

The Mole

Section 10.1 Measuring Matter

pages 320–324

Practice Problems

pages 323–324

1. Zinc (Zn) is used to form a corrosion-inhibiting surface on galvanized steel. Determine the number of Zn atoms in 2.50 mol of Zn.

$$2.50 \text{ mol-Zn} \times \frac{6.02 \times 10^{23} \text{ atoms Zn}}{1 \text{ mol-Zn}} \\ = 1.51 \times 10^{24} \text{ atoms of Zn}$$

2. Calculate the number of molecules in 11.5 mol of water (H_2O).

$$11.5 \text{ mol-H}_2\text{O} \times \frac{6.02 \times 10^{23} \text{ molecules H}_2\text{O}}{1 \text{ mol-H}_2\text{O}} \\ = 6.92 \times 10^{24} \text{ molecules of H}_2\text{O}$$

3. Silver nitrate (AgNO_3) is used to make several different silver halides used in photographic films. How many formula units of AgNO_3 are there in 3.25 mol AgNO_3 ?

$$3.25 \text{ mol-AgNO}_3 \times \frac{6.02 \times 10^{23} \text{ formula units AgNO}_3}{1 \text{ mol-AgNO}_3} \\ = 1.96 \times 10^{24} \text{ formula units of AgNO}_3$$

4. **Challenge** Calculate the number of oxygen atoms in 5.0 mol of oxygen molecules. Oxygen is a diatomic molecule, O_2 .

$$5.00 \text{ mol-O}_2 \times \frac{6.02 \times 10^{23} \text{ molecules-O}_2}{1 \text{ mol-O}_2} \\ \times \frac{2 \text{ O atoms}}{1 \text{ molecule-O}_2} = 6.02 \times 10^{24} \text{ atoms O}$$

5. How many moles contain each of the following?

a. 5.75×10^{24} atoms Al

$$5.75 \times 10^{24} \text{ atoms-Al} \times \frac{1 \text{ mol Al}}{6.02 \times 10^{23} \text{ atoms-Al}} \\ = 9.55 \text{ mol Al}$$

b. 2.50×10^{20} atoms Fe

$$2.50 \times 10^{20} \text{ atoms-Fe} \times \frac{1 \text{ mol Fe}}{6.02 \times 10^{23} \text{ atoms-Fe}} \\ = 4.15 \times 10^{-4} \text{ mol Fe}$$

6. **Challenge** Identify the representative particle for each formula and convert the given number of representative particles to moles.

a. 3.75×10^{24} CO_2

The representative particle is a molecule.

$$3.75 \times 10^{24} \text{ molecules-CO}_2 \times \frac{1 \text{ mol CO}_2}{6.02 \times 10^{23} \text{ molecules-CO}_2} = 6.23 \text{ mol CO}_2$$

b. 3.58×10^{23} ZnCl_2

The representative particle is a formula unit.

$$3.58 \times 10^{23} \text{ formula-units-ZnCl}_2 \times \frac{1 \text{ mol ZnCl}_2}{6.02 \times 10^{23} \text{ formula-units-ZnCl}_2} \\ = 0.595 \text{ mol ZnCl}_2$$

Section 10.1 Assessment

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7. **Explain** why chemists use the mole.

Chemists use the mole because it is a convenient way of knowing how many representative particles are in a sample.

8. **State** the mathematical relationship between Avogadro's number and 1 mol.

One mole contains 6.02×10^{23} representative particles.

9. **List** the conversion factors used to convert between particles and moles.

$$\frac{6.02 \times 10^{23} \text{ representative particles}}{1 \text{ mol}} \\ \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ representative particles}}$$

Mole Solution Manual

Seager/Slabaugh



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Physical Chemistry, Student Solutions Manual Robert J. Silbey, Robert A. Alberty, Mounqi G. Bawendi, George A. Papadantonakis, 2021-12-06 The Fifth Edition of the Student Solutions Manual Physical Chemistry delivers the answers to all four types of problems offered in Physical Chemistry as well as the computer problems The Solutions Manual provides full worked out solutions for the exercises that can be solved with a hand held calculator and Mathematica solutions for all 170 problems that require a personal computer This book also facilitates digital access to all Mathematica answers at www.wiley.com/go/silbey/physicalchemistry5e

Chemistry, Student Solutions Manual James N. Spencer, George M. Bodner, Lyman H. Rickard, 2002-07-25 The second edition of Spencer's Chemistry Structure and Dynamics has been the most successful reform project published for the General Chemistry course The authors have revised the text by building on the recommendations of the ACS's Task Force on the General Chemistry Curriculum and suggestions from the adopters of the first edition This innovative text provides a fifteen chapter introduction to the fundamental concepts of Chemistry A collection of additional topics at the end of each chapter allow instructors to supplement and tailor their courses according to individual need Three major themes link the content of the book the process of science the relationship between molecular structure and physical chemical properties and the relationship between the microscopic and macroscopic levels

Study Guide/Selected Solutions Manual Julie R. Frentrop, 2002-06 Contains a brief overview of every chapter review of skills self tests and the answers and detailed solutions to all odd numbered end of chapter problems in the text book

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 to Accompany Chemistry: Structure & Dynamics, 3rd Edition James N. Spencer, George M. Bodner, Alexander Grushow, Lyman H. Rickard, 2005-03-24 Work more effectively and check solutions as you go along with the text This Student Solutions

Manual is designed to accompany Spencer's Chemistry Structure they begin with data and a spirit of intellectual curiosity In much the same way Spencer Dodner and Rickard's Chemistry Structure and Dynamics 3rd Edition presents data and challenges students to derive the models Built on the recommendations of the American Chemical Society's Task Force on the General Chemistry Curriculum this innovative approach helps students get a feel for how chemists approach problems in the real world This new Third Edition is now revised with a new chapter on materials science and increased coverage of nuclear chemistry

Study Guide and Solutions Manual for Seager/Slabaugh's Chemistry for Today

Seager/Slabaugh,2004 The fifth edition of the Study Guide and Student Solutions Manual has been updated to reflect all of the changes to the text This ancillary tests the student on the learning objectives in each chapter and provides answers to all of the even numbered end of chapter exercises New additional activities have been added to include a review of each section of the chapter and a section entitled Tying It All Together with a Laboratory Application

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Wiegand,1999-07 *Student Study Guide and Solutions Manual to Accompany General, Organic, and Biochemistry*

Katherine J. Denniston,Denniston Katherine,2006 **Physical Chemistry, Solutions Manual** Robert A. Alberty,Robert J.

Silbey,1996-08-20 This book provides thorough coverage of physical chemistry It demonstrates the power and limits of thermodynamics with a more systematic treatment of the second law and more focus on entropy It also covers current topics in physical chemistry and shows how physical chemistry relates to daily life Includes many current applications such as

lasers Instructor's Solutions Manual to Accompany Introductory Chemistry Daniele Peters,1997 General Chemistry

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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 and Study Guide to Accompany Introduction to Organic Chemistry, 4th Ed Paul A. Bartlett,Judith G.

Koch,1992 General Chemistry Richard Langley,2019-09-13 General Chemistry Understanding Moles Bonds and

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Richard Langley holds a Ph D in inorganic chemistry from the University of Nebraska Lincoln He has taught chemistry at the university level for nearly 40 years He is the author of 500 Physical Chemistry Questions and coauthor of 1 001 Practice Problems for Chemistry for Dummies Chemistry for the Utterly Confused Biochemistry for Dummies 5 Steps to a 5 AP Chemistry and Must Know High School Chemistry among other works He has been a grader for the AP Chemistry Exam for many years John Moore holds an Ed D from Texas A M University with an emphasis in science education He previously served as a professor of chemistry at Stephen F Austin State University SFA for 46 years and is currently working for SFA s Science Technology Engineering and Mathematics Center Dr Moore is the author of Chemistry for Dummies Chemistry Essentials for Dummies and Chemistry II for Dummies He is the coauthor of Chemistry for the Utterly Confused Biochemistry for Dummies 5 Steps to a 5 AP Chemistry and Must Know High School Chemistry among other works John has been a grader for the AP Chemistry Exam for many years

Chemistry: Moles, Bonds, Equilibria Student Solutions Manual (First Edition) Richard Langley, 2020-02-20

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