

Physical Chemistry Formula Revision

Basic Concepts

$$\text{Average atomic mass} = \frac{a_1x_1 + a_2x_2 + a_3x_3 + \dots}{100}$$

$a_1, a_2, a_3, \dots$ - atomic mass of isotopes

$x_1, x_2, x_3, \dots$ - percentage abundance

Mole concept

$$\text{no. of moles, } n = \frac{\text{given mass}}{\text{molar mass}} = \frac{W}{M}$$

$$n = \frac{\text{no. of particles}}{\text{Avogadro's No.}} = \frac{N}{6.022 \times 10^{23}}$$

$$n = \frac{\text{vol. of gas}}{\text{vol. of gas at STP}} = \frac{V}{22.4 \text{ L}}$$

Concentration Terms

$$\text{Percentage, \%} = \frac{W_2 \text{ or } V_2}{W_1 \text{ or } V_1} \times 100$$

$$\text{Molarity, } M = \frac{n_2}{V(l)} = \frac{W_2 \times 1000}{M_2 \times V(\text{ml})}$$

$$\text{Normality, } N = \frac{n_{eq}}{V(l)} = \frac{W_2 \times 1000}{E_{eq} \times V(\text{ml})}$$

$\hookrightarrow \frac{W_2}{n_f}$

$$\text{parts per million, ppm} = \frac{W_2}{W_1} \times 10^6$$

$$\text{Molality, } m = \frac{n_2}{W_1 (g)} = \frac{W_2 \times 1000}{M_2 \times W_1 (g)}$$

$$\text{Mole fraction, } x_2 = \frac{n_2}{n_1 + n_2 + n_3 + \dots}$$

Stoichiometry



$$\frac{\text{moles of A}}{a} = \frac{\text{moles of B}}{b} = \frac{\text{moles of C}}{c}$$

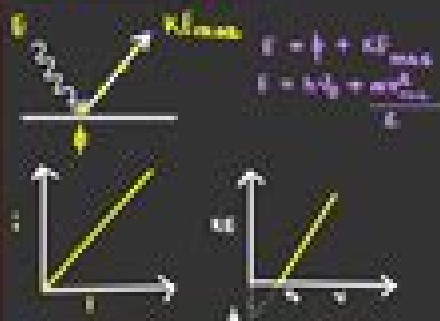
Limiting R_2 : $\frac{\text{given amt.}}{\text{stoichiometric coeff.}} \rightarrow \text{lowest}$

Atomic Structure

Planck's Quantum Theory

$$E = \frac{hc}{\lambda} \quad E (\text{eV}) = \frac{12400}{\lambda (\text{\AA})}$$

Photo Electric Effect



De Broglie's Hypothesis

$$m\lambda = \frac{h\nu}{\lambda} \rightarrow \lambda = \frac{h}{mv} \quad \lambda = \frac{h}{\sqrt{2meV}}$$

Schrodinger's Atomic model

$$mvr = \frac{nh}{2\pi} \quad r = 0.53 \times \frac{n^2}{Z} \text{ \AA}$$

$$r = 2.18 \times 10^{-8} \frac{n^2}{Z} \text{ m}$$

$$E_n = -13.6 \times \frac{Z^2}{n^2} \text{ eV} \quad T.E = E_f - E_i = -13.6$$

$$\frac{1}{\lambda} = R_H Z^2 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right] \quad R_H = 1.1 \times 10^7 \text{ m}^{-1}$$

max no. of spectral lines when e^- returns from $n_2 = n_1 + 1$ to $n_1 = 1$: $\frac{n_2(n_2-1)}{2}$

Heisenberg's Uncertainty Principle: $\Delta x \Delta p \geq \frac{h}{4\pi}$

Quantum Model

total nodes = $n-1$

angular nodes = l

radial nodes = $n-1-l$

Angular momentum

$$\text{orbital} = \sqrt{l(l+1)} \frac{h}{2\pi}$$

$$\text{spin} = \sqrt{s(s+1)} \frac{h}{2\pi}$$

The Nature Of Physical Chemistry

Robert Tuffnell



The Nature Of Physical Chemistry:

The Nature of Physical Chemistry Dudley J. Luke, 1969 *The Nature of Physical Chemistry*, 19?? *The Nature of Physical Chemistry*, by Robert Ruffnell and Dudley J. Luke Robert Tuffnell, *Principles of Physical Chemistry* Hans Kuhn, David H. Waldeck, Horst-Dieter Försterling, 2024-10-25

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web numerically the solution is dab d0 db da i10 i5 j2 i3 j3 i12 j5 6 find the unit vectors that point from a to the other points b to g in question 2 express each vector in component ij notation

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