

EQUATIONS FOR MIDTERM II

ELEMENTS OF PHYSICS

SPRING 2022

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These equations will be provided as a part of the exam package.

$$KE = \frac{1}{2}mv^2, \quad W = Fd, \quad W = \Delta KE, \quad PE_g = mgh, \quad W = \Delta PE$$

$$g = 10 \frac{\text{m}}{\text{s}^2} = 10 \frac{\text{N}}{\text{kg}}, \quad 1 \text{ amu} = 1.66 \times 10^{-27} \text{ kg}$$

$$P = \frac{F}{A} \quad 1 \text{ atm} = 14.7 \text{ psi} = 1.01 \times 10^5 \text{ Pa} \quad P_g = P - P_{\text{atm}}$$

$$D = M/V, \quad P = Dgh$$

$$P_i V_i = P_f V_f, \quad T_K = T_C + 273, \quad PV = NkT$$

$$1 \text{ cal} = 4.2 \text{ J}, \quad \Delta U = Q(\text{in}) + W(\text{on}), \quad Q = cm\Delta T, \quad Q = mL$$

Properties of water

- Density liquid water: $D_w = 1.0 \text{ g/cm}^3 = 1000 \text{ kg/m}^3$
- Density of ice: $D_i = 0.92 \text{ g/cm}^3 = 920 \text{ kg/m}^3$
- Specific heat of liquid water: $c_w = 1 \frac{\text{cal}}{\text{g}^\circ\text{C}} = 4190 \text{ J/kg}\cdot\text{K}$
- Specific heat of ice: $c_i = 0.5 \frac{\text{cal}}{\text{g}^\circ\text{C}} = 2090 \text{ J/kg}\cdot\text{K}$
- Latent heat of melting/freezing: $L_{wi} = 80 \text{ cal/g} = 334 \text{ kJ/kg}$
- Latent heat of vaporization: $L_{wv} = 540 \text{ cal/g} = 2260 \text{ kJ/kg}$