

Teacher Guide: Calorimetry Lab



Learning Objectives

Students will ...

- Use a calorimeter to examine how heat energy transfers from a material to water.
- Compare the specific heat capacities of various materials.
- Determine the amount of energy released by cooling materials.
- Calculate the specific heat capacities of various materials.



Vocabulary

calorie, calorimeter, joule, specific heat capacity



Lesson Overview

Materials differ in how easily they change temperature when they absorb or lose energy. This property is known as *specific heat capacity*. The specific heat capacity of a substance is the amount of energy needed to increase that substance's temperature by 1 °C.

Calorimeters are devices that can be used to determine an object's specific heat capacity. Students can use the *Calorimetry Lab Gizmo* to calculate and compare the specific heat capacities of several different materials.



The Student Exploration sheet contains three activities:

- **Activity A** – Students investigate the factors that affect how heat transfers between objects.
- **Activity B** – Students compare the specific heat capacities of various substances.
- **Activity C** – Students use the specific heat equation to determine how much heat energy a substance gains or loses and to calculate the specific heat capacity of a substance.



Suggested Lesson Sequence

1. **Pre-Gizmo activity: Measure temperature change** (🕒 10 – 15 minutes)
Pour 250 g (250 mL) of pure water into a beaker. Pour 250 g (about 272 mL) of vegetable oil into a second beaker. Place both beakers over Bunsen burners or hot plates. Have a student assistant stir each substance as you take their temperatures every 10–20 seconds. Have another student record each substance's temperature readings on the board. After about 5 minutes, have students compare the temperature changes of the two substances.

After doing the experiment, ask students to identify the substance that heated up the fastest. Assuming the Bunsen burners are at the same intensity, the vegetable oil should heat up about twice as quickly as the water. Have students discuss why they think this may have occurred.

Teacher Key Gizmo On Rabbits

Rufa'i Ahmed Alkali

A red circular graphic with a gradient, appearing as a semi-circle or a partial circle, located to the right of the author's name.

Teacher Key Gizmo On Rabbits:

Creating Project-Based STEM Environments Jennifer Wilhelm,Ronald Wilhelm,Merryn Cole,2019-02-05 This book models project based environments that are intentionally designed around the United States Common Core State Standards CCSS 2010 for Mathematics the Next Generation Science Standards NGSS Lead States 2013 for Science and the National Educational Technology Standards ISTE 2008 The primary purpose of this book is to reveal how middle school STEM classrooms can be purposefully designed for 21st Century learners and provide evidence regarding how situated learning experiences will result in more advanced learning This Project Based Instruction PBI resource illustrates how to design and implement interdisciplinary project based units based on the REAL Realistic Explorations in Astronomical Learning Unit 1 and CREATES Chemical Reactions Engineered to Address Thermal Energy Situations Unit 2 The content of the book details these two PBI units with authentic student work explanations and research behind each lesson including misconceptions students might hold regarding STEM content pre post research results of unit implementation with over 40 teachers and thousands of students In addition to these two units there are chapters describing how to design one s own research based PBI units incorporating teacher commentaries regarding strategies obstacles overcome and successes as they designed and implemented their PBI units for the first time after learning how to create PBI STEM Environments the REAL way **The**

Geography of Beer Mark W. Patterson,Nancy Hoalst-Pullen,2023-12-01 This book focuses on the geography of beer in the contexts of policies perceptions and place Chapters examine topics such as government policies e g taxation legislation regulations how beer and beerscapes are presented and perceived e g marketing neolocalism roles of women use of media and the importance of place e g terroir of ingredients social and economic impacts of beer beer clubs Collectively the chapters underscore political cultural urban and human environmental geographies that underlie beer brewing and the beer industry **New York Magazine** ,1993-03-08 New York magazine was born in 1968 after a run as an insert of the New York Herald Tribune and quickly made a place for itself as the trusted resource for readers across the country With award winning writing and photography covering everything from politics and food to theater and fashion the magazine s consistent mission has been to reflect back to its audience the energy and excitement of the city itself while celebrating New York as both a place and an idea **New York** ,1993 **The School Librarian** School Library Association,1994 **Little Rabbit**

Goes to School Harry Horse,2011 Little Rabbit takes his favorite toy Charlie Horse along for his first day of school and when there is trouble he blames it all on Charlie **Tales of Clever Rabbit** Rufa'i Ahmed Alkali,1998 **Curious about Rabbits** Jill Sherman,2020-08 Nine Q As on pet rabbits answer elementary inquiries about behavior body language and communication Engaging questions and research based answers satisfy young animal lovers curiosity about cute fuzzy bunnies A Stay Curious feature encourages further learning and models media literacy skills Includes simple infographics glossary and index **The Grumpy Bunny Goes to School** Justine Fontes,Justine Korman,1996 Humper the grumpy bunny

thinks school is a bore until he gets a chance to teach the kinderbunny class by himself **Bunnies Go to School** Leslie Matthews, Lisa McCue, 2002-07 McCue's adorable bunnies are back in a new deluxe interactive format packed with flaps to lift and pull tab surprises **Little Bunny** Eileen Spinelli, 2018 Teachers come in all shapes and sizes Baby Bunny learns how to say the word mine Little bunny teaches his cousin how to read Then he creates a storybook about Great Great Grandma from what Mama remembers about her Grandpa Bunny reads a story about the first Thanksgiving and Little Bunny and his cousins discuss what they're thankful for Stories by Eileen Spinelli

Reviewing **Teacher Key Gizmo On Rabbits**: Unlocking the Spellbinding Force of Linguistics

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