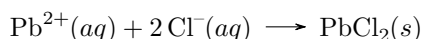


Report Form for An Enigmatic Chemical Conundrum!

Each partner will complete a separate report, which is due at the beginning of next week's lab. Place your answers on a separate sheet of paper and attach it to this covers sheet.

1. Successful Solution of Code (instructor's initials) _____ (30 points)
2. How did you arrive at the identity of the code? Explain your reasoning using complete sentences and referring to the specific results of tests you completed in lab. Use concise but descriptive language. Be sure to explain how you identified the ions in each solution and how you used this information to solve the code itself. If your initial solution for the code was incorrect, then explain the reason(s) for the error and how you were able to use this information to correctly solve the code. (10 points)
3. A precipitate is a neutral, ionic compound that forms when we mix together a cation and an anion. Write chemical reactions that show the formation of the two white precipitates that appear in Table 1 and the brown precipitate that appears in Table 2. For each reaction, include the cation, the anion, and the precipitate only; do not include other species that are not involved in the precipitation reaction (we call this a net ionic reaction). When you write a reaction, ions or molecules dissolved in water are labeled (aq) to indicate that they are aqueous species; for solids, use (s) and for gases use (g). Use an arrow (\longrightarrow) to separate the reactants and the products. For example, when solutions of NaCl and $\text{Pb}(\text{NO}_3)_2$ are mixed together, a precipitate of PbCl_2 forms; the net ionic reaction is



Note that the net ionic reaction does not include the sodium cation or the nitrate anion because they are not involved in the reaction and that two chloride anions react with one lead cation to give neutral PbCl_2 . Feel free to use your textbook and/or other resources to determine the identity of the precipitates. By the way, ammonia, NH_3 , is not an anion, but, as we will learn later in the semester, it is a weak base and, as a result, any solution of ammonia also is a solution of hydroxide anions, OH^{-} , which is what is reacting here. (6 points)

4. The blood-red solution that forms when you add potassium thiocyanate, KSCN, to a solution of Fe^{3+} is an example of a complexation reaction in which a single thiocyanate anion, SCN^{-} , binds to a single Fe^{3+} cation to form a soluble complex ion. Write an equation for this reaction giving careful consideration to the charge of the product. Feel free to use your textbook and/or other resources to determine the identity of the product; look up metal-ligand complexation. (2 points)
5. The instructions in Table 2 indicate that if you obtain a precipitate after you add NH_3 and NH_4NO_3 , you must remove it before you add dmg. In 2–3 sentences, explain why you this separation was necessary. (2 points)