

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 = $\frac{22.4 \text{ L}}{\text{mole}}$
 a gas at STP

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 $M = \frac{\text{mol}}{\text{L}}$ $\text{mol} = V M$ $V = \frac{\text{mol}}{M}$ (V must be in Liters)

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

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

North Carolina 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 Resources in education, 1984-11 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 **General Catalogue** Syracuse University, 1925 **Year Book of the Michigan State Normal College for ...** Eastern Michigan University, Michigan State Normal College, 1914 *Annual Catalog of the Michigan State Normal College for ...* Eastern Michigan University, Michigan State Normal College, 1926 **University of California Bulletins**, 1908 **The Harvard University Catalogue** Harvard University, 1888 Annual Report of the Commissioners of the District of Columbia District of Columbia. Board of Commissioners, 1902 Annual Catalogue Illinois Wesleyan University, 1890 **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 **Undergraduate Catalog** North Carolina State University, 1927 *Catalogue of the Officers and Students of Antioch College of Yellow Springs, Greene Co., Ohio, for the Academical Year* Antioch College, 1925 **Catalogue** Ohio State University, 1901 **Catalogue** Grove City College, 1922 General Catalogue, 1917 **Bulletin**, 1929

The Top Books of the Year Advanced Chemistry The year 2023 has witnessed a noteworthy surge in literary brilliance, with numerous compelling novels captivating the hearts of readers worldwide. Lets delve into the realm of top-selling books, exploring the fascinating narratives that have captivated audiences this year. Advanced Chemistry : Colleen Hoover's "It Ends with Us" This touching tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover masterfully weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can succeed. Uncover the Best : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This spellbinding historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids captivating storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Advanced Chemistry : Delia Owens "Where the Crawdads Sing" This mesmerizing coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens crafts a tale of resilience, survival, and the transformative power of nature, captivating readers with its evocative prose and mesmerizing setting. These top-selling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of engaging stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a masterful and gripping novel that will keep you guessing until the very end. The novel is a warning tale about the dangers of obsession and the power of evil.

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