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Abridged CHEMISTRY

$$U = \pm Q \pm W$$

adiabatic
isothermic
isobaric

$$PV = nRT$$

$$P_1V_1 = P_2V_2$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$T_{\text{kelvin}} = T_{\text{celsius}} + 273$$

M = moles solute/Liter solution
m = moles of solute/kg of solvent

Colligative Properties

$$\Pi = MRT$$

$$\Delta T_b = K_b m \text{ (elevation)}$$

$$\Delta T_f = K_f m \text{ (depression)}$$

$$P_a = P_{\text{total}} X_{\text{solvent}}$$

Conductance

$$X_a = \frac{\text{moles } X}{\text{total moles}}$$

% composition = mass X / total weight

$$q = mc\Delta t$$

$$q = mL$$

$$E = hf$$

$$v = f \lambda$$

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

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

$$[H^+][OH^-] = 1 \times 10^{-14}$$

$$[K_a][K_b] = 1 \times 10^{-14}$$

$$K_a = \frac{[H^+][A^-]}{[HA]}$$

$$K_b = \frac{[OH^-][B^+]}{[B]}$$

$$\text{p}K_a = -\log K_a$$

$$\text{p}K_b = -\log K_b$$

$$\text{pH} = \text{p}K_a + \log\left(\frac{[\text{Conj. Base}]}{[\text{Acid}]}\right)$$

$$\Delta H_{\text{reaction}} = \Delta H_{\text{f(products)}} - \Delta H_{\text{f(reactants)}}$$

$$\Delta H_{\text{reaction}} = \text{Bonds broken} - \text{Bonds formed}$$

$$\Delta S_{\text{reaction}} = \Delta S_{\text{f(products)}} - \Delta S_{\text{f(reactants)}}$$

$$\Delta G_{\text{reaction}} = \Delta G_{\text{f(products)}} - \Delta G_{\text{f(reactants)}}$$

$$\Delta G = -nFE; F=10^5$$

$$\Delta G = -RT \ln K_{\text{eq}}$$

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

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

$$\text{Avagadro} = 6 \times 10^{23}$$

Standard vs. ideal conditions; STP

HCl, HBr, H₂SO₄,
HI, HNO₃, HClO₄ } Strong Acids

NaOH, KOH } Strong Bases

Hydrogen Bond
Dipole - Dipole
Van der Waals, Hydrophobic,
Dispersion } Intermolecular Forces

Acidic $[H^+] > [OH^-]$
Neutral $[H^+] = [OH^-]$
Basic $[H^+] < [OH^-]$

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Abridged CHEMISTRY

1. CNOF Satisfy the octet
 - a. Except carbocation
 - b. Except radicals
2. O likes H
3. Center atom usually least electronegative
4. Obtain formal charge as close to zero as possible

Lewis Structures

(AnOx) Anode → Oxidation
 (RedCat) Cathode → Reduction
 (Oil) Oxidation is Lost
 (RiG) Reduction is Gained

Fe^{3+} → Ferric
 Fe^{2+} → Ferrous
 Cu^{2+} → Cupric
 Cu_2O → Cuprous Oxide

Common Names

Batteries

	ΔG	E	Cathode	Anode
Galvanic Cell	-	+	+	-
Electrolytic Cell	+	-	-	+

Move across a Period (left to right) /
Move up a Group

- ↑ Ionization Energy
- ↑ Electron Affinity
- ↑ Electronegativity
- ↓ Atomic Radius

Periodic Trends

$$Q = \frac{\text{Products}}{\text{Reactants}}$$

$\Delta G = (-)$ $Q < K_{eq}$ → moves to the right
 $\Delta G = 0$ $Q = K_{eq}$ → moves both ways
 $\Delta G = (+)$ $Q > K_{eq}$ → moves to the left

Thermodynamics



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