

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

**CHAPTER 10 STUDY GUIDE FOR CONTENT MASTERY**

**Section 10.3 Reactions in Aqueous Solutions**

In your textbook, read about aqueous solutions, reactions that form precipitates, reactions that form water, and reactions that form gases.

Circle the letter of the choice that best completes the statement or answers the question.

- A spoonful of sodium chloride is dissolved in a liter of water. What is sodium chloride in this solution?  
 a. molecule      **c. solute**      d. solvent
- In an aqueous solution, water is the  
 a. homogeneous part.      **b. precipitate.**      c. solute.      **d. solvent.**
- Compounds that produce hydrogen ions in aqueous solutions are  
 a. acids.      **b. aqueous.**      c. bases.      d. ionic compounds.
- What type of reaction occurs between ions present in aqueous solution?  
 a. decomposition      **b. double-replacement**      c. single-replacement      d. synthesis
- What type of ions are present in solution but are not actually involved in a chemical reaction?  
 a. complete      b. net      c. precipitate      **d. spectator**
- If hydrochloric acid and potassium hydroxide react, what is the product of the net ionic equation for the reaction?  
 a. hydrochloric acid      b. hydrogen ions      c. potassium chloride      **d. water**
- Which of the following gases is not commonly produced in a double-replacement reaction?  
 a. carbon dioxide      b. hydrogen cyanide      c. hydrogen sulfide      **d. sulfur dioxide**
- $H^+(aq) + Br^-(aq) + K^+(aq) + OH^-(aq) \rightarrow H_2O(l) + Br^-(aq) + K^+(aq)$  is an example of what type of chemical equation?  
**a. complete ionic**      b. net ionic      c. precipitation      d. spectator

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**Section 10.3 continued**

Predict the products for each reaction in Column A. Write the formulas for these products on the product side of each equation. In the space at the left, write the letter of the choice from Column B that indicates what type of product is produced during the reaction shown in Column A. Write as many choices as apply. (Hints: Compounds of Group 1 metals are never precipitates;  $H_2S$  and  $CO_2$  are gases.)

	Column A		Column B
c	$HBr(aq) + KOH(aq) \rightarrow$	$KBr(aq) + H_2O(l)$	a. gas
a, c	$HNO_3(aq) + Na_2CO_3(aq) \rightarrow$	$NaNO_3(aq) + H_2O(l) + CO_2(g)$	b. precipitate
b	$NaI(aq) + Pb(C_2H_3O_2)_2(aq) \rightarrow$	$NaC_2H_3O_2(aq) + PbI_2(s)$	c. water
c	$CsOH(aq) + H_2SO_4(aq) \rightarrow$	$Cs_2SO_4(aq) + H_2O(l)$	
a	$K_2S(aq) + HCl(aq) \rightarrow$	$KCl(aq) + H_2S(g)$	

For each of the following reactions, write chemical, complete ionic, and net ionic equations.

- Phosphoric acid ( $H_3PO_4$ ) and lithium hydroxide react to form a salt and water.  
 $H_3PO_4(aq) + 3LiOH(aq) \rightarrow 3H_2O(l) + Li_3PO_4(aq)$ ;  $3H^+(aq) + PO_4^{3-}(aq) + 3Li^+(aq) + 3OH^-(aq) \rightarrow 3H_2O(l) + 3Li^+(aq)$
- When solutions of magnesium sulfate and calcium chloride are mixed, calcium sulfate precipitates.  
 $MgSO_4(aq) + CaCl_2(aq) \rightarrow CaSO_4(s) + MgCl_2(aq)$ ;  $Mg^{2+}(aq) + SO_4^{2-}(aq) + Ca^{2+}(aq) + 2Cl^-(aq) \rightarrow CaSO_4(s) + Mg^{2+}(aq) + 2Cl^-(aq)$ ;  $SO_4^{2-}(aq) + Ca^{2+}(aq) \rightarrow CaSO_4(s)$
- Bubbles are released when nitric acid ( $HNO_3$ ) is added to a potassium carbonate solution.  
 $2HNO_3(aq) + K_2CO_3(aq) \rightarrow 2KNO_3(aq) + H_2O(l) + CO_2(g)$ ;  $2H^+(aq) + 2NO_3^-(aq) + 2K^+(aq) + CO_3^{2-}(aq) \rightarrow 2K^+(aq) + 2NO_3^-(aq) + H_2O(l) + CO_2(g)$ ;  $2H^+(aq) + CO_3^{2-}(aq) \rightarrow H_2O(l) + CO_2(g)$
- Bubbles are released when hydrobromic acid ( $HBr$ ) is added to a solution of ammonium sulfide. Aqueous ammonium bromide also forms.  
 $2HBr(aq) + (NH_4)_2S(aq) \rightarrow H_2S(g) + 2NH_4Br(aq)$ ;  $2H^+(aq) + 2Br^-(aq) + 2NH_4^+(aq) + S^{2-}(aq) \rightarrow H_2S(g) + 2NH_4^+(aq) + 2Br^-(aq)$ ;  $2H^+(aq) + S^{2-}(aq) \rightarrow H_2S(g)$