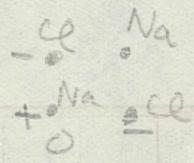


Lattice Energy

i) Normal state

$$\sum_n \sum_m \frac{e^2}{r_{nm}} (-1)^{(m_x - m_x) + (m_y - m_y) + (m_z - m_z)}$$

$$\frac{e^2}{a} \sum_{n \neq m} \frac{(-1)^{(m_x - m_x) + (m_y - m_y) + (m_z - m_z)}}{|n - m|} \rightarrow 0$$



ii) one Na-neutral, one Cl-neutral

$$= \frac{e^2}{a} \sum_{n \neq n_0} \frac{(-1)^{(n_x - m_x) + (n_y - m_y) + (n_z - m_z)}}{|n - m_0|} - \frac{e^2}{a} \sum_{n \neq m_0, n_0} \frac{(-1)^{(n_x - m_x) + (n_y - m_y) + (n_z - m_z)}}{|n - m_0|}$$

$$= 2D \approx \frac{e^2}{a} \frac{1}{|n_0 - m_0|}$$

iii) one Cl-neutral state empty, one lattice state occupied

0 D

iv) one Na-state (double ionized) empty, one lattice state occupied

v) Na⁺ excitation $-D$

i) 0

ii) ~~Na~~ $-E_{3s}(Na) + E_{3p}(Cl^-)$

iii) ~~one Cl~~ $E_{3p}(Cl^-) + K.E.$

iv) $E_{2p}(Na^+) + K.E.$

v) $E_{2p}(Na^+) - E_{3s}(Na)$

Degeneracy: Lattice Energy + Electronic Energy.