

sulfuric acid. How many grams of sulfuric acid are present in 500 mL of battery acid?

## Mole Concept: Chap. 3, Sec. 3; Chap. 7, Sec. 2

### Problems Involving Atoms and Elements

95. Calculate the number of moles in each of the following masses.
- 64.1 g of aluminum
  - 28.1 g of silicon
  - 0.255 g of sulfur
  - 850.5 g of zinc
96. Calculate the mass of each of the following amounts.
- 1.22 mol sodium
  - 14.5 mol copper
  - 0.275 mol mercury
  - $9.37 \times 10^{-3}$  mol magnesium
97. Calculate the amount in moles in each of the following quantities.
- $3.01 \times 10^{23}$  atoms of rubidium
  - $8.08 \times 10^{22}$  atoms of krypton
  - 5 700 000 000 atoms of lead
  - $2.997 \times 10^{25}$  atoms of vanadium
98. Calculate the number of atoms in each of the following amounts.
- 1.004 mol bismuth
  - 2.5 mol manganese
  - 0.000 0002 mol helium
  - 32.6 mol strontium
99. Calculate the number of atoms in each of the following masses.
- 54.0 g of aluminum
  - 69.45 g of lanthanum
  - 0.697 g of gallium
  - 0.000 000 020 g beryllium
100. Calculate the mass of the following numbers of atoms.
- $6.022 \times 10^{24}$  atoms of tantalum
  - $3.01 \times 10^{21}$  atoms of cobalt
  - $1.506 \times 10^{24}$  atoms of argon
  - $1.20 \times 10^{25}$  atoms of helium

### Problems Involving Molecules, Formula Units, and Ions

101. Calculate the number of moles in each of the following masses.
- 3.00 g of boron tribromide,  $\text{BBr}_3$
  - 0.472 g of sodium fluoride,  $\text{NaF}$
  - $7.50 \times 10^2$  g of methanol,  $\text{CH}_3\text{OH}$
  - 50.0 g of calcium chlorate,  $\text{Ca}(\text{ClO}_3)_2$
102. Determine the mass of each of the following amounts.
- 1.366 mol of  $\text{NH}_3$
  - 0.120 mol of glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$
  - 6.94 mol barium chloride,  $\text{BaCl}_2$
  - 0.005 mol of propane,  $\text{C}_3\text{H}_8$
103. Calculate the number of molecules in each of the following amounts.
- 4.99 mol of methane,  $\text{CH}_4$
  - 0.005 20 mol of nitrogen gas,  $\text{N}_2$
  - 1.05 mol of phosphorus trichloride,  $\text{PCl}_3$
  - $3.5 \times 10^{-5}$  mol of vitamin C, ascorbic acid,  $\text{C}_6\text{H}_8\text{O}_6$
104. Calculate the number of formula units in the following amounts.
- 1.25 mol of potassium bromide,  $\text{KBr}$
  - 5.00 mol of magnesium chloride,  $\text{MgCl}_2$
  - 0.025 mol of sodium carbonate,  $\text{Na}_2\text{CO}_3$
  - $6.82 \times 10^{-6}$  mol of lead(II) nitrate,  $\text{Pb}(\text{NO}_3)_2$
105. Calculate the amount in moles of the following numbers of molecules or formula units.
- $3.34 \times 10^{34}$  formula units of  $\text{Cu}(\text{OH})_2$
  - $1.17 \times 10^{16}$  molecules of  $\text{H}_2\text{S}$
  - $5.47 \times 10^{21}$  formula units of nickel(II) sulfate,  $\text{NiSO}_4$
  - $7.66 \times 10^{19}$  molecules of hydrogen peroxide,  $\text{H}_2\text{O}_2$
106. Calculate the mass of each of the following quantities.
- $2.41 \times 10^{24}$  molecules of hydrogen,  $\text{H}_2$
  - $5.00 \times 10^{21}$  formula units of aluminum hydroxide,  $\text{Al}(\text{OH})_3$
  - $8.25 \times 10^{22}$  molecules of bromine pentafluoride,  $\text{BrF}_5$
  - $1.20 \times 10^{23}$  formula units of sodium oxalate,  $\text{Na}_2\text{C}_2\text{O}_4$
107. Calculate the number of molecules or formula units in each of the following masses.
- 22.9 g of sodium sulfide,  $\text{Na}_2\text{S}$
  - 0.272 g of nickel(II) nitrate,  $\text{Ni}(\text{NO}_3)_2$
  - 260 mg of acrylonitrile,  $\text{CH}_2\text{CHCN}$

### Mixed Review

108. Calculate the number of moles in each of the following masses.
- 0.039 g of palladium
  - 8200 g of iron
  - 0.0073 kg of tantalum
  - 0.006 55 g of antimony
  - 5.64 kg of barium
109. Calculate the mass in grams of each of the following amounts.
- 1.002 mol of chromium
  - 550 mol of aluminum
  - $4.08 \times 10^{-8}$  mol of neon
  - 7 mol of titanium
  - 0.0086 mol of xenon
  - $3.29 \times 10^4$  mol of lithium
110. Calculate the number of atoms in each of the following amounts.
- 17.0 mol of germanium
  - 0.6144 mol of copper
  - 3.02 mol of tin
  - $2.0 \times 10^6$  mol of carbon
  - 0.0019 mol of zirconium
  - $3.227 \times 10^{-10}$  mol of potassium
111. Calculate the number of moles in each of the following quantities.
- $6.022 \times 10^{24}$  atoms of cobalt
  - $1.06 \times 10^{23}$  atoms of tungsten
  - $3.008 \times 10^{19}$  atoms of silver