kittel.

3.3. H_2: $\epsilon = 50 \times 10^{-16}$ erg.

$\sigma = 2.96$ Å , cohesive energy in. kJ/mole.

fcc.

treat each H_2 as sphere. fcc: $\sum_j p_{ij}^{-12} = 12.13188$

$\sum_j p_{ij}^{-6} = 14.45392$.

Computing R: $(12)(12.13)\frac{\sigma^{12}}{R^{13}}$

$- (6)(14.45)\frac{\sigma^6}{R^7} = 0$.

multiplying by R^7 on each side gives

$(12)(12.13)\frac{\sigma^{12}}{R^6} - (6)(14.45)\sigma^6 = 0$

$(12)(12.13)\sigma^{12} = (6)(14.45)\sigma^6 R^6$.

$$\left[\frac{(12)(12.13)\sigma^{12}}{(6)(14.45)\sigma^6}\right]^{1/6} = R = \left[\frac{(12)(12.13)}{(6)(14.45)}\right]^{1/6} \sigma$$

$\Rightarrow \boxed{R_0/\sigma = 1.09}$. this matches (14) in kittel.

Thus $R_0 \approx 3.23$ Å.

$\left[(12.13)\left(\frac{\sigma}{R}\right)^{12} - (14.45)\left(\frac{\sigma}{R}\right)^6\right] \approx 4.3128 - 8.612 \approx -4.2994$

$\epsilon = 50 \times 10^{-16}$ erg $= 50 \times 10^{-23}$ J $= 5 \times 10^{-22}$ J.

$U(R) = 2 \times 6.022 \times 10^{23} \times 5 \times 10^{-22} \times (-4.2994)$ /mol

$= -2.408 \times 10^3$ Joules / mol

$\boxed{\approx -2.4 \text{ kJ/mol}}$