

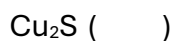
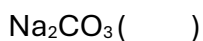
Part I: Solubility rules for Ionic Compounds

1. For each of the following ionic compounds in the table below:

- Put an “**aq**” (for aqueous) in the parenthesis after the formula if the compound is soluble in water or put a “**s**” (for solid) in the parenthesis after the formula if the compound is insoluble in water.
- Fill in the name of the compound in the space provided.
- Complete the drawing of the beaker of water by showing the compound either broken up into ions (if it is soluble) or sitting on the bottom (if it is insoluble).

Soluble	Insoluble
Li ⁺ , Na ⁺ , K ⁺ , NH ₄ ⁺ , & NO ₃ ⁻	None
C ₂ H ₃ O ₂ ⁻ or CH ₃ COO ⁻	None
ClO ₃ ⁻ & ClO ₄ ⁻	None
Cl ⁻ , Br ⁻ , & I ⁻	Compounds containing Ag ⁺ , Hg ₂ ²⁺ , and Pb ²⁺
SO ₄ ²⁻	Compounds containing Ag ⁺ , Sr ²⁺ , Ca ²⁺ , Ba ²⁺ , Hg ₂ ²⁺ , and Pb ²⁺

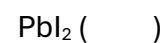
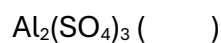
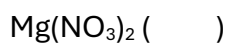
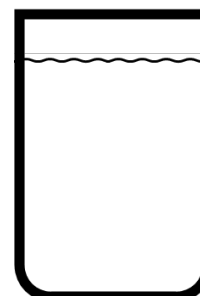
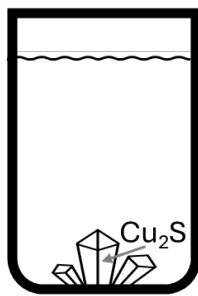
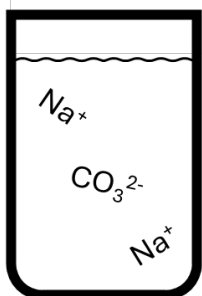
Insoluble	Exceptions
S ²⁻	Compounds containing NH ₄ ⁺ , alkali metals, Ca ²⁺ , Sr ²⁺ , & Ba ²⁺
CO ₃ ²⁻	Compounds containing NH ₄ ⁺ & alkali metals
PO ₄ ³⁻	Compounds containing NH ₄ ⁺ & alkali metals
OH ⁻	Compounds containing alkali metals, Ca ²⁺ , Sr ²⁺ , & Ba ²⁺



Name: _____

Name: _____

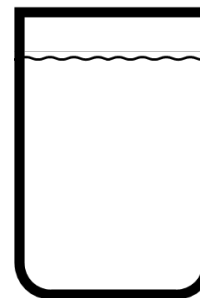
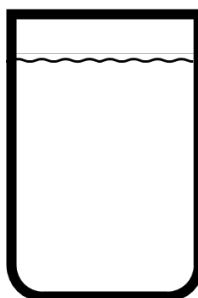
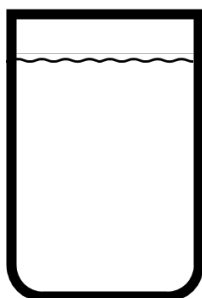
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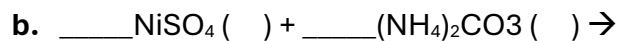
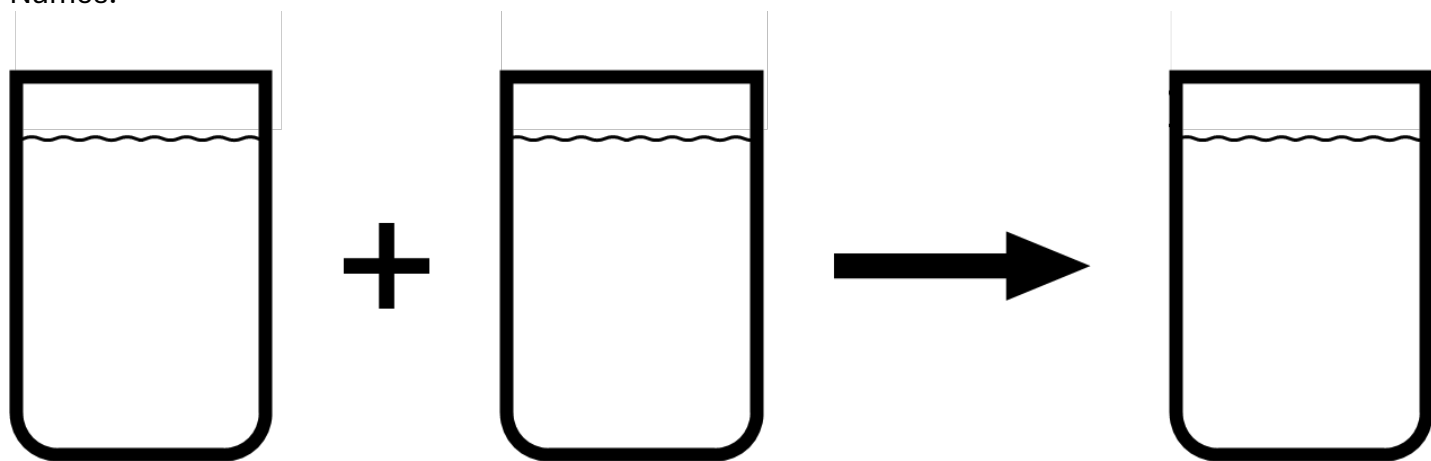
Part II: Predicting Precipitation Reactions

2. For the following two sets of reactants:

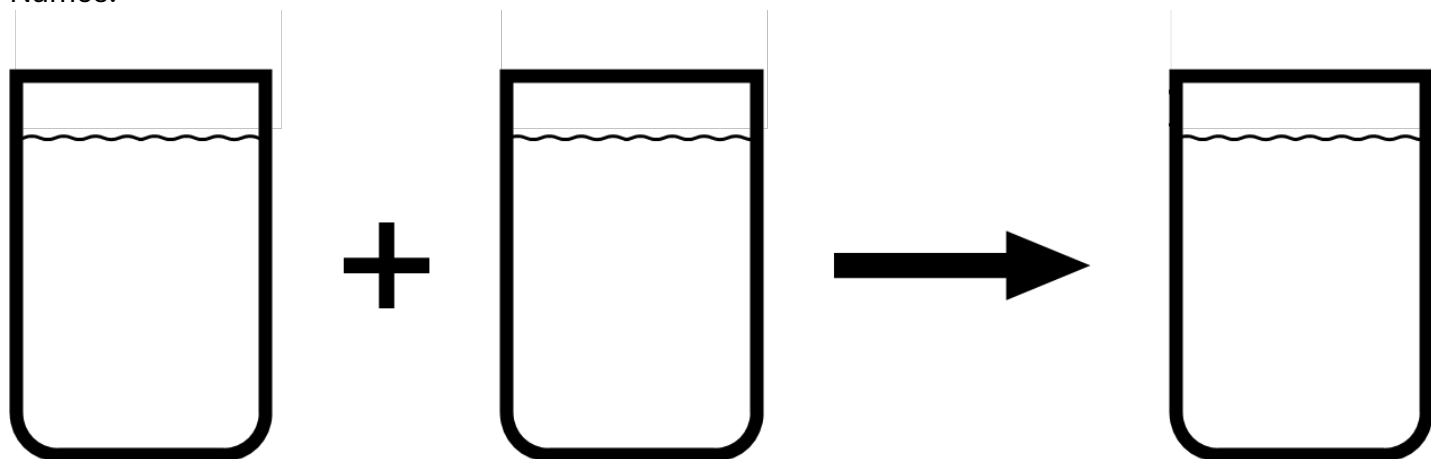
- Predict the products; for the precipitation reactions, this is done by switching the ions around and combining them in the correct ratio.
- Indicate if each species is soluble (aq) or insoluble (s) in water.
- Balance the reaction.
- Name each reactant and product.
- Draw pictures that represent the reaction (they should look like the ones you drew for question 1).



Names:



Names:



4. Aqueous solutions of iron(III) bromide and ammonium carbonate react to form a precipitate.

Answer the following questions with regards to this reaction.

- i. Translating the two reactants into their chemical formulae.
 - ii. Predict the products.
 - iii. Label the physical states of each reactant and product.
 - iv. Balance the reaction.
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- b. Starting with the *molecular equation* you came up with in question 3a, write the *complete ionic equation* also known as the total ionic equation (TIE) by breaking up all of the aqueous compounds into their corresponding ions; leave all of the solid compounds together.
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- c. Starting with the *complete ionic equation* that you came up with in question 3b, write the *net ionic equation* (NIE) for this reaction by cancelling out all of the spectator ions.

Part IV: Additional Solubility Rule Problems

5. You work as a chemical engineer for the Sacramento water district and need to test samples of drinking water for possible contamination. Based on other tests you have done; you have narrowed down the contamination to either Ca^{2+} ions which are okay in drinking water or Pb^{2+} ions which are dangerous. What possible ionic compound could you add to the drinking water to give results that will tell you if you have Ca^{2+} ions or Pb^{2+} ions present? Briefly explain your answer.

6. You had a second sample of drinking water. Based on other tests you have done, you have narrowed down that there is some combination of Ba^{2+} , Ag^+ , and/or Fe^{2+} ions in the sample. You perform a series of tests and make the following observations:

- Test #1: add sodium iodide to the sample → Result of test #1: a precipitate forms
- Remove the solid from the sample and continue testing the remaining liquid.
- Test #2: add Na_2SO_4 to the sample → Result of test #2: no precipitate forms
- Test #3: add NaOH to the sample → Result of test #3: a precipitate forms

Based on the test results, which of the possible ions are in the sample? Briefly explain your answer.

7. A third sample of drinking water contains 0.55 g of dissolved Ba^{2+} ions. How many grams of Na_2SO_4 would have to be added to the solution to completely precipitate all of the dissolved Ba^{2+} ?
8. Provide the molecular equation, total ionic equation, and net ionic equation for the following reactions. If no reaction occurs then write “no reaction”
- Iron (II) chlorate reacts with sodium phosphate resulting in iron (II) phosphate and sodium chlorate as products.
 - Chromium(III) sulphate reacts with ammonium carbonate resulting in chromium (III) carbonate and ammonium sulphate as products
 - Aluminum chloride, carbon dioxide gas, and liquid water are produced with solid aluminum carbonate is added to an aqueous solution of hydrochloric acid.