AP CHEMISTRY

Chapter 1 Problems

1. How many significant figures are in each of the following?
	1. 0.0030
	2. 1.86 x 105
	3. 13800
	4. 1060
2. Use scientific notation to express the number 480 to:
	1. one significant figure
	2. two significant figures
	3. three significant figures
	4. four significant figures
3. Round each of the following numbers to two significant figures.
	1. 86569
	2. 0.020304
	3. 1.476 x 106
	4. 1.9999999
4. Perform the following conversions. Make sure you show your work using conversion factors and the answer has the correct number of significant figures.
	1. How many milligrams of aluminum nitrate are in 17.6 kilograms?
	2. How many cubic centimeters (1 cm3 = 1mL) of carbon dioxide gas are in 1.4 liters?
	3. How many atoms of oxygen are in 1.03 moles of glucose (C6H12O6)?
	4. How much would 4.201x1024 molecules of sodium acetate weigh?
	5. The volume of a diamond is found to be 2.8 mL. What is the mass of the diamond in carats? The density of a diamond is 3.51 g/cm3 and 1 carat = 0.200 grams.
	6. The density of pure silver is 10.5 g/cm3 at 20ºC. If 5.25 g of pure silver pellets is added to a graduated cylinder containing 11.2 mL of water, to what volume level will the water in the cylinder rise?

5. Classify each of the following as an element, compound or mixture.

1. aluminum foil
	1. blueberry muffins
	2. hot tea without any tea leaves in it
	3. salt
	4. carbon dioxide
	5. water
	6. soda
	7. blood
2. In the above problem identify any mixtures as heterogeneous or homogenous.
3. Identify the proper separation technique to use for the following mixtures and explain why/how it would work.
4. Isolate the sodium nitrate from a homogeneous NaNO3 (aq) solution.
5. Isolate the calcium hydroxide from a heterogeneous KBr (aq) solution containing a Ca(OH)2 precipitate.
6. Isolate p53 protein from a mixture of p53 (53kD, polar), p21 (21kD, polar), and p36 (36kD, polar) proteins in water.
7. Isolate hexane from a homogeneous mixture of non-polar hydrocarbons; hexane and octane.
8. Isolate ethanol from a mixture of ethane (non-polar), ethene (non-polar), and ethanol (polar).
9. A researcher is attempting to make 100mL of a 2.5M K2SO4 solution. What would be the appropriate glassware to use to make this volume of solution?
10. A lab procedure directs you to deliver 50.0 mL of water to a 100 mL Erlenmeyer flask. What would be the appropriate glassware to use to deliver this volume of solution?

AP CHEMISTRY

Chapter 2 Problems

1. Describe Rutherford’s gold foil experiment and the results that were determined. A picture may help.
2. Describe Bohr’s observations and the effect they had on atomic theory. A picture may help.
3. Give the *name* and *symbol* of the elements characterized by the following description. There may be more than one possible answer.

 a. Element in the 4th group and 5th period.

 b. Alkali metal with lowest atomic number.

 c. Halogen that is a liquid at room temperature.

 d. Transition metal(s) with a fixed charge.

e. The 3rd period element that has a fixed charge of +2.

1. Identify the following as a metal, nonmetal or semimetal.

 a. Aluminum

 b. Silicon

 c. Phosphorus

 d. Magnesium

1. Write the isotopic symbol () for each of the isotopes described below.

a. Z=8, number of neutrons = 9

 b. the isotope of chlorine in which the mass number is 37.

 c. the isotope of I which has gained an electron and has a mass number of 131.

 d. an atom with 58 protons and 83 neutrons in its nucleus and 56 electrons.

1. Complete the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Symbol | # of Protons | # of Neutrons | # of Electrons | Net Charge |
|  |  |  |  |  |
|  | 35 | 44 | 36 |  |
|  | 15 | 16 |  | -3 |
|  |  |  |  |  |

1. List the transition metals and p-block metals that have a single oxidation state and identify the fixed charge they take on.
2. Name the following ions.

a. PO4-3

b. NO2-1

c. SO4-2

d. Br-1

e. NH4+1

f. N-3

8. Write the symbol and charge of the following ions. And identify if they are a cation or anion.

a. Sulfite ion

b. Chromate ion

c. Sodium ion

d. Iron (III) ion

e. Chloride ion

f. Carbonate ion

9. Name the following ionic compounds.

a. TiCl2

b. (NH4)2S

c. Mg3(PO4)2

d. Fe2O3

10. Write the formulas for the following ionic compounds.

a. Potassium Cyanide

b. Aluminum Chlorite

c. Tin (IV) Nitride

d. Lithium Iodate

11. Name the following molecular compounds.

a. SiF4

b. NO

c. N2F7

d. PCl3

13. Write the formula of the following molecular compounds.

a. Nitrogen Dioxide

b. Triclorine Pentafluoride

c. Sulfur Hexafluoride

d. Octaphosphorus Pentoxide

14. Name the following compounds.

 a. HCN in H2O

 b. HI in H2O

 c. H2C2O4 in water

 d. MgHPO4

 e. Cl3O9

 f. MnO2

1. CaCr2O7
2. HClO2 in water
3. AuCl3
4. Ni2(CO3)3
5. NaKSO4
6. H2SO4 in water
7. CS2
8. P2O5

15. Write formulas for the following compounds.

a. Hydrofluoric Acid

b. Strontium Nitrite

c. Lead (IV) Oxide

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d. Sulfurous Acid

e. Dihydrogen Monoxide

f. Aluminum Acetate

g. Rubidium Hydrogen Sulfate

h. Potassium Sulfide

i. Tetraphosphorus Hexahydride

j. Carbonic Acid

k. Ammonium Phosphate

1. Iron(II) Nitride
2. Copper (I) Sulfate

**\*\*\*Expected memorization for first test\*\*\***

First 3 periods of element names/symbols, fixed charge metals, group names, roman prefixes 1-10, and circled polyatomic ion names/formulas/charges