

Sticks and Stones HW

1. Suppose you react calcium chloride, $\text{CaCl}_2(\text{aq})$, with sodium oleate, $\text{NaC}_{18}\text{H}_{33}\text{O}_2(\text{aq})$.
 - a. Predict the products.
 - b. Write the balanced chemical equation.
 - c. What is the precipitate that forms?
 - d. What ratio of drops of equal molarity would give you the largest volume of precipitate?
2. Suppose you react iron nitrate, $\text{Fe}(\text{NO}_3)_3(\text{aq})$, with sodium sulfide, $\text{Na}_2\text{S}(\text{aq})$.
 - a. Predict the products.
 - b. Write the balanced chemical equation.
 - c. What is the precipitate that forms?
 - d. What ratio of drops of equal molarity would give you the largest volume of precipitate?
3. Suppose you react silver nitrate, $\text{AgNO}_3(\text{aq})$, with calcium chloride, $\text{CaCl}_2(\text{aq})$.
 - a. Predict the products.
 - b. Write the balanced chemical equation.
 - c. What is the precipitate that forms?
 - d. Which of the following mixtures will make the largest amount of precipitate? Explain your reasoning.
 - a. 100 mL 1.0 M AgNO_3 + 200 mL 1.0 M CaCl_2
 - b. 200 mL 1.0 M AgNO_3 + 100 mL 1.0 M CaCl_2
 - c. 150 mL 1.0 M AgNO_3 + 50 mL 1.0 M CaCl_2
 - d. 50 mL 1.0 M AgNO_3 + 150 mL 1.0 M CaCl_2

Selected Answers:

1. a. calcium oleate, $\text{Ca}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2$ and sodium chloride, NaCl (Note: this is a double replacement reaction in which two bonds break and metals bond with nonmetals → criss-cross to get the formulas!)
- b. $\text{CaCl}_2 + 2\text{NaC}_{18}\text{H}_{33}\text{O}_2 \rightarrow \text{Ca}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2 + 2\text{NaCl}$
- c. $\text{Ca}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2$
- d. 1:2 ratio

Hint for #3d: Use your molarity triangle to find out moles of each reactant → whichever moles match the ratio according to the balanced equation, that is the correct answer. For example, for (a) 100 mL of 1.0 M AgNO_3 would be 0.1 moles & 200 mL of 1.0 M CaCl_2 would be 0.2 moles. That is a 1:2 ratio. If the balanced equation does not have a 1:2 ratio, this cannot be the correct answer.