

Pre-AP Chemistry Final Assessment Study Guide

All dates are tentative

Part 1: 12/3-4

1. Explain in detail how you name ionic compounds using the following formula as an example: NiCl_3 .
2. Explain in detail how you write formulas for ionic compounds using lithium nitride as an example.
3. Explain in detail how you name binary molecular compounds using the formula S_2Cl_3 as an example.
4. Explain in detail how you write formulas for binary molecular compounds using carbon dioxide as an example.
5. Explain the process of dimensional analysis in the context of the following conversion: convert 250.3 nanoliters to milliliters. What makes the metric system so useful?
6. Explain how to determine an object's density using water displacement. Create some fictional data for a fictional object and calculate the density of your fictional object.
7. Perform the following calculations and explain, in detail, the rules of significant figures as they apply to these specific operations: $2.15\text{g} + 0.0214\text{g} - 1.202142\text{g}$, $4.521\text{m} \times 0.21\text{m} \div 412\text{m}$.
8. Explain how you know how many digits to record (to ensure proper precision) when using an instrument or device such as a ruler.

Part 2: 12/10-11

1. Please provide, for each of the scientists listed below, a detailed description of any experiments they did that helped advance the understanding of atomic theory. In the absence of (or in addition to) any experiments, please also describe and explain how they arrived at the atomic model attributed to them. The scientists of interest are: Dalton, Thomson, Rutherford, Millikan, Schrodinger, Bohr, and Chadwick.
2. Draw a diagram of a Helium atom and indicate the location and charge of all three common subatomic particles. Also indicate the primary force that holds each of these in its place and indicate which force is strongest.
3. Imagine you have discovered a new element on the periodic table that has three isotopes that you isolated. Create masses and abundances for each isotope of your element and explain, in detail, how you would calculate the average atomic mass of the new element. Also indicate the number of subatomic particles in each of your isotopes and explain how you arrived at those values.
4. Choose any wavelength of visible light and describe how you would go about calculating the frequency and energy of a photon with that particular wavelength. Use a Bohr diagram to explain how this energy you chose was produced.

Part 3: 12/15-16

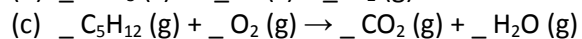
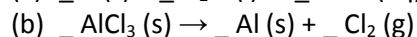
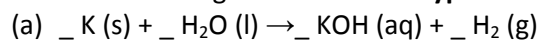
1. Select any element from period three on the periodic table and write the electron configuration for it and its most common ion. Fully describe how you knew what numbers and letters to place at each location in the configuration.
2. List and explain each of the four trends we discussed in class that re evident within the periodic table (electronegativity, atomic radius, ionic radius, and 1st ionization energy). Also select a collection of four adjacent elements from the representative elements and explain which is the least and greatest with respect to the trends above.
3. Select a representative metal and representative nonmetal pair and use them to explain the process of ionic bonding by showing the entire process using Lewis dot structures. Be sure to write the resulting formula unit and name of the compound and list any common physical properties it may have.
4. Explain how and why covalent bonds form and show the process using two or more nonmetal elements of your choice.

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5. Thoroughly explain the octet rule and all common exceptions to it noted in class. Use examples of your choice to aid your explanations.
6. Explain, in detail, what the basis of VSEPR theory is and how orbital hybridization and unshared electron pairs fit into it.
7. Explain the common intermolecular attractions and list them in order of increasing strength. Explain the dependence of common physical properties (melting point, boiling point, state at room temperature, etc) on the forces present and their degree of strength.

Part 4: 12/19

1. **Balance** and give the **reaction type** for each of the reactions below.



2. Complete and balance the following reactions.

(a) Sodium carbonate is heated and decomposes.

(b) Hexane is burned in excess oxygen.

(c) Iron(III) chloride solution is poured over a piece of silver.

(d) Lead(II) nitrate and sodium iodide solutions are mixed.

(e) Nitrogen gas is passed over a hot piece of lithium metal.