

$$c) K = \frac{k\alpha e^2}{r_0^3} (m-1)$$

$$\text{if } m=8, r_0 = 0.281 \text{ nm}, \alpha = 1.7476$$

$$\Rightarrow K = 127 \text{ N}\cdot\text{m}$$

$$\omega = \sqrt{\frac{K}{m}} = \sqrt{\frac{127}{23 \times 1.66 \times 10^{-27}}} = 5.77 \times 10^{13} \text{ rad/s}$$

$$f = \frac{\omega}{2\pi} = \boxed{9.18 \times 10^{12} \text{ Hz}}$$

$$d) E = hf = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{c}{f} = \frac{3 \times 10^8}{9.18 \times 10^{12}}$$

$$\lambda = 3.27 \times 10^{-5} \text{ m} \quad \text{in the infrared}$$

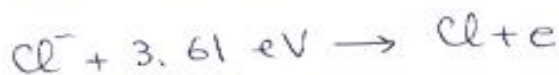
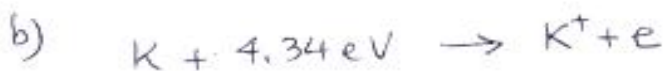
$$32700 \text{ nm} \gg 800 \text{ nm}$$

Pb #7. KCl

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

$$\alpha = 1.7476, r_0 = 0.314 \text{ nm}, m = 9$$

$$U_0 = 1.14 \times 10^{-18} \text{ J} = 7.1 \text{ eV/KCl ion pair.}$$



Atomic cohesive energy = ionic cohesive energy + energy needed to remove an electron from Cl^- - energy gained by adding the electron to $\text{K}^+ = 7.1 + 3.61 - 4.34 = 6.36 \text{ eV/KCl atom pair.}$