

FORMULA SHEET (MAT E 201, Final Exam)

$$\text{Number of atoms} = \frac{\text{mass} \times N_A}{\text{Atomic Mass}}$$

$$N_A = 6.023 \cdot 10^{23} \text{ atoms/mol}; R = 8.314 \text{ J/mol} \cdot \text{K}; k_B = 8.63 \cdot 10^{-5} \text{ eV/K} = 1.38 \cdot 10^{-23} \text{ J/K}$$

$$\rho = \frac{m}{V}; \quad \text{PF} = \frac{\text{Number of atoms per unit cell} \times V_{at}}{V_{uc}}; \quad V = \frac{4}{3} r^3 \pi$$

$$\text{Volume of cubic cell} = a_0^3$$

$$\text{Volume of HCP cell} = 0.866 a_0^2 c_0, \quad c_0 = 1.633 a_0$$

$$D = D_0 \exp\left(-\frac{Q}{RT}\right); \quad n_v = n \exp\left(-\frac{Q}{RT}\right) \quad V_{\text{comp}} = V_A + V_B + \dots; \quad 1 = f_A + f_B + \dots$$

$$f_A = \frac{V_A}{V_{\text{comp}}}; \quad \rho_{\text{comp.}} = f_1 \rho_1 + f_2 \rho_2 + f_3 \rho_3 + \dots + f_n \rho_n$$

$$q = 1.6 \cdot 10^{-19} \text{ C};$$

$$\sigma = nq(\mu_n + \mu_p); \quad \sigma = \sigma_0 \exp\left(-\frac{E_g}{2k_B T}\right); \quad \sigma = \frac{1}{\rho};$$

$$E = \frac{V}{l}; \quad P = IV = I^2 R; \quad R = \rho(l/A) \quad v = \mu E \quad v = \frac{J}{nq} \quad \sigma = nq\mu \quad C = \frac{A\epsilon_0 \kappa}{d}$$

$$\rho = \rho_{RT} [1 + \alpha_R (T - 25)]$$

$$D = D_0 \exp\left(-\frac{Q}{RT}\right); \quad n_v = n \exp\left(-\frac{Q}{RT}\right) \quad \mu = \frac{ZqD}{k_B T} \quad \sigma = nZq\mu$$