

Chapter 5, Lesson 9 — Temperature Changes in Dissolving

Key Concepts

- The process of dissolving can be *endothermic* (temperature goes down) or *exothermic* (temperature goes up).
- When water dissolves a substance, the water molecules attract and “bond” to the particles (molecules or ions) of the substance causing the particles to separate from each other.
- The “bond” that a water molecule makes is not a covalent or ionic bond. It is a strong attraction caused by water’s polarity.
- It takes energy to break the bonds between the molecules or ions of the solute.
- Energy is released when water molecules bond the solute molecules or ions.
- If it takes more energy to separate the particles of the solute than is released when the water molecules bond to the particles, then the temperature goes down (endothermic).
- If it takes less energy to separate the particles of the solute than is released when the water molecules bond to the particles, then the temperature goes up (exothermic).

Summary

Students will feel the temperature change that occurs when a cold pack and a hot pack are activated. They will see that these temperature changes are due to a solid substance dissolving in water. Students will then compare the temperature changes that occur as four different solutes dissolve in water and classify these as either endothermic or exothermic. Students will be introduced to the concept that it takes energy to break bonds and energy is released when bonds are formed during the process of dissolving.

Objective

Students will be able to identify variables in an experiment to find out how much the temperature increases or decreases as each of four solutes dissolves in water. Students will be able to correctly classify the process of dissolving as either exothermic or endothermic for each solute. Students will be able to explain that the temperature changes in dissolving are a result of the amount of energy released compared to the amount of energy used as “bonds” are formed and broken.

Evaluation

The activity sheet will serve as the “Evaluate” component of each S-E lesson plan. The activity sheets are formative assessments of student progress and understanding. A more formal summative assessment is included at the end of each chapter.

Safety

Be sure you and the students wear properly fitting goggles. Excess dry material from the hot and cold packs can be placed in the trash.

Chapter 5 Lesson 9 Temperature Change

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Chapter 5 Lesson 9 Temperature Change:

Spectrum Math Workbook, Grade 6 Spectrum,2014-08-15 Spectrum Math for grade 6 keeps kids at the top of their math game using progressive practice math in everyday settings and tests to monitor progress The math workbook covers multiplying and dividing decimals and fractions complex measurements and beginning algebra A best selling series for well over 15 years Spectrum still leads the way because it works It works for parents who want to give their child a leg up in math It works for teachers who want their students to meet and surpass learning goals And it works to help children build confidence and advance their skills No matter what subject or grade Spectrum provides thorough practice and focused instruction to support student success *Macmillan/McGraw-Hill Math: Teacher ed., v. 2*,2004 **Spectrum Science, Grade 7** Spectrum,2014-08-15 Cultivate a love for science by providing standards based practice that captures children s attention Spectrum Science for grade 7 provides interesting informational text and fascinating facts about homeostasis migration cloning and acid rain When children develop a solid understanding of science they re preparing for success Spectrum Science for grades 3 8 improves scientific literacy and inquiry skills through an exciting exploration of natural earth life and applied sciences With the help of this best selling series your young scientist can discover and appreciate the extraordinary world that surrounds them *ANSYS Workbench Tutorial Release 13* Kent L. Lawrence,2011 The exercises in ANSYS Workbench Tutorial Release 13 introduce the reader to effective engineering problem solving through the use of this powerful modeling simulation and optimization tool Topics that are covered include solid modeling stress analysis conduction convection heat transfer thermal stress vibration and buckling It is designed for practicing and student engineers alike and is suitable for use with an organized course of instruction or for self study **Discover Science: Teacher's annotated edition** ,1991 Science content helps develop the skills needed to understand how science works learn new concepts solve problems and make decisions in today s technological society *ANSYS Workbench Tutorial* Kent L. Lawrence,2010 Presents tutorials for the solid modeling simulation and optimization program ANSYS Workbench **Matter** ,2004 Everything in the universe regardless of its size shape color or physical state is made up of matter **School Publication** Los Angeles City School District,1919 **Problem of the Day 4** Silver Burdett Ginn, *Everyday Mathematics 2 Grade Teacher's Lesson Guide Volume 2* Max Bell,2004 Contains easy to follow three part daily lesson plans This assists teachers in focusing on lesson objectives providing ongoing practice for all students and addressing individual student needs for a variety of populations A unit organizer provides learning goals planning and assessment support content highlights a materials chart suggestions for problem solving cross curricular links and options for individualizing Each guide is grade level specific **Course 1 Applications and Connections** Glencoe/McGraw-Hill,1998-02 **Science, Grade 7** Spectrum,2008-04-15 Our proven Spectrum Science grade 7 workbook features 176 pages of fundamentals in science learning Developed to current national science standards covering all aspects of seventh grade science education This

workbook for children ages 12 to 13 includes exercises that reinforce science skills across the different science areas Science skills include Scientific Tools Chemical vs Physical Change Ecosystems Rock Cycle Biotechnology Natural Hazards Science History Our best selling Spectrum Science series features age appropriate workbooks for grade 3 to grade 8 Developed with the latest standards based teaching methods that provide targeted practice in science fundamentals to ensure successful learning

Science in Your World: Teacher edition Jay K. Hackett,1991 American Photography ,1930 *Houghton Mifflin Math Steps* ,1999-05-15 **Glencoe Mathematics** William Collins,1999 Chemistry of Common Objects Adapted to the Alternative Elementary Stage of the Syllabus of the Department of Science and Art John J. Pilley,1892 **Air Conditioning, Heating and Ventilating** ,1922 **Modeling Mathematical Ideas** Jennifer M. Suh,Padmanabhan Seshaiyer,2016-12-27 Modeling Mathematical Ideas combining current research and practical strategies to build teachers and students strategic competence in problem solving This must have book supports teachers in understanding learning progressions that addresses conceptual guiding posts as well as students common misconceptions in investigating and discussing important mathematical ideas related to number sense computational fluency algebraic thinking and proportional reasoning In each chapter the authors opens with a rich real world mathematical problem and presents classroom strategies such as visible thinking strategies technology integration and other related problems to develop students strategic competence in modeling mathematical ideas Atlantic Educational Journal ,1916

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Table of Contents Chapter 5 Lesson 9 Temperature Change

1. Understanding the eBook Chapter 5 Lesson 9 Temperature Change
 - The Rise of Digital Reading Chapter 5 Lesson 9 Temperature Change
 - Advantages of eBooks Over Traditional Books
2. Identifying Chapter 5 Lesson 9 Temperature Change
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Chapter 5 Lesson 9 Temperature Change
 - User-Friendly Interface
4. Exploring eBook Recommendations from Chapter 5 Lesson 9 Temperature Change
 - Personalized Recommendations

- Chapter 5 Lesson 9 Temperature Change User Reviews and Ratings
- Chapter 5 Lesson 9 Temperature Change and Bestseller Lists
- 5. Accessing Chapter 5 Lesson 9 Temperature Change Free and Paid eBooks
 - Chapter 5 Lesson 9 Temperature Change Public Domain eBooks
 - Chapter 5 Lesson 9 Temperature Change eBook Subscription Services
 - Chapter 5 Lesson 9 Temperature Change Budget-Friendly Options
- 6. Navigating Chapter 5 Lesson 9 Temperature Change eBook Formats
 - ePub, PDF, MOBI, and More
 - Chapter 5 Lesson 9 Temperature Change Compatibility with Devices
 - Chapter 5 Lesson 9 Temperature Change Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Chapter 5 Lesson 9 Temperature Change
 - Highlighting and Note-Taking Chapter 5 Lesson 9 Temperature Change
 - Interactive Elements Chapter 5 Lesson 9 Temperature Change
- 8. Staying Engaged with Chapter 5 Lesson 9 Temperature Change
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Chapter 5 Lesson 9 Temperature Change
- 9. Balancing eBooks and Physical Books Chapter 5 Lesson 9 Temperature Change
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Chapter 5 Lesson 9 Temperature Change
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Chapter 5 Lesson 9 Temperature Change
 - Setting Reading Goals Chapter 5 Lesson 9 Temperature Change
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Chapter 5 Lesson 9 Temperature Change
 - Fact-Checking eBook Content of Chapter 5 Lesson 9 Temperature Change

- Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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