

Advanced Chemistry useful handout #1

Metric conversion chart

10^9 g =	1 Gg	giga	
10^6 g =	1 Mg	mega	
10^3 g =	1 kg	kilo	$1000 \text{ g} = 1 \text{ kg}$
1 g =	1 g	BASE	
1 g =	10^1 dg	deci	$1 \text{ g} = 10 \text{ dg}$
1 g =	10^2 cg	centi	$1 \text{ g} = 100 \text{ cg}$
1 g =	10^3 mg	milli	$1 \text{ g} = 1000 \text{ mg}$
1 g =	10^6 μ g	micro	
1 g =	10^9 ng	nano	
1 g =	10^{12} pg	pico	

10^{10} Å (Angstroms) = 1 meter (atomic size)

Linear to Volume: When converting between linear and volume measurements, you need to *cube* the conversion factor! $10 \text{ cm} = 1 \text{ dm}$; so $(10 \text{ cm})^3 = (1 \text{ dm})^3$ thus $1000 \text{ cm}^3 = 1 \text{ dm}^3 = 1 \text{ Liter}$

Some Helpful Formulas:

Gas Laws: Conversions: STP for gases = 0°C and 1 atm ; (or 273 K , 760 mm Hg)

Combined : $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$ Diffusion: $\frac{\text{rate A}}{\text{rate B}} = \frac{\sqrt{FW B}}{\sqrt{FW A}}$ Molar volume of = $\frac{22.4 \text{ L}}{\text{mole}}$
gas law

Ideal Gas Law: $PV = nRT$ If you know P , V , T of a gas, you can calculate moles!

For $PV = nRT$: P in atm, V in L, n = moles, T in K, Ideal Gas Constant, $R = 0.0821 \text{ L atm/mol K}$
(use Partial Pressure of a gas in $PV = nRT$ to get mol of that particular gas)

Dalton's law of Partial Pressures: $P_{\text{total}} = P_a + P_b + P_c + \dots$ $P_{\text{dry gas}} = P_{\text{total}} - P_{\text{water vapor}}$

Partial pressure = $P_a = X_a P_{\text{total}}$ where mol fraction = $X_a = \frac{\text{mol a}}{\text{Total mol of gases}}$

Solutions: Molarity = $\frac{\text{moles solute}}{\text{L of solution}}$ or $M = \frac{\text{mol}}{\text{L}}$ mol = $V M$ $V = \frac{\text{mol}}{M}$ (V must be in Liters)

Or : can use millimoles and milliliters: $M = \frac{\text{mmol}}{\text{mL}}$ mmol = mL M mL = $\frac{\text{mmol}}{M}$

Dilutions: $V_1 M_1 = V_2 M_2$ (can use mL for Volumes) Acid Base Titration: $V_a M_a (\#H) = V_b M_b (\#OH)$

molality = $m = \frac{\text{mol solute}}{\text{kg solvent}}$ mol fraction = $X_a = \frac{\text{mol a}}{\text{total mol}}$ Weight % = $\frac{\text{g solute}}{100 \text{ g solution}}$

Additional conversion factors and constants:

Energy:

$4.18 \text{ joules} = 1 \text{ calorie}$ $1 \text{ Joule} = \frac{1 \text{ kg m}^2}{\text{sec}^2}$

Volume: $1 \text{ cm}^3 = 1 \text{ mL}$ $1 \text{ dm}^3 = 1 \text{ L}$

$1 \text{ m}^3 = 10^3 \text{ L}$

Density = $\frac{\text{Mass}}{\text{Volume}}$; $\frac{1 \text{ gram}}{\text{mL}}$ (water only)

Avogadro's number: $N = \frac{6.02 \times 10^{23} \text{ particles}}{1 \text{ mole}}$

Kelvin = $^\circ\text{Celsius} + 273$

$1 \text{ atm} = 760 \text{ mm Hg}$

Advanced Chemistry

Ohio State University



Advanced Chemistry:

Advanced Chemistry Michael Clugston, Rosalind Flemming, 2000-06-08 Carefully researched by the authors to bring the subject of chemistry up to date this text provides complete coverage of the new A and AS level core specifications The inclusion of objectives and questions make it suitable for self study Advanced Chemistry : 1 & 2 Combined Edition Philip Matthews, 1992 Advanced Chemistry is an accessible up to date textbook which has been written to appeal directly to A level Chemistry students It covers the syllabuses of all the main examining boards offering A Level Chemistry and contains material suitable for students beginning undergraduate study The author places the subject in context by discussing the nature and where relevant the economics of the chemical industry and wider implications and applications of chemistry The material is divided into four parts physical industrial inorganic and organic chemistry Each part is divided into short self contained units each of which develops a set of well defined themes or concepts Students may work through the units in order or individual units may be used separately Each unit is divided into sections with short questions at the end of each section which may be used by students as a means of self assessment More extensive questions on the physical and industrial chemistry sections are given at the end of the book These may be used to provide material for student assignments and to provide students with practice in answering examination questions *Resources in education*, 1984-11 *General Catalogue* Syracuse University, 1925 Catalogue University of Alabama, 1922 **Catalogue** Wesleyan University (Middletown, Conn.), 1884 Annual Catalog of the Michigan State Normal College for ... Eastern Michigan University, Michigan State Normal College, 1926 *Year Book of the Michigan State Normal College for ...* Eastern Michigan University, Michigan State Normal College, 1914 **University of California Bulletins**, 1908 The Harvard University Catalogue Harvard University, 1888 Annual Catalogue Illinois Wesleyan University, 1890 *Annual Report of the Commissioners of the District of Columbia* District of Columbia. Board of Commissioners, 1902 Reports of the Board of Managers, President of the College, Treasurer of the Corporation Haverford College, 1877 **General Catalog** Louisiana State University (Baton Rouge, La.), 1919 **Catalog of the Officers and Students of the University in Cambridge** Harvard University, 1887 *Annual Meeting, Proceedings and Reports*, 1911 **Catalogue** Grove City College, 1922 **Catalogue** Ohio State University, 1901 **Undergraduate Catalog** North Carolina State University, 1927 **Catalogue of the Officers and Students of Antioch College of Yellow Springs, Greene Co., Ohio, for the Academic Year** Antioch College, 1925

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