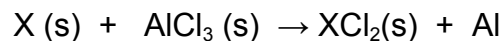


Honors Chemistry Practice Final Exam



1. The above reaction involves unknown metal X. When X is heated in its ion form a deep red flame is observed. When X is analyzed using PES, two distinct regions are observed.

(a) What is the identity of element X. Provide two reasons to support your answer.

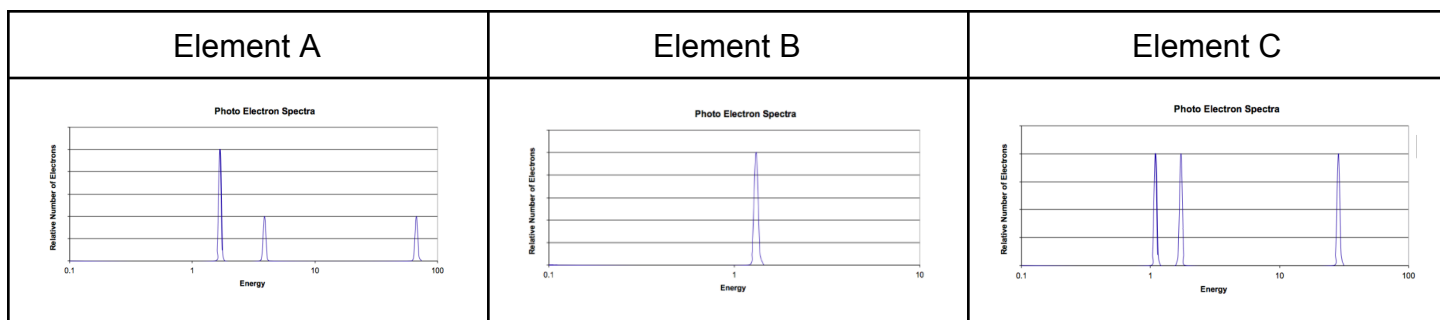
(b) Replace X with the actual elemental symbol. Balance and classify the above reaction.

(c) When 10 grams of X and 40 grams of $AlCl_3$ react.

(i) What mass of XCl_2 is produced?

(ii) What mass of excess reactant remains?

2. Photoelectron Spectra for three unknown elements, A, B and C are shown below:

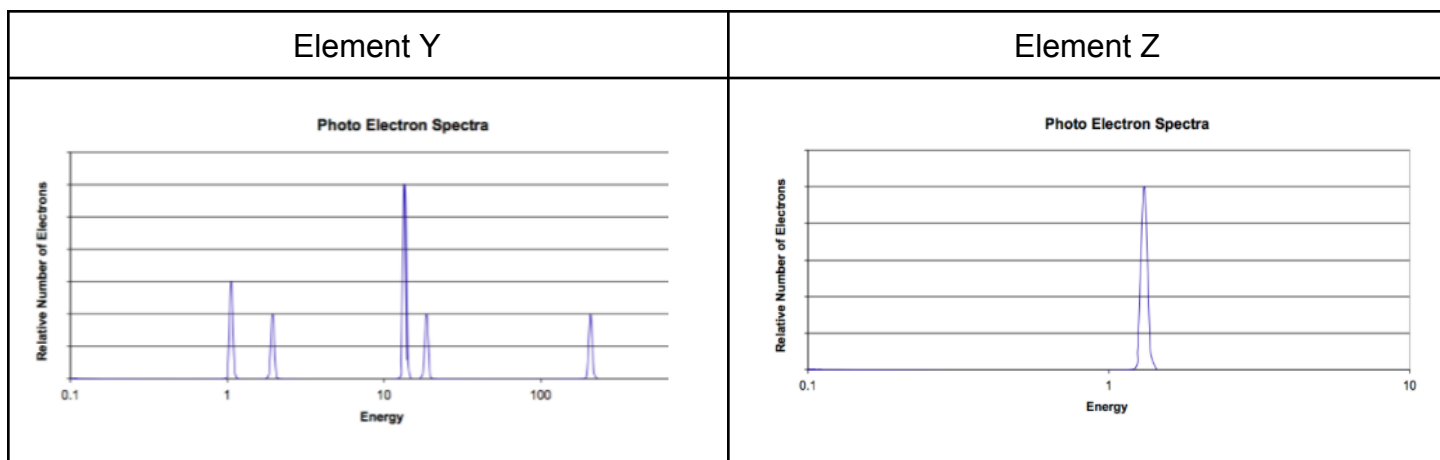


(a) Provide the Lewis Structure, molecular geometry, and polarity (including partial charges) for the compound AB using correct element symbols.

(b) Provide the Lewis Structure, molecular geometry, and polarity (including partial charges) for the compound CB_4 using correct element symbols.

(c) When 0.40 grams of the more ideal gas (AB or CB_4) are contained in a rigid 250 mL container, what is the pressure on the walls of the container at a temperature of 35°C ?

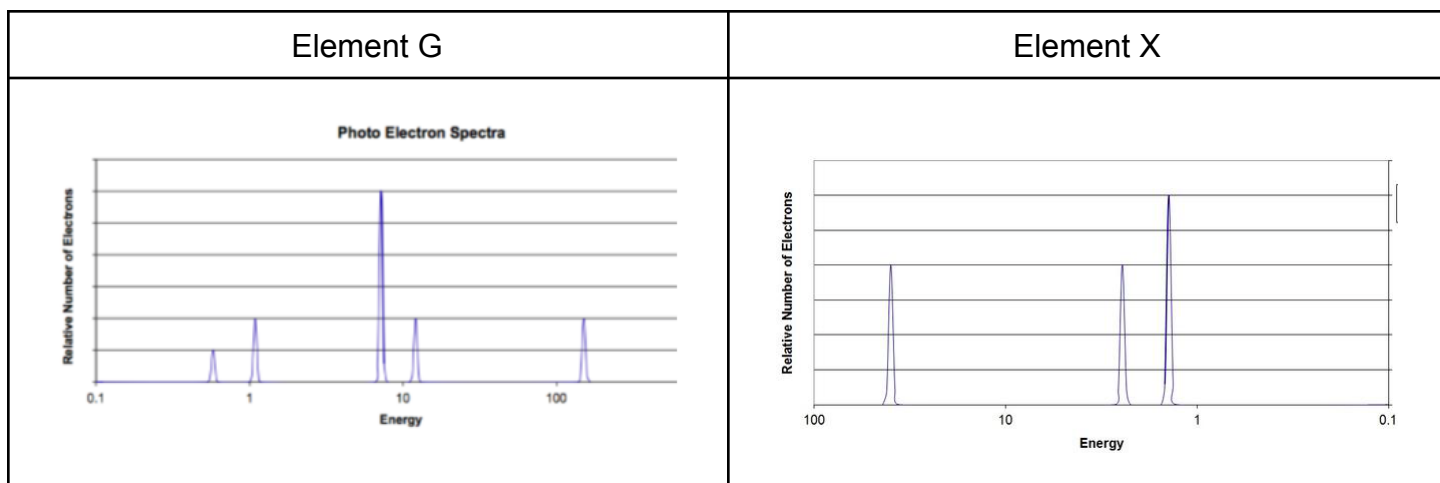
3. Photoelectron Spectra for two elements Y and Z are shown below:



(a) Provide the Lewis Structure, molecular geometry, and polarity (including partial charges) for the compound YZ_3 using correct element symbols.

(b) Do you predict YZ_3 to be more soluble (mix better) with H_2O or CO_2 ? Explain. Justify your answer by drawing an IMF diagram that shows the intermolecular forces (IMFs) between all three compounds.

4. Photoelectron Spectra for two elements G and H are shown below:

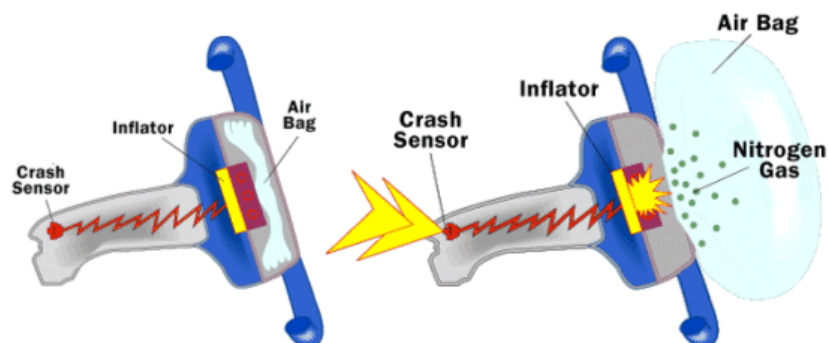


(a) Element G reacts with element X_2 to product compound G_2X_3 . Write, balance and classify this reaction using correct element symbols.

(b) If 0.50 grams of G and 0.50L of X_2 react at 1 atm and 25°C , what mass, in grams, of G_2X_3 is produced? What mass of excess reactant remains.



5. The inflation of a gas bag in a car follows the equation above. A diagram of the process is shown below:



(a) Balance the reaction written above?

(b) A standard airbag contains 17.0 grams of $\text{NaN}_3 (\text{s})$. What volume, in liters, of nitrogen gas will fill the airbag upon activation on a day where the partial pressure reads 0.90 atm and the temperature is 21°C . What mass of excess reactant remains? The NaN_3 is mixed with 250 grams of Fe_2O_3 .

(b) Do you predict the initial pressure inside the airbag to be higher or lower if the temperature inside the airbag increased to 30°C ? Justify your answer by drawing a graph. (Assume the volume of the airbag has already reached a maximum capacity)

(c) Would the final pressure of the airbag be higher or lower if the N_2 produced was replaced with SO_2 gas? Clearly explain using what you know about ideal gases, Lewis Structure and intermolecular forces.

(d) Azide, N_3^- is the active component in the NaN_3 (s) powder in airbags. Provide the Lewis structure and molecular geometry for azide.

(e) If one Azide molecule was mixed with one water molecule, draw what would occur on a molecular level in the space below. Label and classify all intermolecular forces.