

The Equation Sheet

Felicia Yu

Constants:

Avogadro's Number (N_A)	6.02×10^{23}
Universal Gas Constant (R)	8.314 J/mol K
Planck's constant (h)	6.626×10^{-34} J s
Rydberg Constant	2.18×10^{-18} J
Speed of light (c)	3.00×10^8 m/s

Conversion Factors:

$$1 \text{ A} = 1 \text{ C/s}$$

$$1 \text{ C} = 1 \text{ J/V mol}$$

$$1 \text{ L atm} = 101.3 \text{ J}$$

$$1 \text{ nm} = 10^{-9} \text{ m}$$

$$1 \text{ atm} = 760 \text{ torr}$$

$$= 760 \text{ mm Hg}$$

The Equations

$$q = mc\Delta T$$

$$q = C\Delta T$$

$$\Delta H = (-)Q/\text{mol}$$

$$\Delta H^\circ_{\text{rxn}} = \sum \Delta H^\circ_f (\text{products}) - \sum \Delta H^\circ_f (\text{reactants})$$

$$\Delta G^\circ_{\text{rxn}} = \sum \Delta G^\circ_f (\text{products}) - \sum \Delta G^\circ_f (\text{reactants})$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta G^\circ = -RT \ln K$$

$$\Delta G = \Delta G^\circ + RT \ln Q$$

$$\Delta G^\circ = -nF E_{\text{cell}}$$

$$\Delta S^\circ_{\text{rxn}} = \sum \Delta S^\circ_f (\text{products}) - \sum \Delta S^\circ_f (\text{reactants})$$

$$\ln(k_2/k_1) = E_a/R (1/T_1 - 1/T_2)$$

$$[A] = -kt + [A]_o$$

$$1/[A] = kt + 1/[A]_o$$

$$\ln[A] = -kt + \ln[A]_o$$

$$K_p = K_c (RT)^{\Delta n}$$

$$\text{pH} = -\log [H_3O^+]$$

$$K_w = K_a \times K_b$$

$$\text{pK}_a + \text{pK}_b = \text{pK}_w$$

$$\text{pK}_a = -\log K_a$$

$$\text{pK}_b = 14 - \text{pK}_a$$

$$\text{pH} + \text{pOH} = 14$$

$$\text{pOH} = -\log [OH^-]$$

$$\text{pH} = \text{pK}_a + \log \left(\frac{[\text{conjugate base}]}{[\text{acid}]} \right)$$

$$\text{Charge} = \text{Current} \times \text{Time}$$

$$E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$$

$$E^\circ = (0.0582/n) \log K$$

$$E = hc / \lambda$$

$$c = \lambda \nu$$

$$\Delta E = R_H (1/n_i^2 - 1/n_f^2)$$

$$E = h\nu$$

$$t_{1/2} = 0.693/k$$

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