

Chemistry Regents "Must Know" Facts

- 1) Substitute the word "Temperature" for "average kinetic energy" to make questions easier.
- 2) Sublimation is a phase change from a Solid directly to a gas. 2 examples = CO₂ and I₂
- 3) Solutions containing ions of transition elements (groups 3 - 11) are often colored. Ex. = CuSO₄
- 4) Only two elements exist as liquids at STP. Hg (metal) & Br (non-metal)
- 5) Elements are arranged in the periodic table according to their atomic #.
- 6) The atomic mass of an element is the weighted average of the element naturally occurring isotopes
- 7) The mass # of an atom is found by adding the number of protons + neutrons
- 8) One atomic mass unit (1 amu) is defined as exactly $\frac{1}{12}$ the mass of Carbon-12
- 9) Atoms that become ions by losing electrons decrease in size while those that gain e⁻ increase
- 10) The nuclear charge of an atom is the same as its number of protons.
- 11) The nucleons of an atom are those particles found in the nucleus (i.e., protons & neutrons)
- 12) Molecular substances generally contain only covalent bonds, have low m.p.'s and are soft.
- 13) Molecules with polar bonds may be non-polar because their shapes are symmetrical.
- 14) Carbon dioxide has 2-Double bonds and is nonpolar because it is symmetrical (shape = linear)
- 15) Memorize the 7 elements that are diatomic: H₂ N₂ O₂ F₂ Br₂ I₂ Cl₂
- 16) Memorize: 1 mole = 6.02×10^{23} molecules = 6FM grams = 22.4 liters (if it is a gas at STP).
- 17) Water, NH₃ and HF have unusually high boiling points due to strong intermolecular forces (H bonds)
- 18) Network solids contain covalent bonds, have high m.p.'s and are very Hard. Ex = Diamonds
- 19) Elements in the same group have similar chemical properties b/c they have the same # of valence e⁻.
- 20) Elements in the same period have the same # of principal energy levels (shells)
- 21) Metallic elements generally obtain a complete octet by losing electrons
- 21) The most metallic elements are located in the lower left region of the periodic table
- 23) Metals are good conductors of heat and electricity because of their "Sea of mobile electrons"
- 24) Group 1 & 2 metals are so reactive they are not found free in nature and must be obtained by electrolysis
- 25) Semi-metals are located Star, step line and exhibit metallic and nonmetallic properties
- 26) Gases behave most like ideal gases under conditions of high temp and low pressure
- 27) The two gases that behave most like ideal gases under any conditions are H and He.
- 28) An electrolyte is a substance that is capable of conducting elect⁻ when dissolved in water.
- 29) Three examples of electrolytes are NaCl(aq), KCl(aq) and NaNO₃(aq).
- 30) Salts contain ionic bonds and are easily identified b/c they contain a metal and nonmetal
- 31) Memorize and know the significance of: LEO - GER and RED CAT - AN OX.
- 32) Saturated hydrocarbons only contain the elements H & C and have all single bonds.
- 33) Chemical reactions are spontaneous when they are Exothermic and entropy increases.
- 34) All reactions (especially redox reactions), there must be conservation of mass and charge.

- 35) Be able to distinguish (and draw) the differences between elements, compounds & mixtures.
- 36) When one element changes into another, the process is known as transmutation.
- 37) Isotopes of all elements with atomic #'s greater than 83 are radioactive and decay over time.
- 38) Alpha decay & beta decay are examples of Natural transmutation.
- 39) Fission and Fusion both release very large amounts of energy due to the conversion of mass to energy.
- 40) Intermolecular forces (_____ forces) between hydrocarbons are generally (strong/weak).
- 41) Larger hydrocarbons have (stronger/weaker) van der Waals forces and higher m.p.'s & b.p.'s.
- 42) Polar solutes generally dissolve in polar solvents. The most common polar solvent is H₂O.
- 43) As the concentration of dissolved particles in solution increases, the b.p. ↑ and m.p. ↓.
- 44) Ionic solutes affect the m.p. and b.p. to a greater extent than molecular solutes b/c they dissociate in H₂O.
- 45) Electrons must gain energy to move to the excited state & release energy to move to the ground state.
- 46) Rutherford's Gold-Foil Experiment revealed an atom is made of mostly empty space.
- 47) Equilibrium exists when the rate of forward and reverse reactions are equal.
- 48) When a system is at equilibrium, the concentration of reactants and products are constant.
- 49) Electronegativity is a measure of an atom's attraction of for electrons.
- 50) Ionization energy is the energy required to remove an electron from an atom.

Strategies for answering multiple-choice questions

- Many questions/answers have 2 components. Answer them one at a time.
- Eliminate incorrect/inconsistent choices immediately.
- Don't pick answers that you have never heard of.

Blind Guessing & Reaffirmation of answers

- The correct answer to a multiple-choice question is often significantly different from the other 3 choices.
- The correct answer to a multiple-choice question is often at one extreme of a sequence.

General Advice for Parts B-2 and C

- Read Instructions carefully. Answer the question that is being asked.
- When questions include *italics*, be sure to account for the *italicized* word/phrase in your answer.
- Write legibly! Answers that cannot be read, will not earn points!
- Don't write too much. Answer only the question that is being asked.
- When given reading passages, try to answer the questions with words from the passage itself.
- Do not solve mathematical problems that only ask for a correct setup.