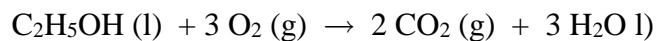


REVIEW QUESTIONS

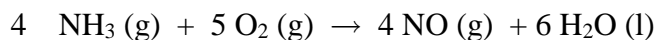
Chapter 4

1. The alcohol in “gasohol” burns according to the equation shown below:



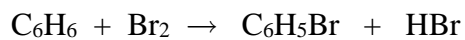
How many grams of  $\text{CO}_2$  are produced when 3.00 g of  $\text{C}_2\text{H}_5\text{OH}$  burns according to this reaction? (Assume excess oxygen)

2. Ammonia burns in air according to the reaction shown below:



- a) How many grams of  $\text{NO}$  form when 1.50 g  $\text{NH}_3$  react with 1.85 g of  $\text{O}_2$  react with one another.
- b) After the reaction above has completed, which reactant, and how much of it remains unreacted?

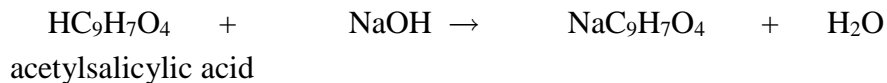
3. When 30.0 g of benzene (C<sub>6</sub>H<sub>6</sub>) and 65.0 g of bromine are reacted together as shown below, 56.7 g of bromobenzene (C<sub>6</sub>H<sub>5</sub>Br) is formed. What is the percent yield of this reaction?



4. How many grams of solute are present in 50.0 mL of 1.33 M CuSO<sub>4</sub> solution?
5. How many mL of 1.50 M Na<sub>3</sub>PO<sub>4</sub> solution contains 5.00 g of solute?
6. What volume of 1.50 M solution of sucrose solution is required to prepare 425 mL of 0.100 M solution?

7. Glacial acetic acid has a density of 1.049 g/mL at 25°C. What is the molarity of a solution of acetic acid prepared by dissolving 10.00 mL of glacial acetic acid at 25°C in enough water to make 100.0 mL of solution?

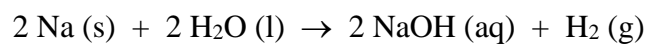
8. The acetylsalicylic content of aspirin can be determined by reaction of the acid with sodium hydroxide as shown below:



23.0 mL of 0.0770 M NaOH solution was used to completely react with the acid present in a 500-mg aspirin tablet. What is the percent of acetylsalicylic acid in the aspirin tablet?

9. Concentrated nitric acid has a density of 1.41 g/mL and contains 70.0% HNO<sub>3</sub> by mass. What is the molarity of this solution?

10. How many grams of Na must react with 155 mL of water to produce a solution that is 0.175 M NaOH, as shown below. (Assume a final solution volume of 155 mL)

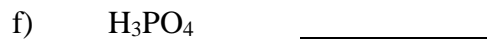
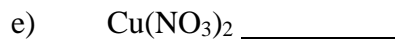


11. A sample of limestone (containing  $\text{CaCO}_3$ ) weighing 438 mg is treated with oxalic acid ( $\text{H}_2\text{C}_2\text{O}_4$ ), as shown below:

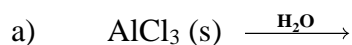


The mass of  $\text{CaC}_2\text{O}_4$  produced in this reaction was found to be 472 mg. Based on this information, what is the mass percent of calcium carbonate in limestone?

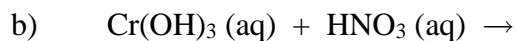
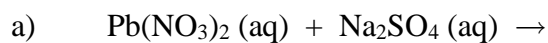
12. Identify each of the following substances as a non-electrolyte (NE), weak electrolyte (WE), or strong electrolyte (SE):



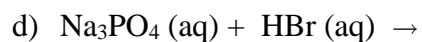
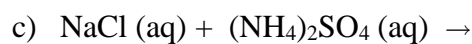
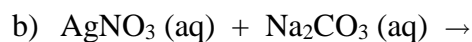
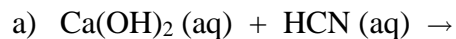
13. Complete each equation shown below:



14. Complete the molecular equations shown below, and write balanced net ionic equations for each:



15. For each reaction shown below, determine if a reaction occurs. If so, write a balanced net ionic equation. If not, write "No Rxn".



16. Write balanced net ionic equations for each reaction described below:

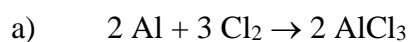
a) Solid sodium hydroxide pellets are dropped in solution of sulfuric acid.

b) Aqueous solutions of ammonium carbonate and calcium chloride are mixed together.

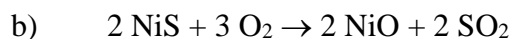
17. In the compounds below, assign oxidation numbers to the underlined element:

- a)  $\text{H}_3\underline{\text{P}}\text{O}_2$  \_\_\_\_\_      d)  $\text{H}_2\underline{\text{C}}\text{O}$  \_\_\_\_\_  
b)  $\text{Na}_2\underline{\text{C}}_2\text{O}_4$  \_\_\_\_\_      e)  $\underline{\text{C}}\text{IF}_4^-$  \_\_\_\_\_  
c)  $\text{Mn}\underline{\text{S}}\text{O}_4$  \_\_\_\_\_      g)  $\text{Al}\underline{\text{H}}_3$  \_\_\_\_\_

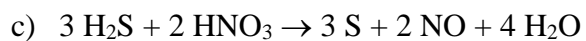
18. Identify which substance is oxidized and which substance is reduced, and determine the total number of electrons transferred in each of the following redox reactions.



oxidized \_\_\_\_\_      reduced \_\_\_\_\_      # of  $e^-$  \_\_\_\_\_



oxidized \_\_\_\_\_      reduced \_\_\_\_\_      # of  $e^-$  \_\_\_\_\_

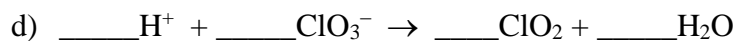
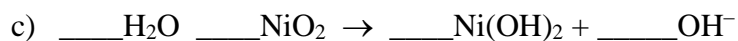
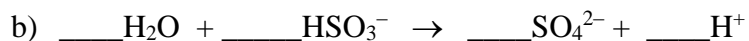


oxidized \_\_\_\_\_      reduced \_\_\_\_\_      # of  $e^-$  \_\_\_\_\_

19. A solution is prepared by mixing 0.10 L of 0.12 M NaCl and 0.23 L of 0.18 M MgCl<sub>2</sub> solutions. What volume of 0.25 M AgNO<sub>3</sub> is required to precipitate all the chloride ions in the solution above? (Answer = 0.38 L)

20. When  $B_5H_9$  reacts with water, it forms boric acid ( $H_3BO_3$ ) and hydrogen gas. Boric acid combines with sodium oxide to form borate salt  $Na_2B_4O_7$  and water. What mass of  $B_5H_9$  is required to form 151 g of the borate salt by this reaction sequence? (Answer = 37.9 g)

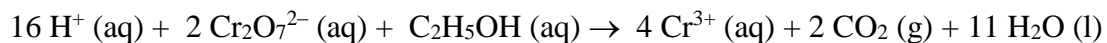
21. Balance each oxidation or reduction half-reaction shown below:



22. What is the overall equation formed from combining half-reactions (b) and (d) above?



23. A person's blood alcohol ( $\text{C}_2\text{H}_5\text{OH}$ ) can be determined by titrating a sample of blood plasma with a sodium dichromate solution. The balanced equation is:



If 35.46 mL of 0.04961 M  $\text{Cr}_2\text{O}_7^{2-}$  is required to titrate 25.00 g of plasma, what is the mass percent of alcohol in blood? (Answer = 0.1621%)

24. Phosphoric acid can be produced by reaction of aqueous sodium phosphate and sulfuric acid. The other product in the reaction is sodium sulfate.

a) What volume (in mL) of 1.55 M sulfuric acid is required to completely react with 27.5 mL of 1.20 M sodium phosphate?

b) What is the concentration of the phosphoric acid produced in the final solution?