CHEM110 - Fall 2022

Please note: This sheet contains relevant equations and constants for Chem110. Omission of an equation/constant does not mean it may not be required to answer a question on an assessment

Useful Constants and Relationships

$c = 2.998 \times 10^{8}$ ms^{-1}

$m_{electron} = 9.109 \times 10^{-31}$ kg

$h = 6.626 \times 10^{-34}$ Js

$N_A = 6.022 \times 10^{23}$ mol^{-1}

1 amu $= 1.66 \times 10^{-27}$ kg

0 K $= -273.15$ °C

1 J $= 1$ kg m^2 s^{-2}

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

1 eV $= 1.6022 \times 10^{-19}$ J

$KE = \frac{1}{2}\, mu^2$

$c = \nu\lambda$

$E_{photon} = h\nu$

Photoelectric Effect: $E_{photon} = \phi + KE_{electron}$

$R_H = 1.097 \times 10^{7}$ m^{-1}

Rydberg Equation: $\frac{1}{\lambda} = R_H \left(\frac{z^2}{{n_1}^2} - \frac{z^2}{{n_2}^2}\right); n_2 > n_1$

Bohr's Constant $= -2.18 \times 10^{-18}$ J

Bohr's Equation: $\Delta E = -2.18 \times 10^{-18} \left(\frac{z^2}{{n_{final}}^2} - \frac{z^2}{{n_{initial}}^2}\right)$

$\lambda_{deBroglie} = \frac{h}{mu}$

Uncertainty Principle: $\Delta x \Delta p \geq \frac{h}{4\pi}$; where $\Delta p = m \times \Delta u$

$\Delta_r H^\circ = \Sigma \Delta_r H^\circ_{\text{breaking}} + \Sigma \Delta_r H^\circ_{\text{forming}}$

$\Delta_r H^\circ = \Sigma$ Bond Energy$_{breakage} - \Sigma$ Bond Energy$_{formation}$

Electronegativity values of the elements (Pauling scale)

H 2.1																	He
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Ti 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn 2.4
Fr 0.7	Ra 0.7	Ac 1.1															

Ce 1.1	Pr 1.1	Nd 1.1	Pm 1.1	Sm 1.1	Eu 1.1	Gd 1.1	Tb 1.1	Dy 1.1	Ho 1.1	Er 1.1	Tm 1.1	Yb 1.1	Lu 1.2
Th 1.3	Pa 1.5	U 1.7	Np 1.3	Pu 1.3	Am 1.3	Cm 1.3	Bk 1.3	Cf 1.3	Es 1.3	Fm 1.3	Md 1.3	No 1.3	Lr