

# the activity series pogil

**the activity series pogil** is an educational resource designed to help students understand chemical reactivity through guided inquiry and active learning. This POGIL (Process Oriented Guided Inquiry Learning) activity focuses on the activity series of metals, a fundamental concept in chemistry that ranks metals based on their reactivity with other substances. Understanding the activity series is essential for predicting the outcomes of single displacement reactions, corrosion, and various industrial processes. This article will explore the structure and objectives of the activity series POGIL, its significance in teaching chemistry, and strategies for effective implementation in the classroom. Additionally, the discussion will cover common misconceptions addressed by the activity and how it enhances students' critical thinking and problem-solving skills.

- Overview of the Activity Series POGIL
- Key Concepts and Learning Objectives
- Structure and Components of the Activity
- Teaching Strategies and Classroom Implementation
- Common Challenges and Misconceptions
- Benefits of Using the Activity Series POGIL

## Overview of the Activity Series POGIL

The activity series POGIL is a structured learning activity that utilizes guided inquiry to teach students about the reactivity of metals. It presents students with data and scenarios that require them to analyze and rank metals according to their ability to displace hydrogen or other metals from compounds. The activity encourages collaboration, discussion, and critical thinking, enabling students to construct their understanding of the activity series rather than passively receiving information. This approach aligns with modern pedagogical practices aimed at fostering deeper comprehension and retention of chemical principles.

## Purpose and Educational Context

The primary purpose of the activity series POGIL is to help students grasp how metals vary in their chemical reactivity and to understand the practical implications of this variability. It is commonly used in high school and introductory college chemistry courses to supplement traditional lectures and textbook explanations. By engaging with real data and experimenting with hypothetical reactions, students develop a more intuitive and functional knowledge of the activity series and its applications in predicting reaction outcomes.

## Historical Background

The activity series concept has been a cornerstone of chemistry education for decades, but the POGIL method represents a more recent innovation. Developed to promote active learning, POGIL activities like this one have been adopted widely to address the diverse learning styles of students and to improve their ability to apply chemical principles in new situations. The activity series POGIL is part of a broader movement toward inquiry-based learning in science education.

## Key Concepts and Learning Objectives

The activity series POGIL focuses on several core chemistry concepts, including metal reactivity, single displacement reactions, oxidation-reduction processes, and the predictive power of the activity series. Students are expected to achieve specific learning objectives that reflect both factual knowledge and analytical skills.

## Understanding Metal Reactivity

Students learn how metals differ in their tendency to lose electrons and form positive ions. The activity illustrates that some metals, like potassium and calcium, are highly reactive, while others, such as gold and platinum, show very low reactivity. Recognizing these differences is critical for predicting chemical behavior.

## Predicting Reaction Outcomes

One of the key learning objectives is for students to use the activity series to predict whether a single displacement reaction will occur. They explore how a more reactive metal can displace a less reactive metal from its compound, providing a clear framework for anticipating chemical changes in laboratory and real-world contexts.

## Connecting to Redox Chemistry

The activity also reinforces the concept of oxidation and reduction by linking metal reactivity to electron transfer. Students analyze how metals lose electrons to oxidizing agents, deepening their understanding of redox reactions and their role in chemical processes.

## Structure and Components of the Activity

The activity series POGIL is typically organized into a series of phases designed to guide students through exploration, concept invention, and application. Each phase builds upon the previous one to promote a comprehensive understanding of the topic.

### Exploration Phase

During this initial phase, students examine experimental data or provided observations related to the reactions of various metals with acids or metal salts. They identify patterns in reactivity and begin to hypothesize about the relative positions of metals in the activity series.

## Concept Invention Phase

Following exploration, students formalize their understanding by constructing the activity series based on the evidence gathered. This phase involves critical thinking and discussion as students articulate the rules governing metal reactivity and relate them to chemical principles.

## Application Phase

In the final phase, students apply their knowledge to predict the outcomes of new reactions, solve problems, and interpret real-world scenarios such as corrosion prevention or extraction of metals from ores.

## Typical Components

- Data tables showing metal reactions
- Guided questions prompting analysis and reasoning
- Instructions for collaborative group work
- Problem sets for applying the activity series
- Reflection prompts to consolidate learning

## Teaching Strategies and Classroom Implementation

Effective use of the activity series POGIL involves careful planning and facilitation to maximize student engagement and learning outcomes. Educators can adopt several strategies to integrate the activity smoothly into their curriculum.

### Group Collaboration

The POGIL method emphasizes teamwork, so organizing students into small groups encourages peer-to-peer learning and discussion. This collaborative environment helps students articulate their thinking and confront misconceptions collectively.

### Facilitation and Scaffolding

Instructors act as facilitators, guiding students through inquiry without providing direct answers. Scaffolding techniques, such as prompting questions or hints, can help maintain progress and focus during the activity.

## **Integration with Laboratory Work**

Pairing the activity with laboratory experiments on metal reactivity enhances experiential learning. Students observe reactions firsthand and then relate their observations to the activity series constructed during the POGIL.

## **Common Challenges and Misconceptions**

While the activity series POGIL is an effective teaching tool, certain challenges and misconceptions commonly arise that educators should address.

### **Misconception About Reactivity and Abundance**

Students sometimes confuse metal reactivity with abundance or economic value. The activity clarifies that reactivity is a chemical property independent of these factors.

### **Confusion Between Reactivity and Stability**

Another frequent misunderstanding is equating high reactivity with instability. The POGIL activity helps differentiate these concepts by examining specific reaction scenarios and outcomes.

### **Difficulty Ranking Metals Accurately**

Students may struggle with ordering metals correctly in the activity series. The guided questions and data analysis components of the activity are designed to support accurate ranking through evidence-based reasoning.

## **Benefits of Using the Activity Series POGIL**

The activity series POGIL offers numerous educational benefits that extend beyond mere content knowledge. Its structured inquiry approach helps develop critical scientific skills.

### **Enhancement of Critical Thinking**

By requiring students to analyze data, construct models, and predict outcomes, the activity cultivates higher-order thinking skills essential for success in chemistry and related fields.

### **Improved Retention and Understanding**

Active engagement with the material leads to better retention and deeper conceptual understanding compared to traditional lecture methods.

### **Encouragement of Scientific Communication**

Group discussions and written reflections foster clear communication of scientific ideas, a vital skill for academic and professional contexts.

## **Development of Problem-Solving Abilities**

The activity series POGIL challenges students to apply theoretical knowledge to new problems, enhancing their problem-solving capabilities and adaptability.

1. Promotes collaborative learning environments
2. Aligns with Next Generation Science Standards (NGSS)
3. Supports differentiated instruction for diverse learners
4. Provides formative assessment opportunities for instructors

## **Frequently Asked Questions**

### **What is the Activity Series in chemistry?**

The Activity Series is a list of metals ranked according to their ability to displace other metals from compounds, indicating their relative reactivity.

### **How is the Activity Series used in POGIL activities?**

In POGIL activities, the Activity Series is used to help students predict the outcomes of single replacement reactions by comparing the reactivity of metals involved.

### **Why do more reactive metals displace less reactive metals in the Activity Series?**

More reactive metals have a greater tendency to lose electrons and form positive ions, allowing them to displace less reactive metals from their compounds.

### **How can the Activity Series help predict if a reaction will occur?**

A reaction is likely to occur if the free metal is higher on the Activity Series than the metal in the compound; otherwise, no reaction takes place.

### **What metals are typically found at the top of the Activity Series?**

Metals like potassium (K), calcium (Ca), and sodium (Na) are typically at the top of the Activity Series because they are very reactive.

## **What role does the Activity Series play in understanding redox reactions?**

The Activity Series helps identify which metals are oxidized and which are reduced during redox reactions based on their relative reactivity.

## **Can the Activity Series be used to predict the products of a reaction involving metals and acids?**

Yes, metals above hydrogen in the Activity Series will react with acids to produce hydrogen gas and a salt, while metals below hydrogen will not react.

## **How does the POGIL approach enhance understanding of the Activity Series?**

POGIL engages students in guided inquiry and group work, allowing them to explore and understand the principles behind the Activity Series through hands-on activities and discussions.

## **What is a common misconception about the Activity Series addressed in POGIL activities?**

A common misconception is that all metals react the same way; POGIL activities clarify that reactivity varies and is ranked in the Activity Series.

## **How can knowledge of the Activity Series be applied in real-world situations?**

Understanding the Activity Series can help in processes like metal extraction, corrosion prevention, and predicting displacement reactions in industrial and laboratory settings.

## **Additional Resources**

### *1. Exploring the Activity Series: A POGIL Approach to Reactivity*

This book offers a comprehensive introduction to the activity series in chemistry using the Process Oriented Guided Inquiry Learning (POGIL) method. It guides students through hands-on activities that help them understand metal reactivity and displacement reactions. The book emphasizes collaborative learning and critical thinking, making complex concepts accessible and engaging.

### *2. POGIL Investigations in Chemical Reactivity and the Activity Series*

Designed for high school and introductory college chemistry courses, this book provides a series of guided inquiry activities focused on the activity series of metals. Students explore how the activity series predicts the outcomes of single displacement reactions. The structured POGIL format encourages teamwork and deep conceptual understanding.

### 3. *Understanding the Activity Series through POGIL: A Student-Centered Approach*

This text presents the activity series within the context of POGIL activities that foster active learning. It includes real-world applications and laboratory exercises to help students connect theory with practice. The book also offers assessment tools to track student progress in mastering the activity series.

### 4. *Metal Reactivity and the Activity Series: POGIL Activities for Chemistry Classrooms*

Focusing specifically on metal reactivity, this book uses POGIL strategies to engage students in exploring the activity series. It provides detailed lesson plans, worksheets, and instructor notes to facilitate inquiry-based learning. The activities promote understanding of why certain metals react more readily than others.

### 5. *POGIL and the Activity Series: Enhancing Conceptual Mastery in Chemistry*

This resource integrates the activity series topic into a broader curriculum of chemical reactivity using POGIL techniques. It emphasizes conceptual mastery through carefully designed questions and collaborative exercises. Teachers will find it useful for fostering student discussions and analytical skills.

### 6. *Guided Inquiry on the Activity Series: POGIL Activities for Effective Learning*

This book offers a collection of POGIL activities focused on the activity series and related chemical reactions. Each activity is designed to develop problem-solving skills and encourage students to formulate hypotheses based on observations. The guide supports differentiated instruction catering to diverse learning styles.

### 7. *The Activity Series and Reactivity Trends: A POGIL-Based Curriculum*

A curriculum resource that uses POGIL methodology to explore trends in metal reactivity as depicted by the activity series. It includes experimental data analysis, group discussions, and critical thinking exercises. The book helps students grasp the periodic trends influencing metal behavior in chemical reactions.

### 8. *Active Learning in Chemistry: POGIL Activities on the Activity Series*

This book provides a series of interactive POGIL activities designed to teach the activity series concept through active engagement. It encourages students to collaborate in small groups to analyze reaction outcomes and predict product formation. The approach aims to improve retention and comprehension of reactivity principles.

### 9. *POGIL Strategies for Teaching the Activity Series and Redox Reactions*

Integrating the activity series with redox chemistry, this resource uses POGIL to enhance understanding of electron transfer processes. Students work through guided inquiries that connect metal reactivity with oxidation and reduction concepts. The book includes assessment rubrics and suggestions for classroom implementation.

## **The Activity Series Pogil**

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# **The Activity Series POGIL: Mastering Redox Reactions with Guided Inquiry**

Are you struggling to grasp the complexities of the activity series and redox reactions? Do you find yourself overwhelmed by memorization, lacking a deep understanding of the underlying principles? Do confusing reaction predictions and balancing equations leave you frustrated? You're not alone. Many students find this topic challenging, leading to missed opportunities and lower grades in chemistry. This book offers a clear, concise, and engaging path to mastery.

This POGIL (Process Oriented Guided Inquiry Learning) based ebook, The Activity Series POGIL, provides a structured approach to understanding the activity series and its application in redox reactions. It moves beyond rote memorization to build a genuine, intuitive understanding of chemical reactivity.

Author: Dr. Eleanor Vance (fictional author, expert in chemistry education)

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Introduction: Understanding the Importance of the Activity Series

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Chapter 2: The Activity Series: Exploring the trends and patterns in metal reactivity.

Chapter 3: Predicting Reaction Outcomes: Applying the activity series to predict spontaneous reactions.

Chapter 4: Balancing Redox Equations: Mastering the techniques for balancing complex redox reactions.

Chapter 5: Real-World Applications: Exploring the practical uses of the activity series.

Conclusion: Consolidating knowledge and looking ahead to advanced concepts.

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## **The Activity Series POGIL: A Comprehensive Guide**

### **Introduction: Understanding the Importance of the Activity Series**

The activity series, also known as the reactivity series, is a crucial concept in chemistry. It ranks metals (and sometimes nonmetals) in order of their reactivity, providing a valuable tool for predicting the outcome of chemical reactions, particularly redox reactions (reduction-oxidation).

reactions). Understanding the activity series goes beyond simple memorization; it involves grasping the underlying principles of electron transfer and electrochemical potential. This introduction will lay the foundation for understanding why the activity series is so important and how it relates to the broader field of chemistry. We'll explore the fundamental concepts that drive the reactivity differences between elements and introduce the key terms needed to navigate the subsequent chapters. This section will also provide a brief overview of the POGIL method and how it will guide your learning experience throughout the book. (Keywords: Activity Series, Reactivity Series, Redox Reactions, Electron Transfer, Electrochemical Potential, POGIL Method, Chemistry)

## **Chapter 1: Defining Oxidation and Reduction: A Foundational Look at Redox Reactions**

Before diving into the activity series, a solid grasp of oxidation and reduction is essential. This chapter will define these core concepts clearly and concisely, avoiding jargon and focusing on intuitive understanding. We will explore electron transfer as the defining characteristic of redox reactions, demonstrating how the loss of electrons (oxidation) is always coupled with the gain of electrons (reduction). We will introduce oxidation states (oxidation numbers) as a practical tool for tracking electron transfer in complex reactions. This chapter will include practice problems to solidify your understanding of oxidation and reduction, laying the groundwork for applying these concepts to the activity series. (Keywords: Oxidation, Reduction, Redox Reactions, Electron Transfer, Oxidation States, Oxidation Numbers, Balancing Equations)

## **Chapter 2: The Activity Series: Exploring the Trends and Patterns in Metal Reactivity**

This chapter delves into the heart of the matter: the activity series itself. We will present the series in a clear and organized manner, highlighting the trends and patterns in metal reactivity. We'll discuss the factors influencing an element's position on the series, such as electronegativity, ionization energy, and atomic radius. We will analyze the series to understand why some metals are highly reactive (e.g., alkali metals) while others are relatively unreactive (e.g., noble metals). This chapter will emphasize the importance of understanding the why behind the series, rather than simply memorizing the order. Interactive exercises and visualizations will aid in understanding the trends and patterns. (Keywords: Activity Series, Reactivity Series, Metal Reactivity, Electronegativity, Ionization Energy, Atomic Radius, Periodic Trends, Chemical Reactivity)

## **Chapter 3: Predicting Reaction Outcomes: Applying the Activity Series to Predict Spontaneous Reactions**

With a solid understanding of the activity series, this chapter focuses on applying this knowledge to predict the outcome of redox reactions. We'll develop a systematic approach to determine whether a given reaction will occur spontaneously. This involves comparing the relative reactivity of metals using the activity series. We'll explore various scenarios and provide numerous examples to illustrate the application of the activity series in predicting reaction spontaneity. Practice problems will challenge you to apply your knowledge and develop your problem-solving skills. (Keywords: Redox Reactions, Spontaneous Reactions, Reaction Prediction, Activity Series Application, Problem Solving, Chemical Reactions)

## **Chapter 4: Balancing Redox Equations: Mastering the Techniques for Balancing Complex Redox Reactions**

Balancing redox equations can be challenging, but this chapter provides a step-by-step approach to mastering this crucial skill. We'll explore various methods for balancing redox equations, including the half-reaction method and the oxidation number method. We will provide detailed examples and work through complex problems, highlighting the importance of correctly balancing both atoms and charges. This chapter will build confidence in handling complex redox reactions, a fundamental skill for success in chemistry. (Keywords: Redox Equations, Balancing Equations, Half-Reaction Method, Oxidation Number Method, Chemical Balancing, Stoichiometry)

## **Chapter 5: Real-World Applications: Exploring the Practical Uses of the Activity Series**

This chapter will demonstrate the practical significance of the activity series by exploring its applications in various real-world contexts. We'll examine its use in metallurgy, electrochemistry, corrosion prevention, and other industrial processes. Real-world examples will bring the abstract concepts to life, highlighting the importance of the activity series beyond the classroom. This chapter will show how the knowledge acquired throughout the book translates to practical applications in everyday life and various industries. (Keywords: Activity Series Applications, Metallurgy, Electrochemistry, Corrosion Prevention, Industrial Applications, Real-World Chemistry)

## **Conclusion: Consolidating Knowledge and Looking Ahead to Advanced Concepts**

The conclusion will serve as a summary, reinforcing the key concepts discussed throughout the book. We will revisit the main takeaways, emphasizing the interconnectedness of the topics covered. This section will also briefly introduce advanced concepts related to the activity series, such as standard reduction potentials and electrochemical cells, paving the way for further exploration in

more advanced chemistry courses. (Keywords: Summary, Key Concepts, Advanced Concepts, Standard Reduction Potentials, Electrochemical Cells)

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#### FAQs:

1. What is a POGIL activity? POGIL stands for Process Oriented Guided Inquiry Learning. It's a teaching method that encourages active learning and collaborative problem-solving.
2. Is this book suitable for beginners? Yes, it's designed to be accessible to beginners, building from foundational concepts to more advanced applications.
3. What prior knowledge is required? A basic understanding of high school chemistry is helpful, but the book covers fundamental concepts.
4. How many practice problems are included? Each chapter includes numerous practice problems of varying difficulty.
5. Can I use this book for self-study? Absolutely! The POGIL approach facilitates self-directed learning.
6. What makes this POGIL activity different from others? This POGIL activity focuses specifically on mastering the activity series in a comprehensive and engaging way.
7. What if I get stuck on a problem? The book provides detailed explanations and hints to guide you through challenging problems.
8. What are the real-world applications covered in the book? Metallurgy, corrosion prevention, and electrochemical cells are just a few of the applications discussed.
9. Is there a supplementary material available? [Optional: mention any supplementary material like answer keys or additional resources.]

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#### Related Articles:

1. Understanding Redox Reactions: A Beginner's Guide: A foundational article explaining oxidation and reduction reactions.
2. Balancing Redox Equations: A Step-by-Step Approach: A detailed guide to mastering the art of balancing redox equations.
3. Electrochemical Cells and the Activity Series: Explores the relationship between electrochemical cells and the activity series.
4. Corrosion and its Prevention: The Role of the Activity Series: Focuses on the practical application of the activity series in preventing corrosion.

5. Metallurgy and the Activity Series: Discusses how the activity series is utilized in metallurgical processes.
6. Predicting Spontaneous Reactions: A Practical Guide: Provides additional exercises and examples for predicting reaction spontaneity.
7. The Activity Series and Standard Reduction Potentials: Explores the connection between the activity series and standard reduction potentials.
8. Common Mistakes in Understanding the Activity Series: Identifies common misconceptions and provides clarification.
9. Advanced Applications of the Activity Series in Electrochemistry: Explores more advanced topics in electrochemistry.

**the activity series pogil:** *POGIL Activities for AP\* Chemistry* Flinn Scientific, 2014

**the activity series pogil: Organic Chemistry** Suzanne M. Ruder, The POGIL Project, 2015-12-29 ORGANIC CHEMISTRY

**the activity series pogil:** *POGIL Activities for High School Chemistry* High School POGIL Initiative, 2012

**the activity series pogil:** *POGIL* Shawn R. Simonson, 2023-07-03 Process Oriented Guided Inquiry Learning (POGIL) is a pedagogy that is based on research on how people learn and has been shown to lead to better student outcomes in many contexts and in a variety of academic disciplines. Beyond facilitating students' mastery of a discipline, it promotes vital educational outcomes such as communication skills and critical thinking. Its active international community of practitioners provides accessible educational development and support for anyone developing related courses. Having started as a process developed by a group of chemistry professors focused on helping their students better grasp the concepts of general chemistry, The POGIL Project has grown into a dynamic organization of committed instructors who help each other transform classrooms and improve student success, develop curricular materials to assist this process, conduct research expanding what is known about learning and teaching, and provide professional development and collegiality from elementary teachers to college professors. As a pedagogy it has been shown to be effective in a variety of content areas and at different educational levels. This is an introduction to the process and the community. Every POGIL classroom is different and is a reflection of the uniqueness of the particular context – the institution, department, physical space, student body, and instructor – but follows a common structure in which students work cooperatively in self-managed small groups of three or four. The group work is focused on activities that are carefully designed and scaffolded to enable students to develop important concepts or to deepen and refine their understanding of those ideas or concepts for themselves, based entirely on data provided in class, not on prior reading of the textbook or other introduction to the topic. The learning environment is structured to support the development of process skills -- such as teamwork, effective communication, information processing, problem solving, and critical thinking. The instructor's role is to facilitate the development of student concepts and process skills, not to simply deliver content to the students. The first part of this book introduces the theoretical and philosophical foundations of POGIL pedagogy and summarizes the literature demonstrating its efficacy. The second part of the book focusses on implementing POGIL, covering the formation and effective management of student teams, offering guidance on the selection and writing of POGIL activities, as well as on facilitation, teaching large classes, and assessment. The book concludes with examples of implementation in STEM and non-STEM disciplines as well as guidance on how to get started. Appendices provide additional resources and information about The POGIL Project.

**the activity series pogil: POGIL Activities for High School Biology** High School POGIL Initiative, 2012

**the activity series pogil:** *POGIL Activities for AP Biology* , 2012-10

**the activity series pogil:** *Process Oriented Guided Inquiry Learning (POGIL)* Richard Samuel Moog, 2008 POGIL is a student-centered, group learning pedagogy based on current learning theory. This volume describes POGIL's theoretical basis, its implementations in diverse environments, and evaluation of student outcomes.

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**the activity series pogil: Chemistry Student Success** Oluwatobi O. Odeleye, 2020

**the activity series pogil:** *Active Learning in Organic Chemistry* Justin B. Houseknecht, Alexey Leontyev, Vincent M. Maloney, Catherine O. Welder, 2019 Organic chemistry courses are often difficult for students, and instructors are constantly seeking new ways to improve student learning. This volume details active learning strategies implemented at a variety of institutional settings, including small and large; private and public; liberal arts and technical; and highly selective and open-enrollment institutions. Readers will find detailed descriptions of methods and materials, in addition to data supporting analyses of the effectiveness of reported pedagogies.

**the activity series pogil:** Biochemistry Education Assistant Teaching Professor Department of Chemistry and Biochemistry Thomas J Bussey, Timothy J. Bussey, Kimberly Linenberger Cortes, Rodney C. Austin, 2021-01-18 This volume brings together resources from the networks and communities that contribute to biochemistry education. Projects, authors, and practitioners from the American Chemical Society (ACS), American Society of Biochemistry and Molecular Biology (ASBMB), and the Society for the Advancement of Biology Education Research (SABER) are included to facilitate cross-talk among these communities. Authors offer diverse perspectives on pedagogy, and chapters focus on topics such as the development of visual literacy, pedagogies and practices, and implementation.

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empirical educational research findings that inform STEM pedagogy. You'll also find a new section on actively engaging students in synchronous and asynchronous online courses, and content has been substantially revised to reflect recent developments in instructional technology and online course development and delivery. Plan and deliver lessons that actively engage students—in person or online Assess students' progress and help ensure retention of all concepts learned Help students develop skills in problem-solving, self-directed learning, critical thinking, teamwork, and communication Meet the learning needs of STEM students with diverse backgrounds and identities The strategies presented in Teaching and Learning STEM don't require revolutionary time-intensive changes in your teaching, but rather a gradual integration of traditional and new methods. The result will be a marked improvement in your teaching and your students' learning.

**the activity series pogil: Calculus I: A Guided Inquiry** Andrei Straumanis, Catherine Bénéteau, Zdenka Guadarrama, Jill E. Guerra, Laurie Lenz, The POGIL Project, 2014-07-21 Students learn when they are activity engaged and thinking in class. The activities in this book are the primary classroom materials for teaching Calculus 1, using the POGIL method. Each activity leads students to discovery of the key concepts by having them analyze data and make inferences. The result is an I can do this attitude, increased retention, and a feeling of ownership over the material.

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**the activity series pogil: *Teaching at Its Best*** Linda B. Nilson, 2010-04-20 *Teaching at Its Best* This third edition of the best-selling handbook offers faculty at all levels an essential toolbox of hundreds of practical teaching techniques, formats, classroom activities, and exercises, all of which can be implemented immediately. This thoroughly revised edition includes the newest portrait of the Millennial student; current research from cognitive psychology; a focus on outcomes maps; the latest legal options on copyright issues; and how to best use new technology including wikis, blogs, podcasts, vodcasts, and clickers. Entirely new chapters include subjects such as matching teaching methods with learning outcomes, inquiry-guided learning, and using visuals to teach, and new sections address Felder and Silverman's Index of Learning Styles, SCALE-UP classrooms, multiple true-false test items, and much more. Praise for the Third Edition of *Teaching at Its Best* Everyone veterans as well as novices will profit from reading *Teaching at Its Best*, for it provides both theory and practical suggestions for handling all of the problems one encounters in teaching classes varying in size, ability, and motivation. Wilbert McKeachie, Department of Psychology, University of Michigan, and coauthor, *McKeachie's Teaching Tips* This new edition of Dr. Nilson's book, with its completely updated material and several new topics, is an even more powerful collection of ideas and tools than the last. What a great resource, especially for beginning teachers but also for us veterans! L. Dee Fink, author, *Creating Significant Learning Experiences* This third edition of *Teaching at Its Best* is successful at weaving the latest research on teaching and learning into what was already a thorough exploration of each topic. New information on how we learn, how students develop, and innovations in instructional strategies complement the solid foundation established in the first two editions. Marilla D. Svinicki, Department of Psychology, The University of Texas, Austin, and coauthor, *McKeachie's Teaching Tips*

**the activity series pogil: *Modern Analytical Chemistry*** David Harvey, 2000 This introductory text covers both traditional and contemporary topics relevant to analytical chemistry. Its flexible approach allows instructors to choose their favourite topics of discussion from additional coverage of subjects such as sampling, kinetic method, and quality assurance.

**the activity series pogil: *Anatomy and Physiology*** J. Gordon Betts, Peter DeSaix, Jody E. Johnson, Oksana Korol, Dean H. Kruse, Brandon Poe, James A. Wise, Mark Womble, Kelly A. Young, 2013-04-25

**the activity series pogil: *Discipline-Based Education Research*** National Research Council, Division of Behavioral and Social Sciences and Education, Board on Science Education, Committee on the Status, Contributions, and Future Directions of Discipline-Based Education Research, 2012-08-27 The National Science Foundation funded a synthesis study on the status, contributions, and future direction of discipline-based education research (DBER) in physics, biological sciences, geosciences, and chemistry. DBER combines knowledge of teaching and learning with deep knowledge of discipline-specific science content. It describes the discipline-specific difficulties learners face and the specialized intellectual and instructional resources that can facilitate student understanding. Discipline-Based Education Research is based on a 30-month study built on two workshops held in 2008 to explore evidence on promising practices in undergraduate science, technology, engineering, and mathematics (STEM) education. This book asks questions that are essential to advancing DBER and broadening its impact on undergraduate science teaching and learning. The book provides empirical research on undergraduate teaching and learning in the sciences, explores the extent to which this research currently influences undergraduate instruction, and identifies the intellectual and material resources required to further develop DBER. Discipline-Based Education Research provides guidance for future DBER research. In addition, the findings and recommendations of this report may invite, if not assist, post-secondary institutions to increase interest and research activity in DBER and improve its quality and usefulness across all natural science disciplines, as well as guide instruction and assessment across natural science courses to improve student learning. The book brings greater focus to issues of student attrition in the natural sciences that are related to the quality of instruction. Discipline-Based Education Research will be of interest to educators, policy makers, researchers, scholars, decision makers in universities,

government agencies, curriculum developers, research sponsors, and education advocacy groups.

**the activity series pogil: Basic Concepts in Biochemistry: A Student's Survival Guide**

Hiram F. Gilbert, 2000 Basic Concepts in Biochemistry has just one goal: to review the toughest concepts in biochemistry in an accessible format so your understanding is thorough and complete.--BOOK JACKET.

**the activity series pogil: A Book on C** Al Kelley, Ira Pohl, 1990

The authors provide clear examples and thorough explanations of every feature in the C language. They teach C vis-a-vis the UNIX operating system. A reference and tutorial to the C programming language. Annotation copyrighted by Book News, Inc., Portland, OR

**the activity series pogil: The Veldt** Ray Bradbury, 2000 Ray Bradbury [RL 6 IL 7-12]

The nursery of the Hadleys ultra-modern Happyhome transforms itself into a sinister African veldt. Theme: technology out of control. 42 pages. Tale Blazers.

**the activity series pogil: College Physics for AP® Courses** Irina Lyublinskaya, Douglas

Ingram, Gregg Wolfe, Roger Hinrichs, Kim Dirks, Liza Pujji, Manjula Devi Sharma, Sudhi Oberoi, Nathan Czuba, Julie Kretchman, John Stoke, David Anderson, Erika Gasper, 2015-07-31 This introductory, algebra-based, two-semester college physics book is grounded with real-world examples, illustrations, and explanations to help students grasp key, fundamental physics concepts. ... This online, fully editable and customizable title includes learning objectives, concept questions, links to labs and simulations, and ample practice opportunities to solve traditional physics application problems.--Website of book.

**the activity series pogil: Engaging Students in Physical Chemistry** Craig M. Teague, David E.

Gardner, 2018-12

**the activity series pogil: AP Chemistry For Dummies** Peter J. Mikulecky, Michelle Rose

Gilman, Kate Brutlag, 2008-11-13 A practical and hands-on guide for learning the practical science of AP chemistry and preparing for the AP chem exam Gearing up for the AP Chemistry exam? AP Chemistry For Dummies is packed with all the resources and help you need to do your very best. Focused on the chemistry concepts and problems the College Board wants you to know, this AP Chemistry study guide gives you winning test-taking tips, multiple-choice strategies, and topic guidelines, as well as great advice on optimizing your study time and hitting the top of your game on test day. This user-friendly guide helps you prepare without perspiration by developing a pre-test plan, organizing your study time, and getting the most out of your AP course. You'll get help understanding atomic structure and bonding, grasping atomic geometry, understanding how colliding particles produce states, and so much more. To provide students with hands-on experience, AP chemistry courses include extensive labwork as part of the standard curriculum. This is why the book dedicates a chapter to providing a brief review of common laboratory equipment and techniques and another to a complete survey of recommended AP chemistry experiments. Two full-length practice exams help you build your confidence, get comfortable with test formats, identify your strengths and weaknesses, and focus your studies. You'll discover how to Create and follow a pretest plan Understand everything you must know about the exam Develop a multiple-choice strategy Figure out displacement, combustion, and acid-base reactions Get familiar with stoichiometry Describe patterns and predict properties Get a handle on organic chemistry nomenclature Know your way around laboratory concepts, tasks, equipment, and safety Analyze laboratory data Use practice exams to maximize your score Additionally, you'll have a chance to brush up on the math skills that will help you on the exam, learn the critical types of chemistry problems, and become familiar with the annoying exceptions to chemistry rules. Get your own copy of AP Chemistry For Dummies to build your confidence and test-taking know-how, so you can ace that exam!

**the activity series pogil: Using Computational Methods to Teach Chemical Principles**

Alexander Grushow, Melissa S. Reeves, 2020-06-15 While computational chemistry methods are usually a research topic of their own, even in the undergraduate curriculum, many methods are becoming part of the mainstream and can be used to appropriately compute chemical parameters

that are not easily measured in the undergraduate laboratory. These calculations can be used to help students explore and understand chemical principles and properties. Visualization and animation of structures and properties are also aids in students' exploration of chemistry. This book will focus on the use of computational chemistry as a tool to teach chemical principles in the classroom and the laboratory.

**the activity series pogil: Molecular Biology of the Cell**, 2002

**the activity series pogil: The Disappearing Spoon** Sam Kean, 2010-07-12 From New York Times bestselling author Sam Kean comes incredible stories of science, history, finance, mythology, the arts, medicine, and more, as told by the Periodic Table. Why did Gandhi hate iodine (I, 53)? How did radium (Ra, 88) nearly ruin Marie Curie's reputation? And why is gallium (Ga, 31) the go-to element for laboratory pranksters? The Periodic Table is a crowning scientific achievement, but it's also a treasure trove of adventure, betrayal, and obsession. These fascinating tales follow every element on the table as they play out their parts in human history, and in the lives of the (frequently) mad scientists who discovered them. The Disappearing Spoon masterfully fuses science with the classic lore of invention, investigation, and discovery -- from the Big Bang through the end of time. Though solid at room temperature, gallium is a moldable metal that melts at 84 degrees Fahrenheit. A classic science prank is to mold gallium spoons, serve them with tea, and watch guests recoil as their utensils disappear.

**the activity series pogil: Integrating Professional Skills Into Undergraduate Chemistry Curricula** Kelly Y. Neiles, Pamela S. Mertz, Justin Fair, 2020

**the activity series pogil: Biology for AP® Courses** Julianne Zedalis, John Eggebrecht, 2017-10-16 Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

**the activity series pogil: High School Physics Unlocked** The Princeton Review, 2016-11-29 UNLOCK THE SECRETS OF PHYSICS with THE PRINCETON REVIEW. High School Physics Unlocked focuses on giving you a wide range of key lessons to help increase your understanding of physics. With this book, you'll move from foundational concepts to complicated, real-world applications, building confidence as your skills improve. End-of-chapter drills will help test your comprehension of each facet of physics, from mechanics to magnetic fields. Don't feel locked out! Everything You Need to Know About Physics. • Complex concepts explained in straightforward ways • Clear goals and self-assessments to help you pinpoint areas for further review • Bonus chapter on modern physics Practice Your Way to Excellence. • 340+ hands-on practice questions in the book and online • Complete answer explanations to boost understanding, plus extended, step-by-step solutions for all drill questions online • Bonus online questions similar to those you'll find on the AP Physics 1, 2, and C Exams and the SAT Physics Subject Test High School Physics Unlocked covers: • One- and Multi-dimensional Motion • Forces and Mechanics • Energy and Momentum • Gravity and Satellite Motion • Thermodynamics • Waves and Sound • Electric Interactions and Electric Circuits • Magnetic Interactions • Light and Optics ... and more!

**the activity series pogil: Barriers and Opportunities for 2-Year and 4-Year STEM Degrees** National Academies of Sciences, Engineering, and Medicine, National Academy of Engineering, Policy and Global Affairs, Board on Higher Education and Workforce, Division of Behavioral and Social Sciences and Education, Board on Science Education, Committee on Barriers and Opportunities in Completing 2-Year and 4-Year STEM Degrees, 2016-05-18 Nearly 40 percent of the students entering 2- and 4-year postsecondary institutions indicated their intention to major in science, technology, engineering, and mathematics (STEM) in 2012. But the barriers to students

realizing their ambitions are reflected in the fact that about half of those with the intention to earn a STEM bachelor's degree and more than two-thirds intending to earn a STEM associate's degree fail to earn these degrees 4 to 6 years after their initial enrollment. Many of those who do obtain a degree take longer than the advertised length of the programs, thus raising the cost of their education. Are the STEM educational pathways any less efficient than for other fields of study? How might the losses be stemmed and greater efficiencies realized? These questions and others are at the heart of this study. *Barriers and Opportunities for 2-Year and 4-Year STEM Degrees* reviews research on the roles that people, processes, and institutions play in 2- and 4-year STEM degree production. This study pays special attention to the factors that influence students' decisions to enter, stay in, or leave STEM majors—quality of instruction, grading policies, course sequences, undergraduate learning environments, student supports, co-curricular activities, students' general academic preparedness and competence in science, family background, and governmental and institutional policies that affect STEM educational pathways. Because many students do not take the traditional 4-year path to a STEM undergraduate degree, *Barriers and Opportunities* describes several other common pathways and also reviews what happens to those who do not complete the journey to a degree. This book describes the major changes in student demographics; how students view, value, and utilize programs of higher education; and how institutions can adapt to support successful student outcomes. In doing so, *Barriers and Opportunities* questions whether definitions and characteristics of what constitutes success in STEM should change. As this book explores these issues, it identifies where further research is needed to build a system that works for all students who aspire to STEM degrees. The conclusions of this report lay out the steps that faculty, STEM departments, colleges and universities, professional societies, and others can take to improve STEM education for all students interested in a STEM degree.

**the activity series pogil:** *Misconceptions in Chemistry* Hans-Dieter Barke, Al Hazari, Sileshi Yitbarek, 2008-11-18 Over the last decades several researchers discovered that children, pupils and even young adults develop their own understanding of how nature really works. These pre-concepts concerning combustion, gases or conservation of mass are brought into lectures and teachers have to diagnose and to reflect on them for better instruction. In addition, there are 'school-made misconceptions' concerning equilibrium, acid-base or redox reactions which originate from inappropriate curriculum and instruction materials. The primary goal of this monograph is to help teachers at universities, colleges and schools to diagnose and 'cure' the pre-concepts. In case of the school-made misconceptions it will help to prevent them from the very beginning through reflective teaching. The volume includes detailed descriptions of class-room experiments and structural models to cure and to prevent these misconceptions.

**the activity series pogil:** *Teaching Programming Across the Chemistry Curriculum* Ashley Ringer McDonald, Jessica A. Nash, 2022 Sponsored by the ACS Division of Chemical Education.

**the activity series pogil:** *Calculus-Based Physics I* Jeffrey W. Schnick, 2009-09-24 *Calculus-Based Physics* is an introductory physics textbook designed for use in the two-semester introductory physics course typically taken by science and engineering students. This item is part 1, for the first semester. Only the textbook in PDF format is provided here. To download other resources, such as text in MS Word formats, problems, quizzes, class questions, syllabi, and formula sheets, visit: <http://www.anselm.edu/internet/physics/cbphysics/index.html> *Calculus-Based Physics* is now available in hard copy in the form of two black and white paperbacks at [www.LuLu.com](http://www.LuLu.com) at the cost of production plus shipping. Note that *Calculus-Based Physics* is designed for easy photocopying. So, if you prefer to make your own hard copy, just print the pdf file and make as many copies as you need. While some color is used in the textbook, the text does not refer to colors so black and white hard copies are viable

**the activity series pogil:** *Reaching Students* Nancy Kober, National Research Council (U.S.). Board on Science Education, National Research Council (U.S.). Division of Behavioral and Social Sciences and Education, 2015 *Reaching Students* presents the best thinking to date on teaching and learning undergraduate science and engineering. Focusing on the disciplines of astronomy, biology,

chemistry, engineering, geosciences, and physics, this book is an introduction to strategies to try in your classroom or institution. Concrete examples and case studies illustrate how experienced instructors and leaders have applied evidence-based approaches to address student needs, encouraged the use of effective techniques within a department or an institution, and addressed the challenges that arose along the way.--Provided by publisher.

**the activity series pogil:** *Cooperative Learning in Higher Education* Barbara Millis, 2023-07-03 Research has identified cooperative learning as one of the ten High Impact Practices that improve student learning. If you've been interested in cooperative learning, but wondered how it would work in your discipline, this book provides the necessary theory, and a wide range of concrete examples. Experienced users of cooperative learning demonstrate how they use it in settings as varied as a developmental mathematics course at a community college, and graduate courses in history and the sciences, and how it works in small and large classes, as well as in hybrid and online environments. The authors describe the application of cooperative learning in biology, economics, educational psychology, financial accounting, general chemistry, and literature at remedial, introductory, and graduate levels. The chapters showcase cooperative learning in action, at the same time introducing the reader to major principles such as individual accountability, positive interdependence, heterogeneous teams, group processing, and social or leadership skills. The authors build upon, and cross-reference, each others' chapters, describing particular methods and activities in detail. They explain how and why they may differ about specific practices while exemplifying reflective approaches to teaching that never fail to address important assessment issues.

**the activity series pogil:** *Broadening Participation in STEM* Zayika Wilson-Kennedy, Goldie S. Byrd, Eugene Kennedy, Henry T. Frierson, 2019-02-28 This book reports on high impact educational practices and programs that have been demonstrated to be effective at broadening the participation of underrepresented groups in the STEM disciplines.

**the activity series pogil:** *Engaging Students in Organic Chemistry* Barbara A. Murray, Patricia J. Kreke, 2022-01-05 Linking OChem to natural products, polymers, pharmaceuticals and more Organic chemistry educators have a critical role in engaging and improving student outcomes at a foundational level. The material in the traditional one-year sequence is foundational for upper level science courses as well as many pre-professional programs, such as medicine. When students are engaged in learning the fundamental concepts in organic chemistry, they are better prepared to apply organic concepts to other applications across chemistry. In this work, authors share methods for engaging students in organic chemistry, including in an online environment. These methods range from creative activities for individual class topics to pedagogical models utilized over an academic year. Laboratory experiments, writing assignments, and innovative assignments are included.

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