Cheatography

CHEM 121 and 122, college/AP chemistry Cheat Sheet

by aprilreynoldsss via cheatography.com/165644/cs/34679/

CH 1: ESSENTIALS

density=mass/volume

°C= 59 ×(°F−32)

°F= (95×°C) + 32

K=°C + 273.15

°C= K−273.15

CH 5: THERMOCHEMISTRY

q =(c × m × ΔT) = (c × m × (Tfinal−Tinitial))

ΔU = q+w

ΔH◦ reaction = (∑n × ΔHf(products)) −(∑n × ΔHf(reactants))

CH 8: ADV. COVALENT BONDING

bond order = ((number of bonding electron) − (number of antibonding electrons)) / 2

CH 10: LIQUIDS AND SOLIDS

h=(2Tcosθ) / (rρg)

$P=Ae^{-\Delta Hvap/(RT)}$

lnP=−ΔHvap/(RT)+lnA

ln(P2/P1)= (ΔHvap/R) (1/T1−1/T2)

nλ=2d sinθ

CH 11: SOLUTIONS AND COLLOIDS

$C^g=kP^g$

($P^A=(X^A)$ (P^A))

Psolution=Xsolvent Psolvent

$\Delta T^b = K^b m$

$\Delta T^f = K^f m$

Π = MRT

CH 17: ELECTROCHEMISTRY

CH 14: ACID-BASE EQUILIBRIA

Kw = [H3O+][OH−] = 1.0 × 10^{-14} (at 25 °C)

pH=−log[H3O+]

pOH = −log[OH−]

$[H3O+] = 10^{-pH}$

$[OH−] = 10^{-pOH}$

pH + pOH = pKw = 14.00 at 25 °C

$Ka=[H3O^+][A^-] / [HA]$

$Kb=[HB^+][OH^-] / [B]$

Ka × Kb = 1.0 × 10^{-14} = Kw

Percent ionization = ([H3O+]eq / [HA]0) ×100

pKa = −log Ka

pKb = −log Kb

$pH= pKa+ log ([A^-]/[HA])$

CH 2: MOLEC, ATOMS, IONS

average mass= ∑ i (fractional abundance × isotopic mass) i

CH 6: ELECTRONIC STRUCTURE & PERIODIC PROP

c = λv

E = hv= hcλ ...where h= 6.626 × 10−34 J s

$1λ = R∞(1/n^2(\#1) −1n^2$

$En=−kZ^2 / n^2$ ...n=1,2,3,…

$\Delta E =kZ^2 (1/n^2 (\#)1 −1/n^2 (\#) 2)$

$\Delta E= kZ^2 (1/n^2(\#1) −1/n^2(\#2))$

$r= (n^2 /Z) a0$

CH 9: GASSES

P=F/A

p = hρg

p = hρg

PvTotalv = PvAv + PvBv + PvCv + … = ΣiPi

PvAv = (XvAv)(PvTotalv)

$XvAv =(nvAv)/ (n^{total})$

rate of diffusion = (amount of gas passing through an area) / (unit of time)

(rate of effusion of gas A / rate of effusion of gas B) = $\sqrt{m^B} / \sqrt{m^A} = \sqrt{M^B} / \sqrt{M^A}$

KEavg =(3/2)(RT)

CH 12: KINETICS

relative reaction rates for aA⟶bB =(−1/a) (Δ[A]/Δt) =(1/b)(Δ[B]/Δt)

integrated rate law for zero-order reactions: [A]t=−kt+[A]0

half-life for a zero-order reaction t1/2= [A]0/(2k)

integrated rate law for first-order reactions: ln[A]t=−kt + ln[A]0

half-life for a first-order reaction t1/2= ln2/k

integrated rate law for second-order reactions: 1/[A]t=kt+ 1/[A]0

half-life for a second-order reaction t1/2 =1/([A]0k)

$k=Ae^{-Ea/RT}$

lnk= (−Ea/R)(1/T) + lnA

lnk(1/k2)= (Ea/R) (1/T2−1/T1)

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CH 15: OTHER EQUILIBRIA

$MpXq(s) \rightleftharpoons pM^{m+}(aq) + qX^{n-}(aq)$

where $Ksp=[M^{m+}]^p[X^{n-}]^q$

CH 3: SUBSTANCE/SOLUTION CONCENTRATION

%X=(massX / mass compound) × 100%

(molecular or molar mass) / (empirical formula mass)=nformula units/molecule

(AxBy)n = (Anx)(Bny)

M=(mol solute) / (L solution)

(C1)(V1) = (C2)(V2)

Percent by mass =(mass of solute / mass of solution) ×100

ppm = (mass solute) / (mass solution) $\times 10^6$ ppm

ppb=(mass solute) / (mass solution) × 10^9 ppb

CH 4: STOICH/CHEM. REACTIONS

percent yield = {(actual yield)/(theoretical yield)} ×100

CH7: CHEM. BONDING & MOLECULAR GEO.

formal charge = (# valence shell electrons (free atom)) − (# lone pair electrons −(1/2) # bonding electrons)

Bond energy,diatomic molecule: $XY(g) \longrightarrow X(g) + Y(g)$ $D^{X-Y}=\Delta H°$

Enthalpy change: $\Delta H = \Sigma D^{\text{bonds broken}} - \Sigma D^{\text{bonds formed}}$

Lattice energy, solid MX: $MX(s) \longrightarrow M^{n+}(g) + X^{n-}(g)$ ΔH^lattice

Lattice energy, ionic crystal: $\Delta H^{\text{lattice}} = (C(Z^+)(Z^-)) / Ro$

CH 13: FUNDAMENTAL EQUILIBRIUM CONCEPTS

$Qc=[C]^c[D]^d / [A]^a[B]^b$

$Qp= [PC]^c[PD]^d / [PA]^a[PB]^b$

P = MRT

Kc = Qc at equilibrium

Kp = Qp at equilibrium

$KP = Kc\ (RT)^{\Delta n}$

CH 16: THERMODYNAMICS

ΔS= qrev/T

S = k ln W

ΔS=k ln(Wf/Wi)

$\Delta S° = \sum vS°(\text{products}) - \sum vS°(\text{reactants})$

ΔS=qrev/T

ΔSuniv = ΔSsys + ΔSsurr

ΔSuniv=ΔSsys+ΔSsurr=ΔSsys+ (qsurr/T)

ΔG = ΔH − TΔS