20. Naturally occurring boron is 80.20% boron-11 (atomic mass = 11.01 amu) and 19.80% of some other isotopic form of boron. What must the atomic mass of this second isotope be in order to account for the 10.81 amu average atomic mass of boron? (Write the answer to two decimal places.)

Number of Atoms in a Sample

21. How many atoms are there in each of the following?

a. 1.50 mol Na
b. 6.755 mol Pb
c. 7.02 g Si

22. What is the mass in grams of each of the following?

a. 3.011×10^{23} atoms F
b. 1.50×10^{23} atoms Mg
c. 4.50×10^{12} atoms Cl
d. 8.42×10^{18} atoms Br
e. 25 atoms W
f. 1 atom Au

23. Determine the number of atoms in each of the following:

a. 5.40 g B
b. 0.250 mol S
c. 0.0384 mol K
d. 0.025 50 g Pt
e. 1.00×10^{-10} g Au

MIXED REVIEW

24. Determine the mass in grams of each of the following:

a. 3.00 mol Al
b. 2.56×10^{24} atoms Li
c. 1.38 mol N
d. 4.86×10^{24} atoms Au
e. 6.50 mol Cu
f. 2.57×10^{8} mol S
g. 1.05×10^{18} atoms Hg

25. Copy and complete the following table concerning the properties of subatomic particles:

Particle	Symbol	Mass number	Actual mass	Relative charge
Electron				
Proton				
Neutron				

26. a. How is an atomic mass unit (amu) related to the mass of a carbon-12 atom?
b. What is the relative atomic mass of an atom?

27. a. What is the nucleus of an atom?
b. Who is credited with the discovery of the atomic nucleus?
c. Identify the two kinds of particles contained in the nucleus.

28. How many moles of atoms are there in each of the following?

a. 40.1 g Ca
b. 11.5 g Na
c. 5.87 g Ni
d. 150 g S
e. 2.65 g Fe
f. 0.007 50 g Ag
g. 2.25×10^{25} atoms Zn
h. 50.0 atoms Ba

29. State the law of multiple proportions, and give an example of two compounds that illustrate the law.

30. What is the approximate atomic mass of an atom if its mass is

a. 12 times that of carbon-12?
b. $\frac{1}{2}$ that of carbon-12?

31. What is an electron?

CRITICAL THINKING

32. Organizing Ideas Using two chemical compounds as an example, describe the difference between the law of definite proportions and the law of multiple proportions.

33. Constructing Models As described on pages 70 to 74, the structure of the atom was determined from observations made in painstaking experimental research. Suppose a series of experiments revealed that when an electric current is passed through gas at low pressure, the surface of the cathode-ray tube opposite the anode glows. In addition, a paddle wheel placed in the tube rolls from the anode toward the cathode when the current is on.

a. In which direction do particles pass through the gas?
b. What charge do the particles possess?

34. Inferring Relationships How much mass is converted into energy during the creation of the nucleus of a $^{235}_{92}U$ nuclide from 92 protons, 143 neutrons, and 92 electrons? (Hint: See Section 22-1.)