Chapter 7 – Chemical Quantities

Chapter 7: 1 – 7, 9 – 11, 13 – 18, 19 – 27, 29 - 35

Practice Problems

1. What is the mass of 0.50 bushel of apples? *1 dozen apples = 2.0 kg apples = 0.20 bushel*

2. Assume that a variety of apples has eight seeds in each. How many apple seeds are in 14 kg of apples?

3. How many moles is 2.80×10^{24} atoms of silicon?

4. How many molecules is 0.360 mol of water?

5. How many atoms are there in 1.14 mol SO_3?

6. How many moles are there in 4.65×10^{24} molecules of NO_2?

7. Find the gram molecular mass of each compound.

     a. C_2H_6

     b. PCl_3

     c. C_3H_7OH

     d. N_2O_5

9. Calculate the gram formula mass of each ionic compound.

     a. K_2O

     b. $CaSO_4$

     c. CuI_2

10. Find the gram formula mass of each compound.

     a. barium fluoride

     b. strontium chloride

     c. sodium hydrogen carbonate

     d. aluminum sulfite

Section Review 7.1

11. Describe the relationship between Avogadro's number and one mole of any substance.

13. How many oxygen atoms are in a representative particle of each substance?

     a. ammonium nitrate (NH_4NO_3), a fertilizer

     b. acetylsalicylic acid ($C_8H_8O_4$), the fever-reducing compound aspirin?

     c. ozone (O_3), a disinfectant

     d. nitroglycerine ($C_3H_5(NO_3)_3$), an explosive

14. How many moles is each of the following?

      a. 1.50×10^{23} molecules NH_3

      b. 1 billion (1×10^9 molecules) O_2

      c. 6.02×10^{22} molecules Br_2

      d. 4.81×10^{24} atoms Li

15. Distinguish among gram atomic mass, gram molecular mass, and gram formula mass.

Practice Problems

16. Find the mass, in grams, of each.

      a. 3.32 mol K

      b. 4.52×10^{-3} mol $C_{20}H_{42}$

      c. 0.0112 mol K_2CO_3

17. Calculate the mass, in grams of 2.50 mol of each substance.

      a. sodium sulfate

      b. iron(II) hydroxide

18. Find the number of moles in each quantity.
     a. 3.70×10^{-1} g B

     b. 27.4 g TiO_2

     c. 847 g $(NH_4)_2CO_3$

20. What is the volume at STP of these gases?
     a. 3.20×10^{-3} mol CO_2

     b. 0.960 mole CH_4

     c. 3.70 mol N_2

21. Assuming STP, how many moles are in these volumes?
     a. 67.2 L SO_2

     b. 0.880 L He

     c. 1.00×10^3 L C_2H_6

22. A gaseous compound composed of sulfur and oxygen that is linked to the formation of acid rain has a density of 3.58 g/ L at STP. What is the molar mass of this gas?

23. What is the density of krypton gas at STP?

Section Review 7.2
24. Find the mass in grams of each quantity:
      a. 0.720 mol Be

      b. 2.40 mol N_2

      c. 0.160 mol H_2O_2

      d. 5.08 mol $Ca(NO_3)_2$

25. Calculate the following:
      a. The number of molecules in 60.0 g NO_2.

      b. The volume, in liters, of 3.24 x 10^{22} molecules Cl_2 at STP.

      c. The mass, in grams, of 18.0 L CH_4 at STP.

26. Would three balloons, each containing the same number of molecules of a different gas at STP, have the same mass or the same volume? Explain.

27. Find the number of moles in each quantity.
       a. 5.00 g hydrogen molecules

       b. 0.000264 g Li_2HPO_4

       c. 187 g Al

       d. 333 g SnF_2

Practice Problems
29. Calculate the percent composition of the following:
       a. When 9.03 g Mg combines completely with 3.48 g N to form a compound.

       b. When 29.0 g Ag combines completely with 4.30 g S to form a compound.

30. When a 14.2 g sample of mercury(II) oxide is decomposed into its elements by heating, 13.2 g Hg is obtained. What is the percent composition of this compound?

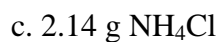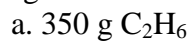31. Calculate the percent composition of these compounds.
       a. ethane (C_2H_6)

       b. sodium bisulfate $(NaHSO_4)$

       c. ammonium chloride (NH_4Cl)

32. Calculate the percent nitrogen in these common fertilizers.
  a. $CO(NH_2)_2$

  b. NH_3

  c. NH_4NO_3

33. Using data calculated from Problem 31, calculate the mass of hydrogen in each of the following.
  a. 350 g C_2H_6

  b. 20.3 g $NaHSO_4$

  c. 2.14 g NH_4Cl

34. Calculate the grams of nitrogen in 125 g of each fertilizer.
  a. $CO(NH_2)_2$

  b. NH_3

  c. NH_4NO_3

35. Calculate the empirical formula of each compound.
     a. 94.1% O, 5.9% H

     b. 79.8% C, 20.2% H

     c. 67.6% Hg, 10.8% S, 21.6% O

     d. 27.59% C, 1.15% H, 16.09% N, 55.17% O