Pb #2



$$\sin \frac{\theta}{2} = \frac{\frac{\sqrt{2}}{2}a}{\frac{\sqrt{3}}{2}a} = \frac{\sqrt{2}}{\sqrt{3}}$$

$$\Rightarrow \frac{\theta}{2} = 54.73^\circ \Rightarrow \theta = 109.5^\circ$$

Pb #3.

Calculate the ionic cohesive energy of NaCl, $U_0 = ?$.

$$\alpha = 1.7476$$

$$r_0 = 0.281 \text{ nm} \Rightarrow$$

$$U_0 = 7.84 \text{ eV} / \text{Na}^+\text{-Cl}^- \text{ pair}$$

$$m = 8$$