

Chemistry 22  
Spring 2010  
Exam 2  
100 points  
Dr. Greg Sanchez

Name:

Instructions: You have 1 hour and 20 minutes to complete this exam. For ALL calculations **SHOW YOUR WORK**. Significant figures are required for full credit. You may use the attached periodic table as your reference. Only use the recommended calculator per the syllabus. **There is zero tolerance for cheating.**

1. In which set do all the elements tend to form anions in binary ionic compounds?
  - a. C, S, Pb
  - b. K, Fe, Br
  - c. Li, Na, K
  - d. N, O, I
2. How many electrons are in the ion,  $\text{CO}_3^{2-}$ ?
  - a. 16
  - b. 28
  - c. 30
  - d. 32
3. Which one of the following compounds contains ionic bonds?
  - a. CaO
  - b. HF
  - c.  $\text{NI}_3$
  - d.  $\text{SiO}_2$
4. When dissolved in water, of  $\text{HClO}_4$ ,  $\text{Ca(OH)}_2$ , KOH, HI, which are acids?
  - a.  $\text{Ca(OH)}_2$  and KOH
  - b. Only HI
  - c. Only KOH
  - d.  $\text{HClO}_4$  and HI
5. Name the following compounds or provide the chemical formula, where appropriate:
  - a. Lead (II) phosphate \_\_\_\_\_
  - b.  $\text{Li}_2\text{S}$  \_\_\_\_\_
  - c. Strontium hydroxide \_\_\_\_\_
  - d. Zinc hydride \_\_\_\_\_

- e. HI \_\_\_\_\_
- f. Dinitrogen trioxide \_\_\_\_\_
- g. Sulfite ion \_\_\_\_\_
- h. Potassium peroxide \_\_\_\_\_
- i. AgCl \_\_\_\_\_
- j. Ferric sulfate \_\_\_\_\_

6. Using the compounds listed in problem #5 (a-j), provide two examples of a soluble salt and two examples of an insoluble salt.

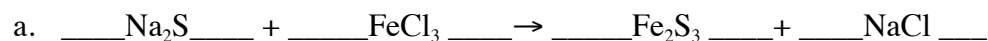
(Soluble) \_\_\_\_\_

(Soluble) \_\_\_\_\_

(Insoluble) \_\_\_\_\_

(Insoluble) \_\_\_\_\_

7. Balance the following equation and provide the states (s, aq, l, or g):



b. Classify the reaction in **7a** \_\_\_\_\_

c. Calculate the molecular weight of  $\text{Fe}_2\text{S}_3$ ?

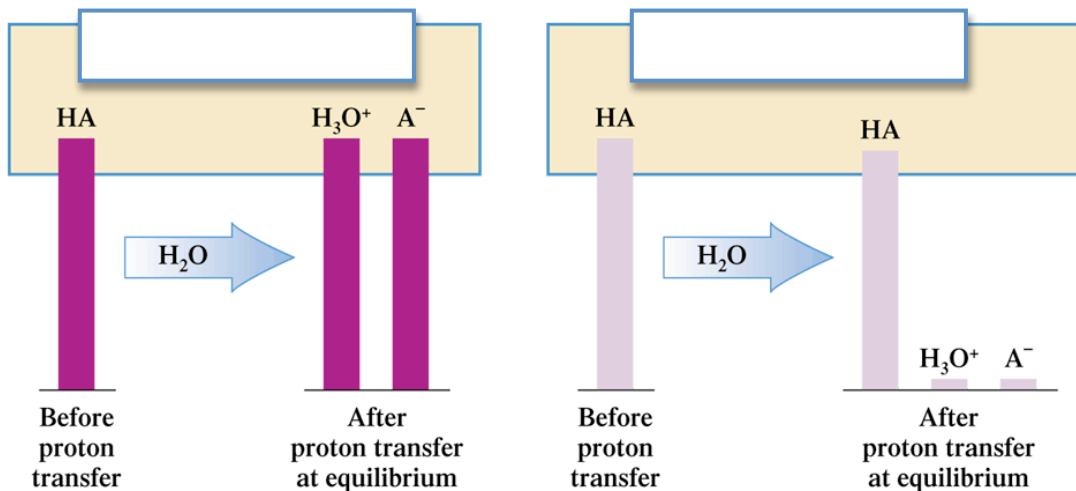
8. Provide the Lewis dot structure and the molecular geometry for the following atoms:

a.  $\text{OF}_2$

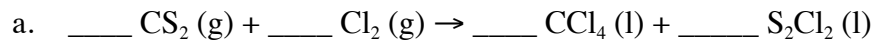
b.  $\text{H}_3\text{O}^+$

c.  $\text{PH}_3$

9. Fill in the titles for the graphical representation of acid dissociation below.



10. Balance the following equations:



b. Classify the reaction in **10a** \_\_\_\_\_

c. What is the mass percent of carbon in 24.3 g of carbon tetrachloride?

11. True or False

a.  Avogadro's number is  $6.022 \times 10^{-23}$ .

b.  Ionic compounds share electron to form very strong bonds.

c.  Bonds between atoms are formed by sharing or donating electrons from the valence shell, which is the shell closest to the nucleus.

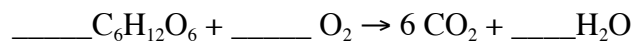
d.  The seven elements that are diatomic are: hydrogen, oxygen, carbon, fluorine, chlorine, bromine, and iodine.

e.  There is no difference between the molecular geometry and electronic geometry.

f. \_\_\_\_ The concepts of electronegativity and polarity are related.

g. \_\_\_\_ An electrolyte is made up of a soluble salt.

12. Balance the following equation and classify the reaction:



13. Write the chemical formulas for the reactants and product and balance the overall chemical equation:

a. Aqueous phosphoric acid is mixed with aqueous barium hydroxide to produce...

\_\_\_\_\_

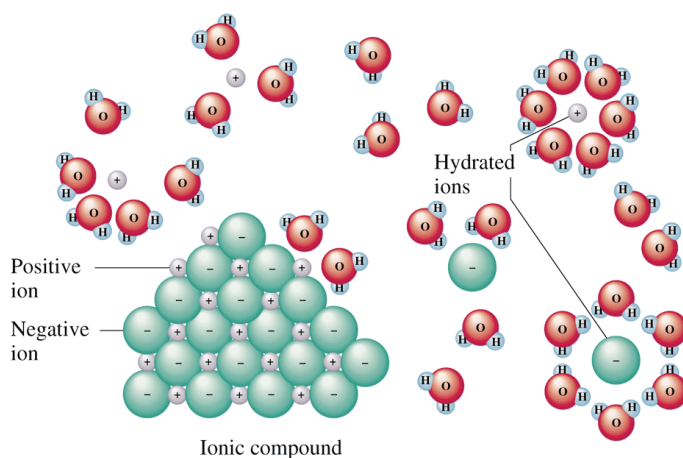
b. Aluminum solid is mixed with aqueous copper (II) nitrate to produce...

\_\_\_\_\_

c. Calcium solid and liquid water react to form aqueous calcium hydroxide and gaseous hydrogen.

\_\_\_\_\_

14. In less than 2 sentences, describe what is occurring in this picture.



15. A solution contains 0.133 g of dissolved lead. How many moles of sodium chloride must be added to the solution to completely precipitate all of the dissolved lead as lead chloride? What mass of sodium chloride must be added? (Molar mass of sodium chloride: 58.44 g/mole; Lead: 207.2 g/mole; Lead chloride: 242.7g/mole)

16. How many acetone ( $C_3H_6O$ ) molecules are in a bottle of acetone with a volume 325 mL? (density of acetone = 0.788 g/mL)

17. Calculate the simplest formula of a compound containing 4.875 g of potassium, 2.429 g of arsenic, and 2.498 g of oxygen.

18) If hydrogen were obtained from water, how much hydrogen in grams could be obtained from 1.0 L of water? (density of water = 1.0 g/mL)