

Physics 102
Formula Sheet for 2nd Major Exam
Second Semester 2003-2004 (Term 032)

$$Q = mc\Delta T, \quad Q = mL$$

$$Q = nc_p\Delta T, \quad Q = nc_v\Delta T$$

$$W = Q_h - Q_c$$

$$\varepsilon = \frac{W}{Q_h} = 1 - \frac{Q_c}{Q_h}$$

$$K = \frac{Q_c}{W}$$

$$\frac{Q_c}{Q_h} = \frac{T_c}{T_h}, \quad \Delta S = \int \frac{dQ}{T}$$

$$F = k \frac{q_1 q_2}{r^2}, \quad \Phi = \int_{\text{Surface}} \vec{E} \cdot d\vec{A}$$

$$E = \sigma / 2\varepsilon_0, \quad E = \sigma / \varepsilon_0$$

$$E = k \frac{q}{r^2}, \quad E = k \frac{q}{R^3} r, \quad E = \frac{2k\lambda}{r}$$

$$\Phi_c = \oint \vec{E} \cdot d\vec{A} = \frac{q_{in}}{\varepsilon_0}$$

$$E_x = -\frac{\partial V}{\partial x}, \quad E_y = -\frac{\partial V}{\partial y}, \quad E_z = -\frac{\partial V}{\partial z}$$

$$\Delta V = V_B - V_A = - \int_A^B \vec{E} \cdot d\vec{S} = \frac{\Delta U}{q_0}$$

$$V = k \frac{q}{r}$$

$$U = k \frac{q_1 q_2}{r_{12}}$$

$$PV^\gamma = \text{constant}; \quad TV^{\gamma-1} = \text{constant}$$

$$C_v = \frac{3}{2} R \text{ for monatomic gases,}$$

$$= \frac{5}{2} R \text{ for diatomic gases.}$$

$$v = v_0 + at$$

$$x - x_0 = v_0 t + \frac{1}{2} a t^2$$

$$v^2 = v_0^2 + 2 a (x - x_0)$$

Constants:

$$\text{Pi} = \pi$$

$$k = 9.0 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$$

$$\varepsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{N}\cdot\text{m}^2$$

$$e = -1.6 \times 10^{-19} \text{ C}$$

$$m_e = 9.11 \times 10^{-31} \text{ kg}$$

$$m_p = 1.67 \times 10^{-27} \text{ kg}$$

$$k_B = 1.38 \times 10^{-23} \text{ J/K}$$

$$N_A = 6.022 \times 10^{23} \text{ molecules/mole}$$

$$R = 8.314 \text{ J/mol}\cdot\text{K}$$

$$1 \text{ atm} = 1.013 \times 10^5 \text{ N/m}^2$$

$$g = 9.8 \text{ m/s}^2$$

$$\text{micro} = 10^{-6}$$

$$\text{nano} = 10^{-9}$$

$$\text{pico} = 10^{-12}$$

$$\text{Sigma} = \sigma$$

$$a*b**c = ab^c$$

$$\text{Sqrt}(a) = \sqrt{a}$$

$$1 \text{ calorie} = 4.186 \text{ Joule}$$

$$\text{for water: } L_f = 80 \text{ cal/g}$$

$$L_v = 540 \text{ cal/g}$$

$$c = 1 \text{ cal/g}\cdot\text{K}$$