Cheatography

Rice CHEM 122 Formula/Info Sheet Cheat Sheet by kaliap714 via cheatography.com/36789/cs/11570/

UNIT 1		UNIT 1
Formula Name	Equation	Arrheni
Boyle's Law	PV = k (N,T)	Equation
Charles's Law	V/T = k (N,P)	Logarith of Arrhe
Avogadro's Law	V/n = k (T,P)	Equatio
Ideal Gas Law	V = nRT/P or PV = nRT	Michae
Dalton's Law	Ptotal = P1 + P2 + P3	UNIT 2
STP	1 atm, 0 Celsius	Formul Name/S
Gas Density	d = m/V = PM/RT = N/V	Equilibr
Partial Pressure	P1 = X1 * Ptotal	(concer
Root Mean Squared Speed	v = sqrt(3RT/M)	Equilibr Consta (pressu
Collision Frequency	f = vrms / mfp (mean free path)	Equilibr Equatio rates)
Average Kinetic Energy	KE = 3/2 nRT	Q = K Q < K
Effusion - Graham's Law	rate1/rate2 = sqrt(MW2/MW 1)	
General Rate Law	rate = k[A] ^{m*} [B] _N	Q > K
Zeroth Order Integrated Rate Law	[A]t = [A]0 - kt	Keq is I (10^3)
First Order Integrated Rate	ln[A]t = ln[A]0 - kt	Keq is s (10^-3) Keq = 1
Law Second Order Integrated Rate LAw	1/[A]t = 1/[A]0 + kt	Kc and Relation
Zeroth Order Half Life	t = [A]0/2k	L'C: ade reactan
First Order Half Life	t = ln2/k	L'C: add product
Second Order Half Life	t = 1/k[A]0	

NIT 1 (cont)		UNIT 2 (cont)		UNIT 3	
rrhenius quation	Ae^-Ea/RT	L'C: increase pressure	reaction shifts towards fewer	Formula Name/Info	Equation/Descri ption
ogarithmic Form f Arrhenius	ln(k2/k1) = (- Ea/R) * (1/T2 -	L'C: decrease	moles reaction shifts	Molarity (M)	mol solute/L solution (mol/L)
quation lichaelis-Menton	1/T1) rate = k2 [E]T	pressure	towards greter moles	Molality (m)	mol solute/kg solution (mol/kg)
nzyme Kinetics	[S]/[S] + km	L'C: increase volume	reaction shifts towards greater moles	Mole Fraction (X)	mol solute/mol solution (mol/mol)
NIT 2 ormula ame/Subject	Equation/Desc ription	L'C: decrease volume	reaction shifts towards fewer moles	Vapor Pressure (two volatile chemicals)	Pvap = P <i>aXa</i> + <i>P</i> bXb
quilibrium onstant :oncentrations)	Kc = [products]/[react ants]	Endothermic (T) Phase Transitions	Melting, Sublimation, Evaporation	Boiling Point Elevation	Tb = kb <i>m</i> i
quilibrium onstant	Kp = P(products)/P(r	Exothermic (P) Phase	Freezing, Deposition,	Freezing Point Depression	Tf = -kf <i>m</i> i
oressures) quilibrium	eactants) K = kf/kr	Transitions Entropy	Condensation S = kB ln(W)	Osmotic Pressure	pi =iMRT
quation (with ites)		Change in	$\Delta S = nR$	Solubility	S = mol dissolved / L solution
= K < K	At equilibirum reaction shifts	Entropy for Change in Volume	In(V2/V1)	CIE: add in species already present	decrease solubility
	in forward direction	Change in Entropy	ΔSsurr = - ΔH/T		
> K	reaction shifts in reverse direction	ofSurroundings Gibbs Free	ΔG = ΔH -	Henderson- Hasselbach Equation	pH = pKa + log(conj. base/acid)
eq is large 0^3)	kforward > kreverse	Energy Nonstandard	$T\Delta S$ $\Delta G = \Delta G0 +$	K value for Neutralization	Kn = Ka*Kb/Kw
eq is small 0^-3)	kforward < kreverse	Gibbs Free Energy (1)	RTInQ	Equivalence Point	mol base added = mol acid
eq = 1	kforward =	Standard Gibbs Free Energy	∆G0 = -RTInK	Midpoint	originally present pH = pKa
c and Kp elation	kreverse Kc = Kp * RT^∆n	Nonstandard Gibbs Free Energy (2)	ΔG = RT In(Q/K)	Solvent- Solvent Interactions	endothermic, overcome IMFs
C: add more	reaction shifts forward	Clausisus- Claperyon Equation	In(P2/P1) = - ∆H/R (1/T2-1/T1)	Solute-Solute Interactions	endothermic, overcome IMFs
C: add more roducts	reaction shifts reverse		(112 111)		

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UNIT 3 (cont)		UNIT 4 (cont)	
Solvent- Solute Interaction s	exothermic, release energy through attractive forces	Standard Hydrogen Electrode (SHE)	2H+ H2(
To relate Ka to Kb	Kw = Ka * Kb	Standard Cell Potential	E0 :
Strong Acids	H2SO4, HNO3, HCI, HI, HCIO4, HCIO3, HBr	Total Charge (Z)	Z = sec colc
Strong Bases	LiOH, NaOH, KOH, RbOH, CsOH, Ca(OH)2, Sr(OH)2	Moles of Electrons Produced	n(e-
UNIT 4	UNIT 4		n(m mol e- n
Formula	Equation/Descripti	Produced	6-11
Name/Subj ect	on	Mass of Metal Produced	m(n n(m
	on charge/time (Amperes)	Produced Nernst	n(m I E =
ect	charge/time	Produced	n(m I
ect Current (I))	charge/time (Amperes) energy/charge	Produced Nernst Equation with	n(m I E =
ect Current (I)) Voltage (V)	charge/time (Amperes) energy/charge (Volts) energy/seconds	Produced Nernst Equation with	n(m I E =
ect Current (I)) Voltage (V) Power (W) Oxidation	charge/time (Amperes) energy/charge (Volts) energy/seconds (Watts)	Produced Nernst Equation with	n(m I E =
ect Current (I)) Voltage (V) Power (W) Oxidation Reaction Reduction	charge/time (Amperes) energy/charge (Volts) energy/seconds (Watts) Lose electrons	Produced Nernst Equation with	n(m I E =

2H+ + 2e> H2(g)
E0 = RT/nF lnK
Z = I * t (in seconds), in coloumbs
n(e-) = Z/F
n(metal) = n(e-)* mol(metal)/mols e- needed
m(metal) = n(metal)/MWmeta I
E = E0red + 2.3RT/F logQ

Cell

(E)

Potential

Gibbs Free Energy (standard)

Faraday's Constant Nernst

Equation

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flow from anode

Eredan $\Delta G0 = -nFE0$

Ecell = Ecathode +

Eanode = Eredcat -

96,500 C/mol e-

E = E0 - RT/nF InQ

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