Appendix 1: Formula Sheet

$\Delta H = q_p = \Delta E + P\Delta V$ $q = sm\Delta T = C_p \Delta T$ $\Delta U = q + w$	$\ln \frac{N_t}{N_0} = -kt$ $t_{\frac{1}{2}} = \frac{\ln 2}{k}$ $E = mc^2$ $c = \lambda\nu \ (= \lambda f)$
$PV = nRT$ $P_{total} = P_1 + P_2 + ...$ $\left(P + \frac{n^2 a}{V^2}\right) \cdot (V - nb) = nRT$ $\bar{u} = \sqrt{\frac{3RT}{M_m}}$ $\frac{\text{rate}_A}{\text{rate}_B} = \frac{\bar{u}_A}{\bar{u}_B} = \frac{\sqrt{M_{mB}}}{\sqrt{M_{mA}}}$	$E = h\nu \ (= hf)$ $\overline{E}_k = \frac{1}{2} m\bar{u}^2$ $\Delta E = -2.178 \times 10^{-18} \text{J} \left(\frac{1}{n^2_{final}} - \frac{1}{n^2_{initial}}\right)$ $\lambda = \frac{h}{mv}$

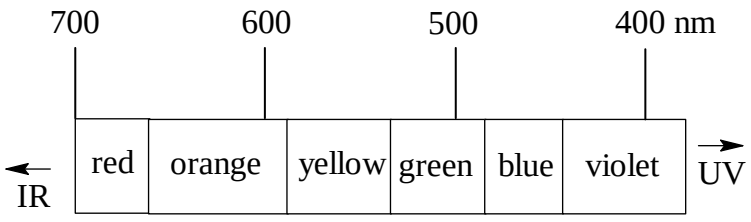
Constants:

h = 6.626 x 10^{-34} J s
c = 2.9979 x 10^{8} m/s
joules = kg m^2 s^{-2}
0°C = 273.15 K
N_A = 6.022 x 10^{23} mol^{-1}

1 atm = 101.325 kPa = 760.00 Torr
mass of an electron: 0.000549 amu (g/mol)
mass of a proton: 1.00728 amu
mass of a neutron: 1.008665 amu
elementary charge (e) = 1.60218 x 10^{-19} C

R = 8.314 J mol^{-1} K^{-1} = 8.314 L Pa mol^{-1} K^{-1} = 0.08206 L atm mol^{-1} K^{-1}
STP = 1 atm, 0°C
standard conditions = 1 atm, 25°C, 1 M

kilo = 10^3 centi = 10^{-2} milli = 10^{-3} micro = 10^{-6} nano = 10^{-9} pico = 10^{-12}



For water: ΔH_{fusion} = 6.02 kJ/mol $\Delta H_{vaporization}$ = 40.7 kJ/mol
specific heat capacities (J/°C•g): s_{ice} = 2.03 s_{liquid} = 4.18 s_{steam} =