Name: _____

1) A student calculates the density of an unknown solid. The mass is 10.04 grams, and the volume is 8.21 cubic centimeters. How many significant figures should appear in the final answer?

A) 1 B) 2 C) 3 D) 4

2) Which mass measurement contains four significant figures?

A) 3870 g C) 1003 g
B) 0.431 g D) 0.086 g

3) During a laboratory experiment, a sample of aluminum is found to have a mass of 12.50 grams and a volume of 4.6 milliliters. What is the density of this sample, expressed to the correct number of significant figures?

A) 2.717 g/mL C) 3 g/mL
B) 2.7 g/mL D) 2.72 g/mL

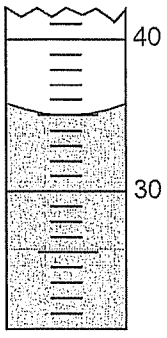
4) A student intended to make a salt solution with a concentration of 10.0 grams of solute per liter of solution. When the student's solution was analyzed, it was found to contain 8.90 grams of solute per liter of solution. What was the percent error in the concentration of the solution?

A) 18.9% C) 1.10%
B) 8.90% D) 11.0%

5) A student calculated the percent by mass of water in a hydrate as 14.2%. A hydrate is a compound that contains water as part of its crystal structure. If the accepted value is 14.7%, the student's percent error was

A) $\frac{0.5}{14.7} \times 100$ C) $\frac{0.5}{14.2} \times 100$
B) $\frac{14.2}{14.7} \times 100$ D) $\frac{14.7}{14.2} \times 100$

6) The diagram below represents a portion of a 100-milliliter graduated cylinder.



What is the reading of the meniscus?

A) 44.0 mL C) 35.0 mL
B) 45.0 mL D) 36.0 mL

7) The density of hydrogen at STP is 0.0899 gram per liter. Express this density to *two* significant figures.

8) A student used a balance and a graduated cylinder to collect the following data:

Sample mass	10.23 g
Volume of water	20.0 mL
Volume of water and sample	21.5 mL

(a) Calculate the density of the element. Include the appropriate number of significant figures and proper units. [*Show your work.*]

(b) If the accepted value is 6.93 grams per milliliter, calculate the percent error.

(c) What error is introduced if the volume of the sample is determined first?

9) A plan is being developed for an experiment to test the effect of concentrated strong acids on a metal surface protected by various coatings. Some safety precautions would be the wearing of chemical safety goggles, an apron, and gloves.

State *one* additional safety precaution that should be included in the plan.

10) The gram formula mass of NH_4Cl is

A) 53.5 g/mole C) 22.4 g/mole
B) 95.5 g/mole D) 28.0 g/mole

11) The percentage by mass of Br in the compound $AlBr_3$ is *closest* to

A) 10.% C) 75%
B) 90.% D) 25%

12) What is the percent composition by mass of nitrogen in NH_4NO_3 (gram-formula mass = 80.0 grams/mole)?

A) 17.5% C) 35.0%
B) 60.0% D) 52.5%

13) The percent by mass of calcium in the compound calcium sulfate ($CaSO_4$) is approximately

A) 29% C) 15%
B) 47% D) 34%

14) A hydrated salt is a solid that includes water molecules within its crystal structure. A student heated a 9.10-gram sample of a hydrated salt to a constant mass of 5.41 grams. What percent by mass of water did the salt contain?

A) 59.5% C) 3.69%
B) 16.8% D) 40.5%

15) A hydrate is a compound with water molecules incorporated into its crystal structure. In an experiment to find the percent by mass of water in a hydrated compound, the following data were recorded:

Mass of crucible + hydrated crystals before heating	7.50 grams
Mass of crucible	6.90 grams
Mass of crucible + anhydrous crystals after heating	7.20 grams

What is the percent by mass of water in the hydrate?

A) 96.%
B) 72.%
C) 50.%
D) 8.0%

16) A substance has an empirical formula of CH_2 and a molar mass of 56 grams per mole. The molecular formula for this compound is

A) C_4H_8
B) C_8H_4
C) CH_2
D) C_4H_6

17) Given the reaction:

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

What is the total number of moles of water needed to make 2.5 moles of $C_6H_{12}O_6$?

A) 6.0
B) 12
C) 15
D) 2.5

18) Given the reaction:

$$PbCl_2(aq) + Na_2CrO_4(aq) \longrightarrow PbCrO_4(s) + 2NaCl(aq)$$

What is the total number of moles of NaCl formed when 2 moles of Na_2CrO_4 react completely?

A) 1 mole
B) 2 moles
C) 3 moles
D) 4 moles

19) Given the balanced equation:

$$2C_4H_{10}(g) + 13O_2(g) \longrightarrow 8CO_2(g) + 10H_2O(g)$$

What is the total number of moles of $O_2(g)$ that must react completely with 5.00 moles of $C_4H_{10}(g)$?

A) 32.5
B) 20.0
C) 10.0
D) 26.5

20) What is the total number of moles of O_2 produced in the given equation when 8 moles of H_2O is completely consumed?

21) What is the molarity of a solution that contains 0.50 mole of NaOH in 0.50 liter of solution?

A) 0.50 M
B) 2.0 M
C) 1.0 M
D) 0.25 M

22) What is the molarity of a solution containing 20 grams of NaOH in 500 milliliters of solution?

A) 0.5 M
B) 1 M
C) 2 M
D) 0.04 M

23) How many moles of solute are contained in 200 milliliters of a 1 M solution?

A) 200
B) 0.2
C) 0.8
D) 1

24) A student wants to prepare a 1.0-liter solution of a specific molarity. The student determines that the mass of the solute needs to be 30. grams. What is the proper procedure to follow?

A) Add 30. g of solute to 1.0 L of solvent.
B) Add enough solvent to 30. g of solute to make 1.0 L of solution.
C) Add 1,000. g of solvent to 30. g of solute.
D) Add 30. g of solute to 970. mL of solvent to make 1.0 L of solution.

25) A weather balloon has a volume of 52.5 liters at a temperature of 295 K. The balloon is released and rises to an altitude where the temperature is 252 K.

The original pressure of the given weather balloon at 295 K was 100.8 kPa and the pressure at the higher altitude at 252 K is 45.6 kPa. Assume the balloon does not burst. Show a correct numerical setup for calculating the volume of the balloon at the higher altitude.

26) A lightbulb contains argon gas at a temperature of 295 K and at a pressure of 75 kilopascals. The lightbulb is switched on, and after 30 minutes, its temperature is 418 K.

Show a correct numerical setup for calculating the pressure of the gas inside the lightbulb at 418 K. [*Assume the volume of the lightbulb remains constant.*]

27) When 50. milliliters of an HNO_3 solution is exactly neutralized by 150 milliliters of a 0.50 M solution of KOH, what is the concentration of HNO_3?

A) 1.5 M
B) 0.5 M
C) 1.0 M
D) 3.0 M

Reference Tables Scavenger Hunt Name_____

Directions: Using the Reference Tables for Chemistry, locate the following information. Give the letter of the table used and then answer the question.

1. Name C_5H_{12}.
   Table _____
2. Write the equation for the decay of Kr-85.
   Table _____
3. Explain how you know that $NaPO_4$ is soluble in water but $NiCrO_4$ is not.
   Table _____
4. What is the definition of STP, and give the values?
   Table _____
5. Name, and give the formulas of the strongest and weakest bases.
   Table _____
6. Name $C_2H_3O^-_2$ or CH_3COO^-
   Table _____
7. What is the solubility of sulfur dioxide at 40 degrees Celsius, in grams?
   Table _____
8. What is the freezing point of fluorine?
   Table _____
9. What are the units for the heat of fusion, and what do they mean?
   Table _____
10. What is the symbol for the mole?
    Table _____
11. What is the vapor pressure of water at 75^0C?
    Table _____
12. How much heat does it take to convert 20g of water to steam at 100^0C?
    Table _____
13. What is the molecular formula of ammonia?
    Table _____
14. What is the formula for the permanganate ion?
    Table _____
15. Name CH_3COOH
    Table _____
16. Write the symbol for a positron?
    Table _____
17. What is the half-life of Pu-239?
    Table _____
18. Is the formation of water, from its elements endothermic or exothermic?
    Table _____
19. What is the atomic mass of silver?
    Table _____
20. How much heat is released when LiBr dissolves in water?
    Table _____
21. Give the names and formulas of the strongest and weakest acids.
    Table _____
22. What is the general formula for alkynes? What does it mean?
    Table _____
23. What is the electronegativity of chlorine?
    Table _____
24. What is the decay mode of Au-198?
    Table _____
25. What is the ionization energy of Rb?
    Table _____

26. Which atom is more likely to lose electrons, Al or Zn?
    Table _____
27. What is the atomic number of Te?
    Table _____
28. What is the atomic radius of Bromine?
    Table _____
29. What is the oxidation state of sulfur?
    Table _____
30. Which indicator would be the best to use to identify a strong base?
    Table _____
31. Write the electron configuration of potassium.
    Table _____
32. At what temperature will water boil, when the atmospheric pressure is 55 kPa?
    Table _____
33. What is the trend of atomic radii across period 3?
    Table _____
34. Will Mn produce colored ions in solution? Why or why not?
    Table _____
35. Will Sn^{4+} gain or lose electrons when it reacts with Cu?
    Table _____
36. What is the heat of vaporization of water?
    Table _____
37. Will Al react with HCl to produce hydrogen gas?
    Table _____
38. What is the density of tin?
    Table _____
39. In the molecule CCl_4, what is the EN difference of the C-Cl bond?
    Table _____
    Is the bond polar or nonpolar? Why?

    Is the molecule polar or nonpolar? Why?

Using table T, solve the following problems:

40. Give the parts per million of solute for a solution containing 25g of sodium chloride in 200g of water.

41. If the accepted value for the mass of an object is 10.3g and a student found that the mass was 10.1g, what is the student's percent error?

42. If a peanut is burned in a calorimeter containing 50g of water, and the water temperature changes from 45^0C to 57^0C, how many joules of energy were released by the peanut?