# AP Problem Set #4

Name_____
Period_____

The Carbonate ion is formed when carbon dioxide reacts with slightly basic cold water.

(A) Draw the lewis electron dot structure for the carbonate ion. Include resonance structures when they are appropriate.
(B) Describe the hybridization of carbon in the carbonate ion.
(C) Describe the relative lengths of the three C-O bonds in the carbonate ion.
(D) Compare the average length of the C-O bonds in the carbonate ion to the average lengths of the C-O bonds in carbon dioxide.

Use the principles of bonding and molecular structure to explain the following statements.

(A) The angles between the N-F bonds in $NF_3$ is smaller than the angle between the B-F bonds in $BF_3$
(B) $I_2$ (s) is insoluble in water but is soluble in carbon tetrachloride.
(C) Diamond is one of the hardest substances on Earth

The table below shows three commons forms of copper ore.

| | | Percent by weight | | |
|---|---|---|---|---|
| | | Copper | Sulfur | Iron |
| 1 | $Cu_2S$ | ? | ? | 0 |
| 2 | ? | 34.6 | 34.9 | 30.5 |
| 3 | ? | 55.6 | 28.1 | 16.3 |

(A) What is the percent by weight of $Cu_2S$?
(B) What is the empirical formula of ore #2
(C) If a sample of ore #3 contains 11.0 g of iron, how many grams of sulfur does it contain?
(D) Cu can be extracted from $Cu_2S$ by the following process:

$$3Cu_2S + 3O_2 \rightarrow 3SO_2 + 6\ Cu$$

If 3.84 g of $O_2$ are consumed in the process, how many grams of Cu are produced?

<u>Lab Procedures 1984</u>

Given solid samples of KI and of $(NH_4)_2CO_3$, briefly describe four simple laboratory test by which these two compounds can be distinguished. For each test report the expected result for each compound.

Gases 1982D

(A) From the standpoint of the kinetic-molecular theory, discus briefly the properties of gas molecules that cause deviations from the ideal behavior.

(B) At 25°C and 1atm pressure, which of the following gases shows the greatest deviation from the ideal behavior? Give two reasons for your choice.

$CH_4$ $SO_2$ $O_2$ $H_2$

(C) Real gases approach ideality at low pressure, high temp or both. Explain these observations.