Example Exam

Chemistry 120A **October 10, 1999**

Name _____

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1. Two atoms or ions of the same element must have the same
   a) mass number b) atomic number c) atomic mass
   d) number of electrons e) number of neutrons

2. How many protons are there in the nucleus of an atom of $^{11}_{5}B$?

   a) 5 b) 6 c) 10 d) 11 e) 16

3. Which of the following materials is a homogeneous mixture?

   a) paper b) concrete c) vinegar d) wood e) milk

4. Which of the following elements is the least abundant constituent of ordinary air

   a) neon b) nitrogen c) argon d) hydrogen e) oxygen

5. The element calcium, Ca, is found in what group on the periodic table?

   a) alkali metals b) halogens c) noble gases d) transition metals e) alkaline-earth elements

6. One of the advantages of burning hydrogen as a source of energy is that it is
   a) cheap b) clean c) non-reactive d) easy to store e) odorless

7. All of the following terms describe ways of separating mixtures except
   a) distillation b) filtration c) chromatography
   d) partial pressure e) crystallization

8. How many atoms of oxygen are there in 0.10 mole of Fe_2O_3?

   a) 6.0×10^{22} atoms b) 6.0×10^{23} atoms c) 1.2×10^{22} atoms
   d) 1.20×10^{23} atoms e) 1.8×10^{23} atoms

9. How many moles of calcium oxide, CaO, are there in 22.4g of the substance? (At. wt. Ca = 40.08)

   a) 0.400 mol b) 2.50 mol c) 1.50 mol d) 4.00 mol e) 0.80 mol

10. What is the mass percentage of phosphorus in calcium phosphate; $Ca_3(PO_4)_2$? (At. wts. Ca = 40.08 and P = 30.97)

a) 61.2% b) 38.8% c) 20.0% d) 46.0% e) 10.0%

11. (2 pts) How many moles of hydrogen are produced when 2 moles of magnesium react with steam to give magnesium oxide and hydrogen?

a) 5 mol b) 1 mol c) 10 mol d) 2 mol e) 8 mol

12. (2 pts) What is the empirical formula of a compound that contains 7.00% C and 93.00% Br by mass? (At. wt. Br = 79.90)

a) CBr b) CBr_2 c) CBr_3 d) CBr_4 e) C_2Br

13. (2 pts) A bar of silver 40 cm long, 25 cm wide and 15 cm deep has a mass of 157.5 kg. What is the density of silver?

a) 26.2g/cm^3 b) 2.62g/cm^3 c) 1.05g/cm^3 d) 10.5g/cm^3 e) 63.5g/cm^3

14. (2 pts) A flask has a mass of 78.23 g when empty and 593.63 g when filled with water. When the same flask is filled with concentrated sulfuric acid, H_2SO_4, its mass is 1026.57 g. What is the density of concentrated sulfuric acid? (Assume that water has a density of 1.00 g/cm^3 at the temperature of the measurement).

a) 1.992 g/cm^3 b) 1.840 g/cm^3 c) 1.729 g/cm^3 d) 1.598 g/cm^3 e) 1.237 g/cm^3

15. (2 pts) What mass of potassium chlorate, $KClO_3(s)$, would have to be decomposed to prepare 10.00L of oxygen at STP? (At. wts: K = 39.1 and Cl = 35.45)

a) 26.24g b) 275.7g c) 13.12g d) 54.47g e) 39.84g

16. (2 pts) Write the names of the following compounds

    a) ICl_5

    b) SO_3

17. (4 pts) Give a specific example of each of the following:

    a) a physical change

    b) a homonuclear diatomic molecule

    c) a trigonal pyramidal molecule

    d) an oxidation reaction

19. (3 pts) Magnesium has isotopes with masses 23.993u, 24.994u and 25.991u with abundances, of 78.60%, 10.11% and 11.29% respectively. What is the average atomic mass of magnesium?

20. (3 pts) How many grams of phosphorus trichloride, PCl_3 can be prepared by passing a stream of chlorine over 200.0 grams of phosphorus until all of the phosphorus is reacted? (At. wts. P = 30.97 and Cl = 35.45)

21. (4 pts) For a hot pack you're designing you'll use 200 mL of water and calcium chloride. How much calcium chloride should you add to your hot pack to get a temperature change of 15^oC? Show all calculations.
    Note: Typical result from your laboratory experiment was that 1 gram of calcium chloride produced 180 calories of heat when added to 100 mL of water.

22. (4 pts) What is the mass of 4.5×10^{18} molecules of carbon dioxide expressed in pounds? (1 lb = 453g and 1 amu = 1.6606×10^{-24} g)