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

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

$\Rightarrow K = 127$ N.m

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

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

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

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

32700 nm >> 800 nm

Pb # 7. KCl

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

$\alpha = 1.7476$, $r_0 = 0.314$ nm, $m = 9$

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

b) $K + 4.34\ eV \rightarrow K^+ + e$

$Cl^- + 3.61\ eV \rightarrow Cl + e$

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