Chemical equation. A chemical equation is a written statement that uses symbols and formulas instead of words to represent how reactants undergo transformation into products in a chemical reaction (Section 6.5).

Balanced chemical equation. A balanced chemical equation has the same number of atoms of each element involved in the reaction on each side of the equation. An unbalanced chemical equation is brought into balance through the use of equation coefficients. An equation coefficient is a number that is placed to the left of the formula of a substance in a chemical equation and that changes the amount, but not the identity, of the substance (Section 6.6).

The mole and chemical equations. The equation coefficients in a balanced chemical equation give the molar ratios between substances consumed or produced in the chemical reaction described by the equation (Section 6.7).

KEY REACTIONS AND EQUATIONS

1. Calculation of formula mass (Section 6.1)

$$\text{Formula mass} = \text{sum of atomic masses of all components}$$

2. The mole (Section 6.2)

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ objects}$$

3. Avogadro's number (Section 6.2)

$$\text{Avogadro's number} = 6.02 \times 10^{23} \text{ objects}$$

4. Mass of a mole (Section 6.3)

$$\text{Molar mass} = \frac{\text{mass, in grams, numerically equal to}}{\text{a substance's formula mass}}$$

5. Balanced chemical equation (Section 6.6)

$$\text{Balanced chemical equation} = \frac{\text{same number of atoms of each}}{\text{kind on each side of the equation}}$$

EXERCISES *and* PROBLEMS

The members of each pair of problems in this section test similar material.

Formula Masses (Section 6.1)

6.1 Calculate, to two decimal places, the formula mass of each of the following substances. Obtain the needed atomic masses from the inside front cover of the text.
a. $C_{12}H_{22}O_{11}$ (sucrose, table sugar)
b. C_7H_{16} (heptane, a component of gasoline)
c. $C_7H_5NO_3S$ (saccharin, an artificial sweetener)
d. $(NH_4)_2SO_4$ (ammonium sulfate, a lawn fertilizer)

6.2 Calculate, to two decimal places, the formula mass of each of the following substances. Obtain the needed atomic masses from the inside front cover of the text.
a. $C_{20}H_{30}O$ (vitamin A)
b. $C_{14}H_9Cl_5$ (DDT, formerly used as an insecticide)
c. $C_8H_{10}N_4O_2$ (caffeine, a central nervous system stimulant)
d. $Ca(NO_3)_2$ (calcium nitrate, gives fireworks their red color)

The Mole as a Counting Unit (Section 6.2)

6.3 Indicate the number of objects present in each of the following molar quantities.
a. Number of apples in 1.00 mole of apples
b. Number of elephants in 1.00 mole of elephants
c. Number of atoms in 1.00 mole of Zn atoms
d. Number of molecules in 1.00 mole of CO_2 molecules

6.4 Indicate the number of objects present in each of the following molar quantities.
a. Number of oranges in 1.00 mole of oranges
b. Number of camels in 1.00 mole of camels
c. Number of atoms in 1.00 mole of Cu atoms
d. Number of molecules in 1.00 mole of CO molecules

6.5 How many atoms are present in the following molar quantities of various elements?
a. 1.50 moles Fe b. 1.50 moles Ni
c. 1.50 moles C d. 1.50 moles Ne

6.6 How many atoms are present in the following molar quantities of various elements?
a. 1.20 moles Au b. 1.20 moles Ag
c. 1.20 moles Be d. 1.20 moles Si

6.7 Select the quantity that contains the greater number of atoms in each of the following pairs of substances.
a. 0.100 mole C atoms or 0.200 mole Al atoms
b. Avogadro's number of C atoms or 0.750 mole Al atoms
c. 6.02×10^{23} C atoms or 1.50 moles Al atoms
d. 6.50×10^{23} C atoms or Avogadro's number of Al atoms

6.8 Select the quantity that contains the greater number of atoms in each of the following pairs of substances.
a. 0.100 mole N atoms or 0.300 mole P atoms
b. 6.18×10^{23} N atoms or Avogadro's number of P atoms
c. Avogadro's number of N atoms or 1.20 moles of P atoms
d. 6.18×10^{23} N atoms or 2.00 moles P atoms

Molar Mass (Section 6.3)

6.9 How much, in grams, does 1.00 mole of each of the following substances weigh?
a. CO (carbon monoxide) b. CO_2 (carbon dioxide)
c. NaCl (table salt) d. $C_{12}H_{22}O_{11}$ (table sugar)

6.10 How much, in grams, does 1.00 mole of each of the following substances weigh?

a. H_2O (water)
b. H_2O_2 (hydrogen peroxide)
c. NaCN (sodium cyanide)
d. KCN (potassium cyanide)

6.11 What is the mass, in grams, of each of the following quantities of matter?
a. 0.034 mole of gold atoms
b. 0.034 mole of silver atoms
c. 3.00 moles of oxygen atoms
d. 3.00 moles of oxygen molecules (O_2)

6.12 What is the mass, in grams, of each of the following quantities of matter?
a. 0.85 mole of copper atoms
b. 0.85 mole of nickel atoms
c. 2.50 moles of nitrogen atoms
d. 2.50 moles of nitrogen molecules (N_2)

6.13 How many moles of specified particles are present in a sample of each of the following substances if each sample weighs 5.00 g?
a. CO molecules b. CO_2 molecules
c. B_4H_{10} molecules d. U atoms

6.14 How many moles of specified particles are present in a sample of each of the following substances if each sample weighs 7.00 g?
a. N_2O molecules b. NO_2 molecules
c. P_4O_{10} molecules d. V atoms

Chemical Formulas and the Mole Concept (Section 6.4)

6.15 Write the six mole-to-mole conversion factors that can be derived from each of the following chemical formulas.
a. H_2SO_4 b. $POCl_3$

6.16 Write the six mole-to-mole conversion factors that can be derived from each of the following chemical formulas.
a. HNO_3 b. $C_2H_4Br_2$

6.17 How many moles of each type of atom are present in each of the following molar quantities?
a. 2.00 moles SO_2 molecules
b. 2.00 moles SO_3 molecules
c. 3.00 moles NH_3 molecules
d. 3.00 moles N_2H_4 molecules

6.18 How many moles of each type of atom are present in each of the following molar quantities?
a. 4.00 moles NO_2 molecules
b. 4.00 moles N_2O molecules
c. 7.00 moles H_2O molecules
d. 7.00 moles H_2O_2 molecules

6.19 How many *total moles* of atoms are present in each of the following molar quantities?
a. 4.00 moles SO_3 b. 2.00 moles H_2SO_4
c. 1.00 mole $C_{12}H_{22}O_{11}$ d. 3.00 moles $Mg(OH)_2$

6.20 How many *total moles* of atoms are present in each of the following molar quantities?
a. 3.00 moles N_2O_4 b. 4.00 moles HNO_3
c. 0.500 mole C_2H_6O d. 5.00 moles $(NH_4)_2S$

6.21 Based on the chemical formula H_3PO_4, write the conversion factor that would be needed to do each of the following one-step conversions.
a. Moles of H_3PO_4 to moles of H atoms
b. Moles of H_3PO_4 to moles of O atoms
c. Moles of H_3PO_4 to total moles of atoms
d. Moles of P atoms to moles of O atoms

6.22. Based on the chemical formula H_2CO_3, write the conversion factor that would be needed to do each of the following one-step conversions.
a. Moles of H_2CO_3 to moles of C atoms
b. Moles of H_2CO_3 to moles of H atoms
c. Moles of H_2CO_3 to total moles of atoms
d. Moles of H atoms to moles of O atoms

Calculations Based on Chemical Formulas (Section 6.5)

6.23 Determine the number of atoms in each of the following quantities of an element.
a. 10.0 g B b. 32.0 g Ca c. 2.0 g Ne d. 7.0 g N

6.24 Determine the number of atoms in each of the following quantities of an element.
a. 10.0 g S b. 39.1 g K c. 3.2 g U d. 7.0 g Be

6.25 Determine the mass, in grams, of each of the following quantities of substance.
a. 6.02×10^{23} copper atoms b. 3.01×10^{23} copper atoms
c. 557 copper atoms d. 1 copper atom

6.26 Determine the mass, in grams, of each of the following quantities of substance.
a. 6.02×10^{23} silver atoms b. 3.01×10^{23} silver atoms
c. 1.00×10^{6} silver atoms d. 1 silver atom

6.27 Determine the number of moles of substance present in each of the following quantities.
a. 10.0 g He b. 10.0 g N_2O
c. 4.0×10^{10} atoms P d. 4.0×10^{10} atoms Be

6.28 Determine the number of moles of substance present in each of the following quantities.
a. 25.0 g N b. 25.0 g Li
c. 8.50×10^{15} atoms S d. 8.50×10^{15} atoms Cl

6.29 Determine the number of atoms of sulfur present in each of the following quantities.
a. 10.0 g H_2SO_4 b. 20.0 g SO_3
c. 30.0 g Al_2S_3 d. 2.00 moles S_2O

6.30 Determine the number of atoms of nitrogen present in each of the following quantities.
a. 10.0 g N_2H_4 b. 20.0 g HN_3
c. 30.0 g $LiNO_3$ d. 4.00 moles N_2O_5

6.31 Determine the number of grams of sulfur present in each of the following quantities.
a. 3.01×10^{23} S_2O molecules
b. 3 S_4N_4 molecules
c. 2.00 moles SO_2 molecules
d. 4.50 moles S_8 molecules

6.32 Determine the number of grams of oxygen present in each of the following quantities.
a. 4.50×10^{22} SO_3 molecules b. 7 P_4O_{10} molecules
c. 3.00 moles H_2SO_4 molecules d. 1.50 moles O_3 molecules

Writing and Balancing Chemical Equations (Section 6.6)

6.33 Indicate whether each of the following chemical equations is balanced.
a. $SO_3 + H_2O \rightarrow H_2SO_4$
b. $CuO + H_2 \rightarrow Cu + H_2O$
c. $CS_2 + O_2 \rightarrow CO_2 + SO_2$
d. $AgNO_3 + KCl \rightarrow KNO_3 + AgCl$

6.34 Indicate whether each of the following chemical equations is balanced.

a. $H_2 + O_2 \rightarrow H_2O$
b. $NO + O_2 \rightarrow NO_2$
c. $C + O_2 \rightarrow CO_2$
d. $HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$

6.35 For each of the following balanced chemical equations, indicate how many atoms of each element are present on the reactant and product sides of the chemical equation.

a. $2N_2 + 3O_2 \rightarrow 2N_2O_3$
b. $4NH_3 + 6NO \rightarrow 5N_2 + 6H_2O$
c. $PCl_3 + 3H_2 \rightarrow PH_3 + 3HCl$
d. $Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

6.36 For each of the following balanced chemical equations, indicate how many atoms of each element are present on the reactant and product sides of the chemical equation.

a. $4Al + 3O_2 \rightarrow 2Al_2O_3$
b. $2Na + 2H_2O \rightarrow 2NaOH + H_2$
c. $2Co + 3HgCl_2 \rightarrow 2CoCl_3 + 3Hg$
d. $H_2SO_4 + 2NH_3 \rightarrow (NH_4)_2SO_4$

6.37 Balance the following chemical equations.

a. $Na + H_2O \rightarrow NaOH + H_2$
b. $Na + ZnSO_4 \rightarrow Na_2SO_4 + Zn$
c. $NaBr + Cl_2 \rightarrow NaCl + Br_2$
d. $ZnS + O_2 \rightarrow ZnO + SO_2$

6.38 Balance the following chemical equations.

a. $H_2S + O_2 \rightarrow SO_2 + H_2O$
b. $Ni + HCl \rightarrow NiCl_2 + H_2$
c. $IBr + NH_3 \rightarrow NH_4Br + NI_3$
d. $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$

6.39 Balance the following chemical equations.

a. $CH_4 + O_2 \rightarrow CO_2 + H_2O$
b. $C_6H_6 + O_2 \rightarrow CO_2 + H_2O$
c. $C_4H_8O_2 + O_2 \rightarrow CO_2 + H_2O$
d. $C_5H_{10}O + O_2 \rightarrow CO_2 + H_2O$

6.40 Balance the following chemical equations.

a. $C_2H_4 + O_2 \rightarrow CO_2 + H_2O$
b. $C_6H_{12} + O_2 \rightarrow CO_2 + H_2O$
c. $C_3H_6O + O_2 \rightarrow CO_2 + H_2O$
d. $C_5H_{10}O_2 + O_2 \rightarrow CO_2 + H_2O$

6.41 Balance the following chemical equations.

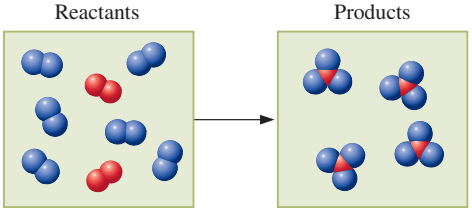
a. $PbO + NH_3 \rightarrow Pb + N_2 + H_2O$
b. $Fe(OH)_3 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + H_2O$

6.42 Balance the following chemical equations.

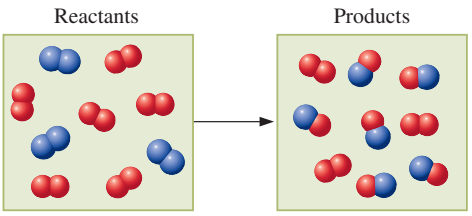
a. $SO_2Cl_2 + HI \rightarrow H_2S + H_2O + HCl + I_2$
b. $Na_2CO_3 + Mg(NO_3)_2 \rightarrow MgCO_3 + NaNO_3$

6.43 The following diagrams represent the reaction of A_2 (red spheres) with B_2 (blue spheres) to give specific products. Write a balanced equation for each reaction based on the information in the diagram.

a.

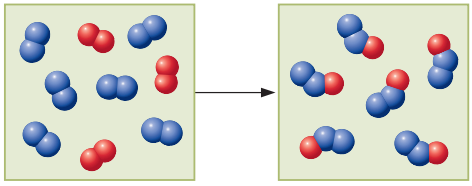


b.

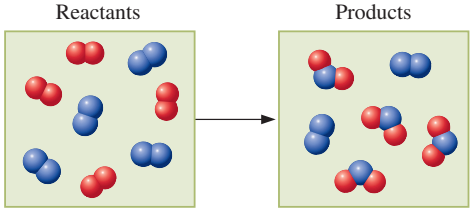


6.44 The following diagrams represent the reaction of A_2 (red spheres) with B_2 (blue spheres) to give specific products. Write a balanced equation for each reaction based on the information in the diagram.

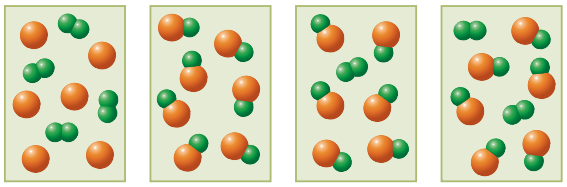
a.



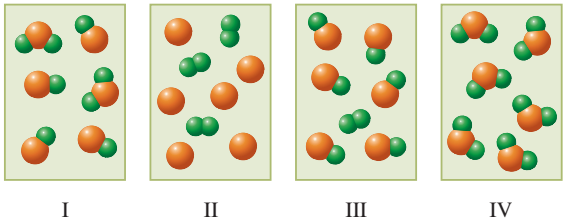
b.



6.45 Diagram I represents the reactant mixture for a chemical reaction. Select from diagrams II through IV the product mixture that is consistent with both diagram I and the concepts associated with a balanced chemical equation.



6.46 Diagram I represents the reactant mixture for a chemical reaction. Select from diagrams II through IV the product mixture that is consistent with both diagram I and the concepts associated with a balanced chemical equation.



Chemical Equations and the Mole Concept (Section 6.7)

6.47 Write the 12 mole-to-mole conversion factors that can be derived from the following balanced chemical equation.

$$2Ag_2CO_3 \longrightarrow 4Ag + 2CO_2 + O_2$$

6.48 Write the 12 mole-to-mole conversion factors that can be derived from the following balanced chemical equation.

$$N_2H_4 + 2H_2O_2 \longrightarrow N_2 + 4H_2O$$

6.49 Using each of the following chemical equations, calculate the number of moles of CO_2 that can be obtained from 2.00 moles of the first listed reactant with an excess of the other reactant.

a. $C_7H_{16} + 11O_2 \rightarrow 7CO_2 + 8H_2O$
b. $2HCl + CaCO_3 \rightarrow CaCl_2 + CO_2 + H_2O$
c. $Na_2SO_4 + 2C \rightarrow Na_2S + 2CO_2$
d. $Fe_3O_4 + CO \rightarrow 3FeO + CO_2$

6.50 Using each of the following chemical equations, calculate the number of moles of CO_2 that can be obtained from 3.50 moles of the first listed reactant with an excess of the other reactant.

a. $FeO + CO \rightarrow Fe + CO_2$
b. $3O_2 + CS_2 \rightarrow CO_2 + 2SO_2$
c. $2C_8H_{18} + 25O_2 \rightarrow 16CO_2 + 18H_2O$
d. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

6.51 For the chemical reaction

$$Sb_2S_3 + 6HCl \longrightarrow 2SbCl_3 + 3H_2S$$

write the conversion factor that would be needed to do each of the following one-step conversions.

a. Moles of $SbCl_3$ to moles of H_2S
b. Moles of Sb_2S_3 to moles of HCl
c. Moles of H_2S to moles of HCl
d. Moles of Sb_2S_3 to moles of $SbCl_3$

6.52 For the chemical reaction

$$UF_6 + 2H_2O \longrightarrow UO_2F_2 + 4HF$$

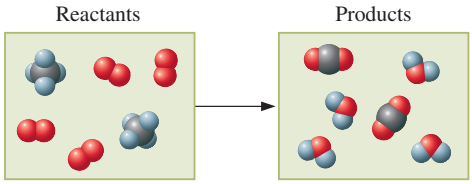
write the conversion factor that would be needed to do each of the following one-step conversions.

a. Moles of UF_6 to moles of HF
b. Moles of UO_2F_2 to moles of H_2O
c. Moles of HF to moles of UO_2F_2
d. Moles of H_2O to moles of UF_6

6.53 How many water molecules (H_2O) are needed to react with 8 ethene molecules (C_2H_4) to produce ethyl alcohol molecules (C_2H_5OH)?

6.54 How many carbon monoxide molecules (CO) are needed to react with 8 hydrogen molecules (H_2) to produce methyl alcohol molecules (CH_3OH)?

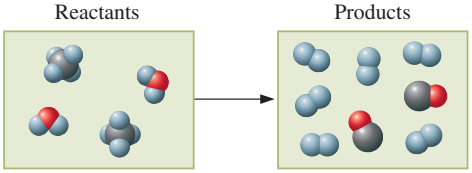
6.55 The following diagram represents the high-temperature reaction between CH_4 and O_2.



Use this diagram to answer the following questions.

a. What are the chemical formulas of the products?
b. How many moles of each product can be obtained if 6.0 moles of CH_4 reacts?

6.56 The following diagram represents the high-temperature reaction between CH_4 and H_2O.



Use this diagram to answer the following questions.

a. What are the chemical formulas of the products?
b. How many moles of each product can be obtained if 6.0 moles of CH_4 reacts?

Calculations Based on Chemical Equations (Section 6.8)

6.57 How many grams of the first reactant in each of the following chemical equations would be needed to produce 20.0 g of N_2 gas?

a. $4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$
b. $(NH_4)_2Cr_2O_7 \rightarrow N_2 + 4H_2O + Cr_2O_3$
c. $N_2H_4 + 2H_2O_2 \rightarrow N_2 + 4H_2O$
d. $2NH_3 \rightarrow N_2 + 3H_2$

6.58 How many grams of the first reactant in each of the following chemical equations would be needed to produce 20.0 g of H_2O?

a. $N_2H_4 + 2H_2O_2 \rightarrow N_2 + 4H_2O$
b. $H_2O_2 + H_2S \rightarrow 2H_2O + S$
c. $2HNO_3 + NO \rightarrow 3NO_2 + H_2O$
d. $3H_2 + WO_3 \rightarrow W + 3H_2O$

6.59 The principal constituent of natural gas is methane, which burns in air according to the reaction

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$

How many grams of O_2 are needed to produce 3.50 g of CO_2?

6.60 Tungsten (W) metal, which is used to make incandescent bulb filaments, is produced by the reaction

$$WO_3 + 3H_2 \longrightarrow 3H_2O + W$$

How many grams of H_2 are needed to produce 1.00 g of W?

6.61 The catalytic converter that is standard equipment on American automobiles converts carbon monoxide (CO) to carbon dioxide (CO_2) by the reaction

$$2CO + O_2 \longrightarrow 2CO_2$$

What mass of O_2, in grams, is needed to react completely with 25.0 g of CO?

6.62 A mixture of hydrazine (N_2H_4) and hydrogen peroxide (H_2O_2) is used as a fuel for rocket engines. These two substances react as shown by the equation

$$N_2H_4 + 2H_2O_2 \longrightarrow N_2 + 4H_2O$$

What mass of N_2H_4, in grams, is needed to react completely with 35.0 g of H_2O_2?

6.63 Both water and sulfur dioxide are products from the reaction of sulfuric acid (H_2SO_4) with copper metal, as shown by the equation

$$2H_2SO_4 + Cu \longrightarrow SO_2 + 2H_2O + CuSO_4$$

How many grams of H_2O will be produced at the same time that 10.0 g of SO_2 is produced?

6.64 Potassium thiosulfate ($K_2S_2O_3$) is used to remove any excess chlorine from fibers and fabrics that have been bleached with that gas. The reaction is

$$K_2S_2O_3 + 4Cl_2 + 5H_2O \longrightarrow 2KHSO_4 + 8HCl$$

How many grams of HCl will be produced at the same time that 25.0 g of $KHSO_4$ is produced?

ADDITIONAL PROBLEMS

6.65 The compound 1-propanethiol, which is the eye irritant released when fresh onions are chopped up, has a formula mass of 76.18 amu and the formula C_3H_yS. What number does *y* stand for in the formula?

6.66 Select the quantity that has the greater number of atoms in each of the following pairs of quantities. Make your selection using the periodic table but without performing an actual calculation.
a. 1.00 mole S or 1.00 mole S_8
b. 28.0 g Al or 1.00 mole Al
c. 28.1 g Si or 30.0 g Mg
d. 2.00 g Na or 6.02×10^{23} atoms He

6.67 What amount or mass of each of the following substances would be needed to obtain 1.000 g of Si?
a. Moles of SiH_4
b. Grams of SiO_2
c. Molecules of $(CH_3)_3SiCl$
d. Atoms of Si

6.68 How many grams of Si would contain the same number of atoms as there are in 2.10 moles of Ar?

6.69 After the following chemical equation was balanced, the name of one of the reactants was substituted for its formula.

$$2 \text{ butyne} + 11O_2 \longrightarrow 8CO_2 + 6H_2O$$

Using only the information found within the chemical equation, determine the molecular formula of butyne.

6.70 Ammonium dichromate decomposes according to the following reaction.

$$(NH_4)_2Cr_2O_7 \longrightarrow N_2 + 4H_2O + Cr_2O_3$$

How many grams of each of the products can be formed from the decomposition of 75.0 g of ammonium dichromate?

6.71 Black silver sulfide can be produced from the reaction of silver metal with sulfur.

$$2Ag + S \longrightarrow Ag_2S$$

How many grams of Ag and how many grams of S are needed to produce 125 g of Ag_2S?

6.72 How many grams of beryllium (Be) are needed to react completely with 45.0 g of nitrogen (N_2) in the synthesis of Be_3N_2?

Multiple-Choice Practice Test

6.73 Which of the following are the values of the formula masses, respectively, of the compounds H_2O and CO_2?
a. 10.00 amu and 22.00 amu
b. 17.01 amu and 30.01 amu
c. 18.02 amu and 30.01 amu
d. 18.02 amu and 44.01 amu

6.74 Which statement concerning Avogadro's number is *correct*?
a. It has the value 6.02×10^{26}.
b. It denotes the number of molecules in 1 mole of any molecular compound.
c. It is the mass, in grams, of 1 mole of any substance.
d. It denotes the number of atoms in 1 mole of any substance.

6.75 Which set of quantities is needed to calculate the mass of 1 mole of a substance?
a. Chemical formula and Avogadro's number
b. Chemical formula and atomic masses
c. Atomic masses and Avogadro's number
d. Atomic numbers and Avogadro's number

6.76 Which of the following are the values of the molar masses, respectively, of Na and K?
a. 11.00 amu and 19.00 amu
b. 11.00 grams and 19.00 grams
c. 22.99 amu and 39.10 amu
d. 22.99 grams and 39.10 grams

6.77 Which compound sample contains the greatest number of atoms?
a. 4.0 moles NH_3 b. 3.0 moles SO_3
c. 6.0 moles CO d. 4.0 moles CO_2

6.78 Which of the following statements is true for all balanced chemical equations?
a. The total number of molecules on each side of the equation must be equal.
b. The total number of atoms on each side of the equation must be equal.
c. The sum of the subscripts on each side of the equation must be equal.
d. The sum of the coefficients on each side of the equation must be equal.

6.79 When the chemical equation $NH_3 \longrightarrow N_2 + H_2$ is correctly balanced, the coefficients are
a. 1, 2, 3 b. 2, 1, 3 c. 3, 1, 2 d. 1, 1, 3

6.80 In which of the following is the first listed quantity less than the second listed quantity?
a. Mass of 1 mole of CO_2, mass of 1 mole of CO
b. Moles in 28.0 g of CO_2, moles in 28.0 g of CO
c. Molecules in 2 moles of CO_2, molecules in 2 moles of CO
d. Atoms in 2 moles of CO_2, atoms in 2 moles of CO

6.81 Which of the following is the correct "setup" for the problem, "How many grams of S are present in 50.0 g of S_4N_4?"

a. $50.0 \text{ g } S_4N_4 \times \dfrac{1 \text{ mole } S_4N_4}{184.32 \text{ g } S_4N_4} \times \dfrac{4 \text{ moles S}}{1 \text{ mole } S_4N_4} \times \dfrac{32.07 \text{ g S}}{4 \text{ moles S}}$

b. $50.0 \text{ g } S_4N_4 \times \dfrac{1 \text{ mole } S_4N_4}{184.32 \text{ g } S_4N_4} \times \dfrac{4 \text{ moles S}}{1 \text{ mole } S_4N_4} \times \dfrac{32.07 \text{ g S}}{1 \text{ mole S}}$

c. $50.0\text{ g } S_4N_4 \times \frac{1\text{ mole } S_4N_4}{184.32\text{ g } S_4N_4} \times \frac{1\text{ mole S}}{1\text{ mole } S_4N_4} \times \frac{32.07\text{ g S}}{1\text{ mole S}}$

d. $50.0\text{ g } S_4N_4 \times \frac{1\text{ mole } S_4N_4}{184.32\text{ g } S_4N_4} \times \frac{1\text{ mole S}}{4\text{ moles } S_4N_4} \times \frac{32.07\text{ g S}}{1\text{ mole S}}$

6.82 Which of the following is the correct "setup" for the problem, "How many grams of H_2O form when 3.2 moles of O_2 react according to the following reaction?"

$$2H_2S + 3O_2 \longrightarrow 2H_2O + 2SO_2$$

a. $3.2\text{ moles } O_2 \times \frac{18.02\text{ g } H_2O}{2\text{ moles } H_2O}$

b. $3.2\text{ moles } O_2 \times \frac{32.00\text{ g } O_2}{1\text{ mole } O_2} \times \frac{18.02\text{ g } H_2O}{32.00\text{ g } O_2}$

c. $3.2\text{ moles } O_2 \times \frac{2\text{ moles } H_2O}{3\text{ moles } O_2} \times \frac{18.02\text{ g } H_2O}{1\text{ mole } H_2O}$

d. $3.2\text{ moles } O_2 \times \frac{32.00\text{ g } O_2}{1\text{ mole } O_2} \times \frac{2\text{ moles } H_2O}{3\text{ moles } O_2}$