

CHEM-1105 TEST # 1 NAME: _____

Feb. 07, 2003

Please be neat and show your work.

1. The density of gold is 19.3 g/cm^3 . What is the density in kg/m^3 ?
[2]

2. Ernie Els is the hottest golfer on the planet right now. Tiger Woods is recovering from arthroscopic knee surgery and will be back in two weeks to challenge Ernie. One of Ernie's drive at a tournament in Hawaii was 401 yards long (it was down hill, down wind and temperature was 80°F). How far, in mm, did the ball travel. Given: 1 foot=12 inches; 1 yard = 3 feet; 1 inch = 2.54 cm. [3]
3. An airplane flying at the speed of sound has a speed of 1 Mach; Mach 1.5 is 1.5 times the speed of sound; and so on. If the speed of sound in air is 1130 ft/second, what is the speed in km/hour, of an airplane flying at Mach 1.38? [2]

4. Provide formulas for the following: [6]

- a) Potassium hydroxide _____
- b) Calcium sulfite _____
- c) Xenon tetrafluoride _____
- d) Ammonium sulfate _____
- e) Hydrosulfuric acid _____
- f) Mercury(I)bromide _____

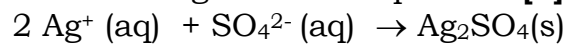
5. Give names for the following: [6]

- a) Cl_2O_7 _____
- b) $\text{H}_3\text{PO}_4(\text{aq})$ _____
- c) $\text{Co}(\text{NO}_3)_2 \cdot 6 \text{H}_2\text{O}$ _____
- d) Ca_3N_2 _____
- e) P_2O_5 _____
- f) KH_2PO_4 _____

6. Complete and balance the following equations. Give the states of products. All reactions occur. [8]

- a) $\text{C}_2\text{H}_5\text{OH}(\text{l}) + \text{O}_2(\text{g}) \rightarrow$
(combustion)
- b) $\text{K}_2\text{CO}_3(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow$
- c) $\text{BaCl}_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow$
- d) $\text{Al}(\text{s}) + \text{S}_8(\text{s}) \rightarrow$

7. Suggest two soluble ionic compounds that, when mixed together in water, result in the following net-ionic equation. **[2]**



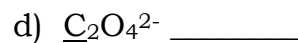
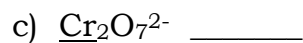
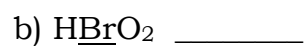
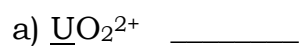
8. The element europium (symbol Eu) exists in nature as two isotopes. The isotope ^{151}Eu has a mass of 150.9196 amu, and ^{153}Eu has a mass of 152.9209 amu. The average atomic mass of europium is 151.96 amu. Calculate the percent abundance of the two isotopes. **[3]**

9. Complete the following table. **[5]**

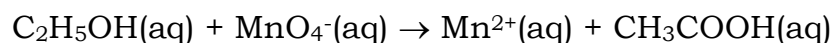
Isotopic Notation	Z	A	Number of protons	Number of neutrons	Number of electrons	Net Charge
			33	42		+3
	81			123		+1
		37		20		-1
				36	29	0

10. Density of gold is 19.3g/cm^3 and that of silver is 10.5g/cm^3 . A jewelry piece is made from an alloy of gold and silver. It has a mass of 9.35 g and its volume is 0.654 cm^3 . Calculate the percentage of gold (by mass) in the jewelry piece. **[4]**

11. Give the oxidation number for the underlined atom in the following. **[2]**

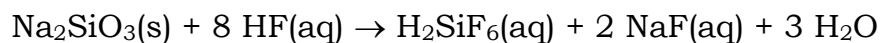


12. a) Balance the following skeletal redox reaction that takes place in an acidic solution. **[5]**



- b) Give the formula of the oxidizing agent. **[1]** _____
- 13.** Lactic acid is produced by the muscles when insufficient oxygen is available and is responsible for muscle cramps during vigorous exercising. Chemical analysis shows that lactic acid is 39.99% C, 6.73% H, and the rest is O. Molar mass of lactic acid is 90.0 g/mol. Determine the empirical (simplest) and molecular formulas for lactic acid. **[5]**

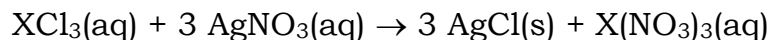
- 14.** Hydrofluoric acid, HF, cannot be stored in glass bottles because silicates in glass are attacked by HF. For example, sodium silicate, Na_2SiO_3 , reacts in the following manner: **[5]**



How many grams of NaF (MM=42.0) could form when 12.2 g of sodium silicate (MM=122.1) react with 100.0 mL of 4.90 M HF?

- 15.** A total of 18.50 mL of H_2SO_4 was carefully neutralized with 14.60 mL of NaOH solution. Unfortunately, the student neglected to copy down the concentration of the NaOH solution. Evaporation of the final solution resulted in the isolation of 0.525 g of Na_2SO_4 (MM= 142.0). Determine the molarity of NaOH and H_2SO_4 solutions. **[5]**

- 16.** A 2.00 g sample of $\text{XCl}_3(\text{s})$ (where X is a metal) was dissolved in water and excess $\text{AgNO}_3(\text{aq})$ was added. The reaction is:



A total of 5.20 g of AgCl (MM= 143.4) was isolated. Determine the molar mass and hence the identity of the metal X. **[4]**