

Chemistry

Name: _____ Period ____

Semester 1 Review 2011-2012

Place answers on a separate paper. This review must be turned in to the proctor on the day of the exam to receive credit.

- Describe the next logical step in the scientific method after developing a hypothesis based on an observation.
- Define: Element, compound and mixture.
- Differentiate between a chemical versus physical change.
- Differentiate between accuracy and precision. A student measures the density of a material three times with values of 3.13g/mL, 3.15g/mL and 3.12g/mL. She finds in a chemistry reference book that the accepted density for the material is 3.75g/mL. Comment on the accuracy and precision of these measurements.
- Write the formulas for the following compounds: a) iron(III)oxide, b) stannic sulfide, c) tetraarsenic decaoxide, d) sulfuric acid, e) cupric sulfate, f) dinitrogen pentoxide
- Name the following compounds: a) BaSO₄, b) I₄O₉, c) K₃PO₄, d) NH₄C₂H₃O₂, e) Fe₂(CO₃)₃, f) HNO₂
- Naturally occurring bromine is composed of two isotopes. One of them, bromine-79 has a mass of 78.9183amu and a percentage of 50.69%. Use this information and the average atomic mass of bromine given on the periodic table to calculate the mass of the other isotope of bromine.
- Balance** the following reactions and **identify the type** of reaction involved.
 - $C_2H_5OH_{(l)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(g)}$
 - $Ca_{(s)} + AgNO_{3(aq)} \rightarrow Ag_{(s)} + Ca(NO_3)_{2(aq)}$
 - $(NH_4)_2CO_{3(aq)} + Ba(ClO_4)_{2(aq)} \rightarrow NH_4ClO_4 + BaCO_3$
 - $NaOH_{(aq)} + HNO_{3(aq)} \rightarrow H_2O_{(l)} + NaNO_{3(aq)}$
- Predict the insoluble product (if any) from the reaction in question 8c. above.
- If the following represents the reactants of a synthesis reaction, predict the product (write the correct formula) and then balance the overall reaction equation. $Ga_{(s)} + Cl_{2(g)} \rightarrow$
- Using the terms element, compound, molecule, homogeneous mixture and heterogeneous mixture identify the following:
 - Beach sand
 - Br₂
 - KCl
 - Vinegar
 - CO₂
 - PCl₃
- A block of an unknown material with dimensions 2.00cm x 1.50cm x 1.50cm is determined to have a mass of 9.55g. Determine the density of the block in g/cm³ **and** in kg/dm³.

13. A liquid is initially at 25.0°C. If there is a 2.00°F decrease in the temperature of the liquid, what is its new temperature in °C?

14. If a 5.0g object absorbs 60.J of heat which raises the temperature of the object by 4.0°C, what is the specific heat of the object in J/g°C?

15. Fill in the missing information in the chart:

Element	Protons	Neutrons	Electrons (in neutral atom)	Group number (and name if applicable)	Common charge	Spectroscopic notation (for neutral atom).
Potassium						
	20					
				VIIA, halogen		$1s^2 2s^2 2p^6 3s^2 3p^5$
			14			
		10			0	

16. For each of the five elements from question 15, identify the type (metal, nonmetal or metalloid) and number of valence electrons in its neutral state.

17. Write the Lewis dot structure for: a) The neutral atoms calcium and oxygen (monoatomic form) b) the compound calcium oxide and c) the compound nitrogen trichloride.

18. What was the plum pudding model of the atom lacking that was later added in the Bohr model? What was the major discovery produced from Rutherford's Gold Foil Experiment?

19. An electromagnetic wave has a wavelength of 325nm. What is its frequency in hertz? What is the energy of the wave in joules?

20. Give the electronic and molecular geometry for the compound in question 17c. Is this compound likely to be polar or nonpolar? Explain.

21. If an isotope of sulfur has a mass that is 2.6643 times the mass of the carbon-12 isotope, what is its atomic mass? How many neutrons does it contain?

22. Write the following reaction in equation form and balance: calcium phosphate reacts with sulfuric acid to produce calcium sulfate and phosphoric acid.

23. Draw a Bohr model electron representation for the element silicon.

24. What is the total number of electrons possible in a) the 3rd principle energy level of an atom, b) a d-sublevel, c) any single orbital?

25. An electron in a hydrogen atom makes a single transition from a higher to a lower energy level releasing a photon with a frequency of 6.91×10^{14} Hz. What is the difference in energy (in joules) between the levels involved in the transition?

26. Rank the following atoms in terms of **increasing** atomic radius: Ga, N, Rb, P, Ca