Net Ionic Equations Problems:

1.A student was given 125 mL of an aqueous test solution that contains three metal ions at the following concentrations; 0.0250 M Pb^{2+}, 0.0250 M Mg^{2+} and 0.0250 M Al^{3+}. The students also has three separate reagent solutions for testing; 0.500 M $NaNO_3$, 0.500 M K_2SO_4 and 0.500 M Na_2CO_3.

a) Based on solubility rules, which of the reagent solution would be best to precipitate all/most of the Pb^{2+} ions, but not any of the other two cations from the aqueous test solution? (2)

b) Write a balanced net ionic equation, including phases to describe the reaction that occurs when the reagent solution selected in part a, is added to the student's test solution. (3)

c) Calculate the volume, in milliliters, of the reagent solution required to precipitate all/most of the Pb^{2+} ions from the student's test solution. (5)

2. A student is given an unknown solution that contains two of the following anions: $Cl^{-}_{(aq)}$, $CO3^{2-}_{(aq)}$, $S^{2-}_{(aq)}$.

i) The student decides to add a few drops of $BaCl2_{(aq)}$ solution to the unknown. Assuming $CO3^{2-}_{(aq)}$ is one of the unknowns in the solution describe what the student observes happening in the solution to justify their conclusion that $CO3^{2-}_{(aq)}$ is present. (3)

ii) Write a net ionic chemical equation to describe the reaction. (3)

iii) Assume the student has added sufficient $BaCl2_{(aq)}$ to the unknown solution to remove all of the $CO3^{2-}_{(aq)}$ from the solution. What would be another salt solution the student could add to determine which of the other anions could be present? (4)

3. Which of the following compounds is insoluble in water?

A) $HC_2H_3O_2$

B) $(NH_4)_3PO_4$

C) $Mg(OH)_2$

D) $CaCO_3$

E) $Fe_2(SO_4)_3$