

Stoichiometry

Section 11.1 Defining Stoichiometry

pages 368–372

Practice Problems

pages 371–372

1. Interpret the following balanced chemical equations in terms of particles, moles, and mass. Show that the law of conservation of mass is observed.



1 molecule N_2 + 3 molecules

$\text{H}_2 \rightarrow$ 2 molecules NH_3

1 mole N_2 + 3 moles $\text{H}_2 \rightarrow$ 2 moles NH_3

Mass:

N_2 : (2 mol)(14.007 g/mol) = 28.014 g

3H_2 : (6 mol)(1.008 g/mol) = 6.048 g

2NH_3 : (2 mol)(14.007 g/mol) +
(6 mol)(1.008 g/mol) = 34.062 g

28.014 g N_2 + 6.048 g $\text{H}_2 \rightarrow$ 34.062 g NH_3

34.062 g reactants = 34.062 g products



1 molecule HCl + 1 formula unit $\text{KOH} \rightarrow$

1 formula unit KCl + 1 molecule H_2O

1 mole HCl + 1 mole $\text{KOH} \rightarrow$

1 mole KCl + 1 mole H_2O

Mass:

HCl : (1 mol)(1.008 g/mol) +
(1 mol)(35.453 g/mol) = 36.461 g

KOH : (1 mol)(39.098 g/mol) +
(1 mol)(15.999 g/mol) + (1 mol)(1.008 g/mol)
= 56.105 g

KCl : (1 mol)(39.098 g/mol) +
(1 mol)(35.453 g/mol) = 74.551 g

H_2O : (2 mol)(1.008 g/mol) +
(1 mol)(15.999 g/mol) = 18.015 g

36.461 g HCl + 56.105 g $\text{KOH} \rightarrow$
74.551 g KCl + 18.015 g H_2O

92.566 g reactants = 92.566 g products



2 atoms Mg + 1 molecule

$\text{O}_2 \rightarrow$ 2 formula units MgO

2 moles Mg + 1 mole $\text{O}_2 \rightarrow$ 2 moles MgO

Mass:

2Mg : (2 mol)(24.305 g/mol) = 48.610 g

O_2 : (2 mol)(15.999 g/mol) = 31.998 g

2MgO : (2 mol)(24.305 g/mol) +
(2 mol)(15.999 g/mol) = 80.608 g

48.610 g Mg + 31.998 g $\text{O}_2 \rightarrow$ 80.608 g MgO

80.608 g reactants = 80.608 g products

2. **Challenge** For each of the following, balance the chemical equation; interpret the equation in terms of particles, moles, and mass; and show that the law of conservation of mass is observed.



2 atoms Na + 2 molecules $\text{H}_2\text{O} \rightarrow$

2 formula units NaOH + 1 molecule H_2

2 mol Na + 2 mol $\text{H}_2\text{O} \rightarrow$

2 mol NaOH + 1 mol H_2

Mass:

2Na : (2 mol)(22.990 g/mol) = 45.980 g

$2\text{H}_2\text{O}$: (4 mol)(1.008 g/mol) +
(2 mol)(15.999 g/mol) = 36.030 g

2NaOH : (2 mol)(22.990 g/mol) +
(2 mol)(15.999 g/mol) + (2 mol)(1.008 g/mol)
= 79.994 g

H_2 : (2 mol)(1.008 g/mol) = 2.016 g

45.980 g Na + 36.030 g $\text{H}_2\text{O} \rightarrow$

79.994 g NaOH + 2.016 g H_2

82.01 g reactants = 82.01 g products

Solutions Manual Chemistry Matter And Change Stoichiometry

Deborah Wiegand



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Solutions Manual for Chemistry: Molecules Matter and Change, Fourth Edition Julie Henderleiter, Charles Trapp, Peter Atkins, Loretta Jones, 1999-08-13 This student companion is a supplement to Chemistry Molecules Matter and Change 4th edition with CD ROM It features guided reading strategies collaborative learning sheets and strategies for using CD ROM tools

Chemistry, Student Solutions Manual James E. Brady, Joel W. Russell, John R. Holum, 2000-01-26 The images on the cover call attention to the relationship between macro observations and the intimate structure of chemical substances and the changes both chemical and physical that they undergo

Fireworks One of the ingredients is phosphorus a molecular form of which is believed to consist of linked tetrahedra of phosphorus atoms The chemical reaction of phosphorus with oxygen is partly responsible for the spectacular show of light

Carbon The element is found in several forms including the familiar diamond and another recently discovered sooty substance that consists of soccer ball shaped molecules often referred to as buckeyballs

Diamond is not the most stable form of carbon and is created from other forms of carbon at high temperatures and pressures deep within the earth

Acetylene torch Cutting steel is possible because of the intense heat generated by the chemical reaction of acetylene with oxygen a reaction between molecules of C_2H_2 and O_2 to give CO_2 and H_2O

Hot air balloon The air that helps it rise is heated by the combustion of molecules of propane each composed of three carbon and eight hydrogen atoms

Stormy weather The evaporation of water serves to store energy provided by the sun

Subsequent condensation of the water vapor releases this energy and is the basis of all the weather systems on our planet

Student Solutions Manual: Ssm Chemistry Deborah Wiegand, 2003 This manual contains complete worked out solutions to all follow up problems and about half of all the chapter problems Each chapter of solutions opens with a summary of the text chapter content and a list of key equations needed to solve the problems

Solutions Manual to Accompany General Chemistry with Qualitative Analysis, Second Edition Ralph H. Petrucci, Robert K. Wismer, 1987

Student Solutions Manual Deborah Wiegand, 1999-07

Solutions Manual to Accompany General Chemistry, Fourth Edition, and General Chemistry with Qualitative Analysis, Fourth Edition, Whitten, Gailey, Davis Yi-Noo Tang, Wendy L. Keeney-Kennicutt, 1992

CHEMISTRY SILBERBERG, 2003

Chemistry Neil D. Jespersen, Alison Hyslop, 2014-01-13 The Student Solutions Manual to accompany Chemistry The Molecular Nature of Matter 7th Edition Jespersen's Chemistry The Molecular Nature of Matter 7th Edition provides readers with the necessary practice support instruction and assessment that is required for learning and teaching the content of a General Chemistry course This text provides the forum for problem solving and concept mastery of chemical phenomena that leads to proficiency and success The Seventh Edition includes revisions to key content coverage areas and concepts and the addition of more Analyzing Solving Multi Concept problems and examples throughout the text An increased emphasis has also been placed on the intimate relationship that exists between structure at the submicroscopic molecular level and the observable macroscopic properties of matter Jespersen

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