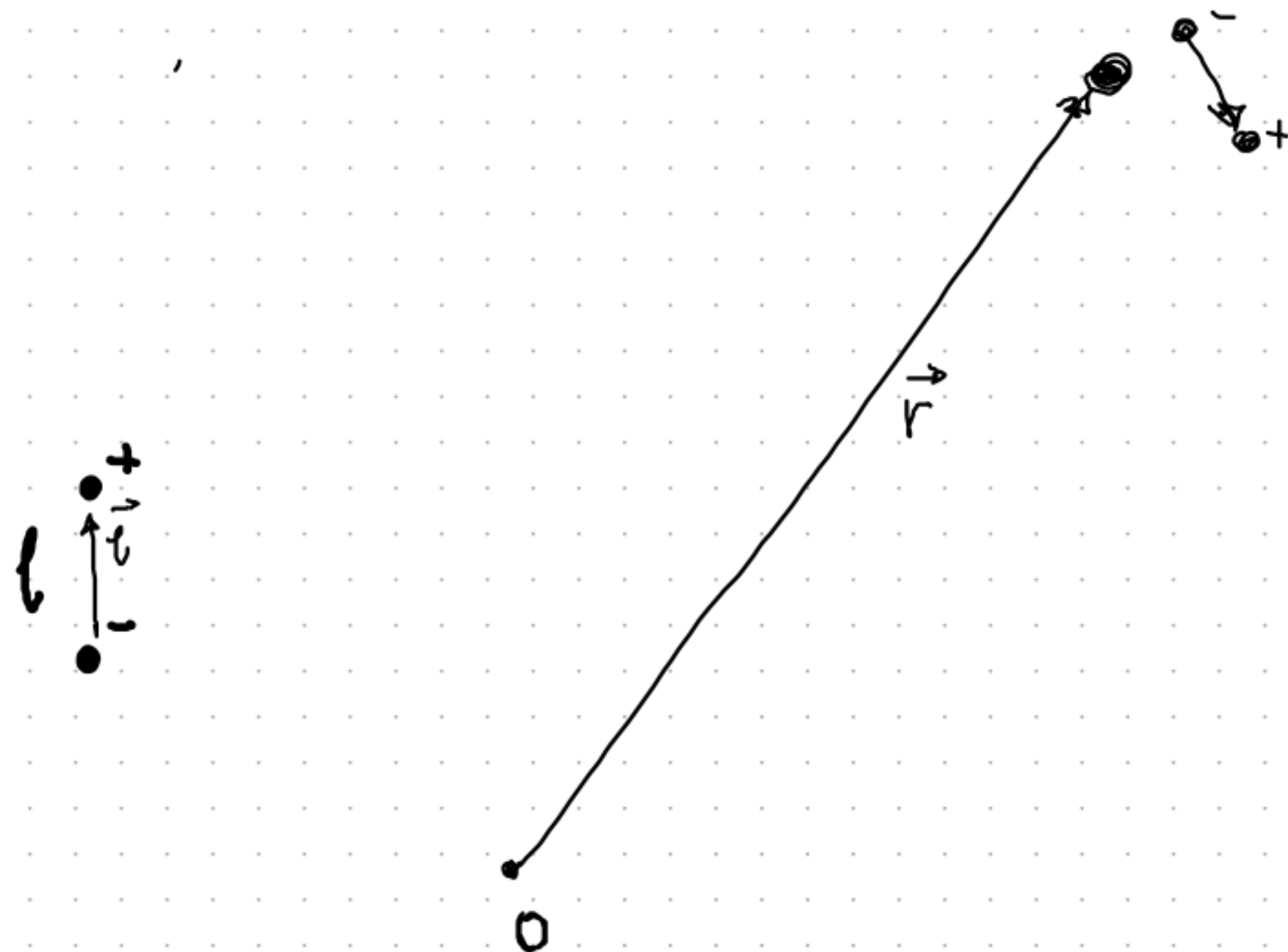
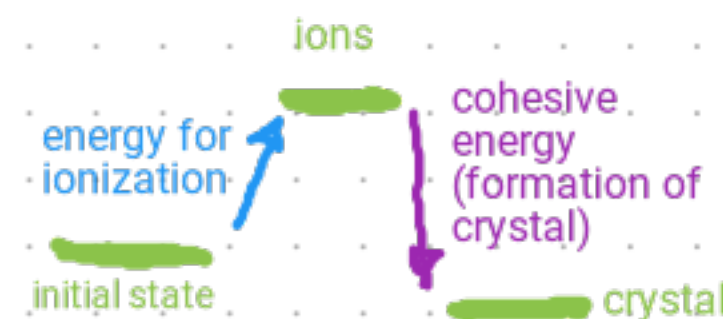


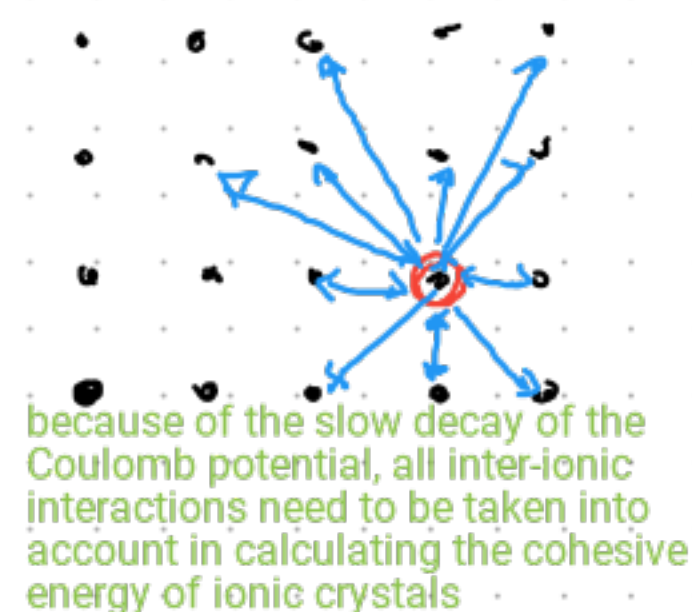
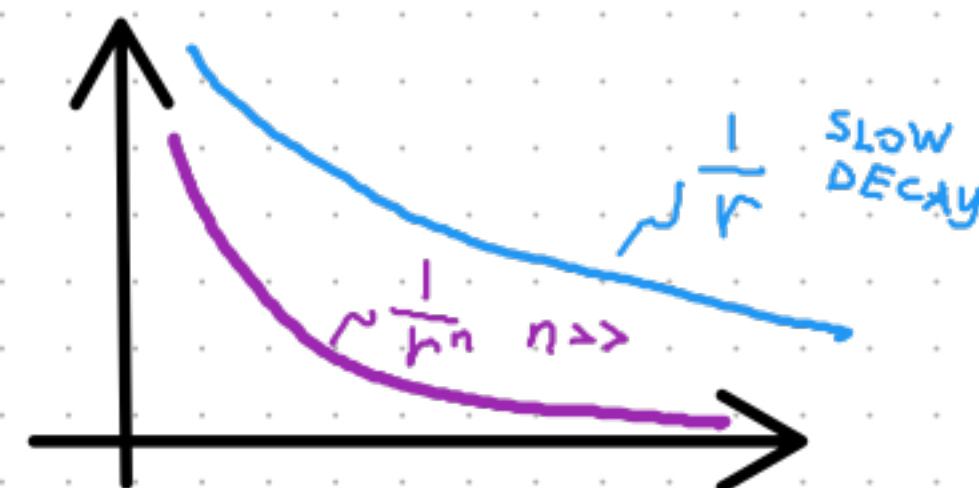


BORN-HABER CYCLE



COULOMB INTERACTION

$$U_c \propto \frac{1}{r}$$



Madelung Constant

Example: how would you calculate the Madelung Constant for a Sodium Chloride Structure?

$$U = \frac{1}{4\pi\epsilon_0} \left(-6 \frac{q^2}{|\vec{r}_1|} + 12 \frac{q^2}{|\vec{r}_2|} - 8 \frac{q^2}{|\vec{r}_3|} + \dots \right)$$

$$\vec{r}_1 = \left(\frac{1}{2}, \frac{1}{2}, \frac{1}{2} \right) a$$

$$\vec{r}_2 = \left(\frac{1}{2}, 0, 0 \right) \cdot a$$

$$\vec{r}_3 = \left(\frac{1}{2}, \frac{1}{2}, 0 \right) a$$

$$\frac{1}{4\pi\epsilon_0} \left(-\frac{q^2}{\sqrt{\frac{1}{2}^2 + 0^2 + 0^2}} - \frac{q^2}{\sqrt{0^2 + \left(\frac{1}{2}\right)^2 + 0}} - \frac{q^2}{\sqrt{0^2 + 0^2 + \left(\frac{1}{2}\right)^2}} - \frac{q^2}{\sqrt{\left(-\frac{1}{2}\right)^2 + 0^2 + 0^2}} - \dots \right)$$