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Abridged CHEMISTRY

$U = \pm Q \pm W$
adiabatic
isothermic
isobaric

$PV = nRT$

$P_1V_1 = P_2V_2$

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

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

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

Colligative Properties
$\Pi = MRT$

$\Delta T_b = K_b m$ (elevation)

$\Delta T_f = K_f m$ (depression)

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

Conductance

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

%composition= mass X/ total weight

$q = mc\Delta t$
$q = mL$

$E = hf$
$v = f\lambda$

$pH = -\log [H^+]$
$pOH = -\log [OH^-]$

$[H^+][OH^-] = 1X10^{-14}$
$[K_a][K_b] = 1X10^{-14}$

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

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

$pK_a = -\log K_a$
$pK_b = -\log K_b$

$pH = pK_a + \log([\text{Conj. Base}]/[\text{Acid}])$

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

$\Delta H_{reaction}$ = Bonds broken– Bonds formed

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

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

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

$\Delta G = -RT\ln Keq$

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

1ATM = 760 torr
Avagadro = $6 X 10^{23}$
Standard vs. ideal conditions; STP

HCl, HBr, H_2SO_4, HI, HNO_3, $HClO_4$ } 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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Lewis Structures

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

Batteries

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

Common Names

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

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

Periodic Trends

Move across a Period (left to right) /
Move up a Group
↑ Ionization Energy
↑ Electron Affinity
↑ Electronegativity
↓ Atomic Radius

Thermodynamics

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

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

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