Chem 047 Final Test a Name:_____

1. One molecule of sulphur contains 8 sulphur atoms. How many sulphur molecules can be made from 104 sulphur atoms?

2. If one mole of gas has a volume of 22.7 L , how many moles are there in 3.50 L of gas?

3. A 70.0 g sphere of manganese (density = 7.20×10^3 g/L) is dropped into a graduated cylinder containing 54.0 mL of water. What will the water level be after the sphere is inserted?

4. How many significant figures are in the following?
   a. 41.400
   b. 41.50×10^{-4}
   c. 0.00900

5. Perform the indicated operations and give the answer to the correct number of significant figures:
   a. $(3.789 \times 10^{-3}) \div (6.925 \times 10^{-4}) =$

   b. $35.0 \times 1.525 + 50.0 \times 0.975 =$

6. Which of the following processes could you use to separate salt from water? (choose all that apply)
    a. Distillation
    b. Filtration
    c. Chromatography
    d. Evaporation

7. Choose the best definition for 'mixture':
    a. A substance that cannot be broken into other substances by chemical changes
    b. A pure substance made of two or more types of atoms
    c. A system made up of two or more substances
    d. An element, molecule or ion

8. Give the name of the following compounds:
    a. MnO_2

    b. N_2O

9. Give the formula for the following compounds:
    a. Calcium hypochlorite

    b. Manganese (II) fluoride

10. What volume at STP is occupied by 0.386 g of $BCl_{3(g)}$?

11. How many atoms are in 2.5 mol of $SO_{3(g)}$

12. What is the density of $SO_{2(g)}$ at STP?

13. What volume of 12.0 M NaOH is required to prepare 2.50 L of 0.150 M NaOH?

14. Write the balanced equation with the phases for the following reaction: Sodium nitrate crystals and solid sodium metal react to form solid sodium oxide and nitrogen gas.

15. Balance and classify each reaction as one of: synthesis, decomposition, single replacement, double replacement, neutralization or combustion.

a. $\_\_Na + \_\_O_2 \rightarrow \_\_ Na_2O$

b. $\_\_ Cr + \_\_ SnCl_4 \rightarrow \_\_ CrCl_3 + \_\_ Sn$

16. Complete and balance the following double-replacement reaction:

a. $\_\_Ba(NO_3)_2 + \_\_Na_2SO_4 \rightarrow$

17. In an experiment, 3.25 g of NH_3 are allowed to react with 3.50g of O_2 in the following balanced reaction: $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

a. Which reactant is the limiting reagent?

b. How many grams of NO are formed?

c. How much of the excess reactant remains after the reaction?

18. The roasting of siderite ore, $FeCO_3$, produces iron(III)oxide:
$4FeCO_3 + O_2 \rightarrow 2Fe_2O_3 + 4CO_2$ A 56.0g sample of $FeCO_3$ is roasted and 37.0g of Fe_2O_3 is produced. What is the percentage yield?

19. How many protons, neutrons and electrons are in Mn^{4+}?

20. Which is the correct electron configuration (core notation) for Technetium.
    a. $[Kr]4s^24d^5$
    b. $[Ar]4s^23d^5$
    c. $[Xe]5s^25d^5$
    d. $[Kr]5s^24d^5$

21. Ernest Rutherford: (choose one)
    a. Created a model of electron orbits for hydrogen atom
    b. Discovered the neutron
    c. Wrote the atomic theory in 1808
    d. Discovered the atomic nucleus
    e. Discovered the electron

22. Which of the following selections includes atoms that only bonded covalently?

a. N-O, C-O, Fe-O

b. N-O, Li-O, C-H

c. Si-C, C-N, Cr-O

d. C-N, N-O, C-O

23. Circle the atom with the greater electronegativity: Mg Ba

24. Which of the following selections only includes substances that conduct electricity?

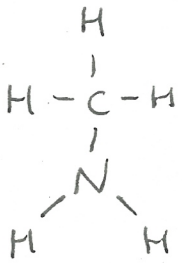
a. $NaCl_{(s)}$, $Cu_{(s)}$, $HCl_{(aq)}$

b. $K_2CrO_{4(aq)}$, $Cu_{(s)}$, $Ba(OH)_{2(s)}$

c. $HNO_{3(aq)}$, $NaCl_{(l)}$, $Ba(OH)_{2(s)}$

d. $NaCl_{(aq)}$, $Fe_{(s)}$, $NaOH_{(aq)}$

25. Circle the molecules that are polar:



26. A solution is made by mixing 100.0 mL of 0.200 M $BaCl_2$ and 150.0 mL of 0.400 M NaCl. What is the concentration of Cl^-?