

Pogil Periodic Trends

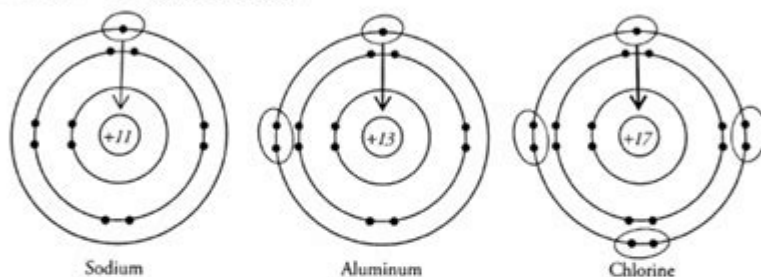
Advanced Periodic Trends

How do the particles in an atom interact to dictate periodic properties of elements?

Why?

Previously you have learned about Coulombic attraction and how it governs the trends in properties among the elements of the Periodic Table. For example, as you move across a period, atoms have more protons in the nucleus, which pulls the electrons in tighter making smaller, more electronegative atoms. As you proceed down a column of the periodic table, the valence electrons get further away, and the atoms get larger and less electronegative. Inquisitive students will always ask, "If more protons in the nucleus pull electrons in tighter, then why don't atoms get smaller when going down a column?" That is a good question, and one that you will investigate in this activity.

Model 1 – Period 3 Elements



Atomic Number	11	13	17
Number of Electrons	11	13	17
Number of Valence Electrons	1	3	7
Core Charge	+1	+3	+7
Atomic Radius	186 pm	143 pm	99 pm
1st Ionization Energy	496 kJ/mol	578 kJ/mol	1251 kJ/mol
Electronegativity	0.9	1.5	3.0

- Describe the relationship of the three elements in Model 1 with regard to their relative positions on the periodic table.

The three elements are in the same row of the periodic table.

- Refer to a periodic table to complete the first three rows of the table in Model 1.

See Model 1.

POGIL Periodic Trends: Mastering the Periodic Table's Patterns

Are you struggling to grasp the fascinating patterns and trends within the periodic table? Does memorizing elements feel like an uphill battle? Fear not! This comprehensive guide delves into the world of POGIL (Process-Oriented Guided Inquiry Learning) activities related to periodic trends, providing a structured approach to mastering this essential chemistry concept. We'll break down key trends, explain their underlying principles, and offer practical strategies for applying your knowledge. Get ready to unlock the secrets of the periodic table and achieve a deeper understanding

of atomic behavior!

Understanding Periodic Trends: A Foundation

The periodic table, far from being a static grid of elements, showcases remarkable trends in atomic properties. These trends are directly linked to the arrangement of electrons in an atom's electron shells and the resulting forces of attraction and repulsion. Understanding these trends is crucial for predicting element behavior and understanding chemical reactivity. POGIL activities provide a hands-on approach to learning these trends, moving beyond rote memorization to a deeper conceptual understanding.

Key Periodic Trends Explored in POGIL Activities:

Atomic Radius: This refers to the size of an atom. POGIL activities often explore how atomic radius varies across periods (rows) and down groups (columns) of the periodic table, explaining the influence of effective nuclear charge and shielding effect.

Ionization Energy: The energy required to remove an electron from an atom is ionization energy. POGIL exercises help understand the factors affecting ionization energy, such as nuclear charge, electron shielding, and electron configuration. Trends across periods and down groups will be highlighted and explained.

Electron Affinity: This describes the energy change when an atom gains an electron. POGIL activities can explore the variations in electron affinity, linking them to an atom's electron configuration and its tendency to accept electrons.

Electronegativity: This measures an atom's ability to attract electrons in a chemical bond. POGIL-style questions and activities encourage students to analyze electronegativity differences and predict the type of bonding (ionic, covalent) between atoms.

How POGIL Activities Enhance Understanding of Periodic Trends

POGIL's process-oriented approach promotes active learning and critical thinking. Instead of passively receiving information, students actively engage with the material through collaborative problem-solving and guided inquiry. Here's how POGIL aids in mastering periodic trends:

1. Collaborative Learning:

Working in groups fosters discussion and allows students to explain their reasoning to peers, solidifying their understanding. Explaining concepts to others is a powerful way to reinforce

learning.

2. Guided Inquiry:

POGIL activities often present a series of carefully designed questions and challenges that lead students to discover the trends themselves. This discovery-based approach enhances retention and comprehension.

3. Problem-Solving:

POGIL activities frequently involve applying the concepts of periodic trends to solve real-world problems or predict the behavior of elements in various chemical scenarios.

4. Conceptual Understanding:

By focusing on the "why" behind the trends, POGIL activities cultivate a deep conceptual understanding rather than simply memorizing facts.

Effective Strategies for Utilizing POGIL in Periodic Trends

To maximize the benefits of POGIL activities for periodic trends, consider these strategies:

Pre-reading: Encourage students to review the relevant textbook sections before the activity to provide a foundation for the guided inquiry process.

Active Participation: Stress the importance of active participation during group discussions and problem-solving sessions.

Instructor Facilitation: Instructors should act as facilitators, guiding students through the activities rather than directly providing answers.

Post-Activity Discussion: Dedicate time for a class discussion to summarize key findings and address any lingering questions.

Application to Real-World Scenarios: Relate the learned trends to real-world applications, making the learning more engaging and meaningful.

Conclusion

Mastering periodic trends is crucial for success in chemistry. POGIL activities offer a powerful tool to move beyond rote memorization and foster a deep, conceptual understanding of these fundamental patterns. By actively engaging with the material through collaborative problem-solving and guided inquiry, students can unlock the secrets of the periodic table and develop a robust understanding of atomic behavior. Remember to embrace the collaborative spirit, actively participate in discussions, and apply your knowledge to real-world problems to achieve a true mastery of periodic trends.

Frequently Asked Questions (FAQs)

1. What are the most common types of POGIL activities used for periodic trends? Common activities include analyzing data sets showing atomic radii, ionization energies, etc., predicting properties based on trends, and explaining observed trends using electron configurations and effective nuclear charge.
2. Can POGIL activities be used for all levels of chemistry students? Yes, POGIL activities can be adapted to suit various levels of student understanding, from introductory to advanced chemistry courses.
3. How can I find POGIL activities specifically focusing on periodic trends? You can search online resources like the POGIL Project website or university chemistry websites for downloadable activities. Many textbooks also include POGIL-style exercises.
4. What are the limitations of using POGIL activities alone? While highly beneficial, POGIL activities are most effective when used in conjunction with other teaching methods like lectures and demonstrations to provide a comprehensive learning experience.
5. How can I assess student learning after a POGIL activity on periodic trends? Assessment can involve written quizzes, group presentations summarizing their findings, individual problem-solving tasks, or a combination of these approaches.

pogil periodic trends: POGIL Activities for High School Chemistry High School POGIL Initiative, 2012

pogil periodic trends: 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.

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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!

poGIL periodic trends: 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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poGIL periodic trends: 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

poGIL periodic trends: An Introduction to Chemistry Mark Bishop, 2002 This book teaches chemistry at an appropriate level of rigor while removing the confusion and insecurity that impair student success. Students are frequently intimidated by prep chem; Bishop's text shows them how to

break the material down and master it. The flexible order of topics allows unit conversions to be covered either early in the course (as is traditionally done) or later, allowing for a much earlier than usual description of elements, compounds, and chemical reactions. The text and superb illustrations provide a solid conceptual framework and address misconceptions. The book helps students to develop strategies for working problems in a series of logical steps. The Examples and Exercises give plenty of confidence-building practice; the end-of-chapter problems test the student's mastery. The system of objectives tells the students exactly what they must learn in each chapter and where to find it.

pogil periodic trends: 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.

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pogil periodic trends: Chemistry Education Javier García-Martínez, Elena Serrano-Torregrosa, 2015-02-17 Winner of the CHOICE Outstanding Academic Title 2017 Award This comprehensive collection of top-level contributions provides a thorough review of the vibrant field of chemistry education. Highly-experienced chemistry professors and education experts cover the latest developments in chemistry learning and teaching, as well as the pivotal role of chemistry for shaping a more sustainable future. Adopting a practice-oriented approach, the current challenges and opportunities posed by chemistry education are critically discussed, highlighting the pitfalls that can occur in teaching chemistry and how to circumvent them. The main topics discussed include best practices, project-based education, blended learning and the role of technology, including e-learning, and science visualization. Hands-on recommendations on how to optimally implement innovative strategies of teaching chemistry at university and high-school levels make this book an essential resource for anybody interested in either teaching or learning chemistry more effectively, from experience chemistry professors to secondary school teachers, from educators with no formal training in didactics to frustrated chemistry students.

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pogil periodic trends: Track Design Handbook for Light Rail Transit , 2012 TCRP report 155 provides guidelines and descriptions for the design of various common types of light rail transit (LRT) track. The track structure types include ballasted track, direct fixation (ballastless) track, and

embedded track. The report considers the characteristics and interfaces of vehicle wheels and rail, tracks and wheel gauges, rail sections, alignments, speeds, and track moduli. The report includes chapters on vehicles, alignment, track structures, track components, special track work, aerial structures/bridges, corrosion control, noise and vibration, signals, traction power, and the integration of LRT track into urban streets.

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available for download online and on CD-ROM

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pogil periodic trends: The Periodic Table I D. Michael P. Mingos, 2020-02-05 As 2019 has been declared the International Year of the Periodic Table, it is appropriate that Structure and Bonding marks this anniversary with two special volumes. In 1869 Dmitri Ivanovitch Mendeleev first proposed his periodic table of the elements. He is given the major credit for proposing the conceptual framework used by chemists to systematically inter-relate the chemical properties of the elements. However, the concept of periodicity evolved in distinct stages and was the culmination of work by other chemists over several decades. For example, Newland's Law of Octaves marked an important step in the evolution of the periodic system since it represented the first clear statement that the properties of the elements repeated after intervals of 8. Mendeleev's predictions demonstrated in an impressive manner how the periodic table could be used to predict the occurrence and properties of new elements. Not all of his many predictions proved to be valid, but the discovery of scandium, gallium and germanium represented sufficient vindication of its utility and they cemented its enduring influence. Mendeleev's periodic table was based on the atomic weights of the elements and it was another 50 years before Moseley established that it was the atomic number of the elements, that was the fundamental parameter and this led to the prediction of further elements. Some have suggested that the periodic table is one of the most fruitful ideas in modern science and that it is comparable to Darwin's theory of evolution by natural selection, proposed at approximately the same time. There is no doubt that the periodic table occupies a central position in chemistry. In its modern form it is reproduced in most undergraduate inorganic textbooks and is present in almost every chemistry lecture room and classroom. This first volume provides chemists with an account of the historical development of the Periodic Table and an overview of how the Periodic Table has evolved over the last 150 years. It also illustrates how it has guided the research programmes of some distinguished chemists.

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pogil periodic trends: Electronic Portfolios 2.0 Darren Cambridge, Kathleen Blake Yancey, Barbara Cambridge, 2023-07-03 Higher education institutions of all kinds—across the United States and around the world—have rapidly expanded the use of electronic portfolios in a broad range of applications including general education, the major, personal planning, freshman learning communities, advising, assessing, and career planning. Widespread use creates an urgent need to evaluate the implementation and impact of eportfolios. Using qualitative and quantitative methods, the contributors to this book—all of whom have been engaged with the Inter/National Coalition for Electronic Portfolio Research—have undertaken research on how eportfolios influence learning and the learning environment for students, faculty members, and institutions. This book features emergent results of studies from 20 institutions that have examined effects on student reflection, integrative learning, establishing identity, organizational learning, and designs for learning supported by technology. It also describes how institutions have responded to multiple challenges in eportfolio development, from engaging faculty to going to scale. These studies exemplify how eportfolios can spark disciplinary identity, increase retention, address accountability, improve writing, and contribute to accreditation. The chapters demonstrate the applications of eportfolios at community colleges, small private colleges, comprehensive universities, research universities, and a state system.

pogil periodic trends: Second International Handbook of Science Education Barry J. Fraser, Kenneth Tobin, Campbell J. McRobbie, 2011-12-13 The International Handbook of Science Education is a two volume edition pertaining to the most significant issues in science education. It is a follow-up to the first Handbook, published in 1998, which is seen as the most authoritative resource ever produced in science education. The chapters in this edition are reviews of research in science education and retain the strong international flavor of the project. It covers the diverse theories and methods that have been a foundation for science education and continue to characterize this field. Each section contains a lead chapter that provides an overview and synthesis of the field and related chapters that provide a narrower focus on research and current thinking on the key issues in that field. Leading researchers from around the world have participated as authors and consultants to produce a resource that is comprehensive, detailed and up to date. The chapters provide the most recent and advanced thinking in science education making the Handbook again the most authoritative resource in science education.

pogil periodic trends: Introduction to Materials Science and Engineering Elliot Douglas, 2014 This unique book is designed to serve as an active learning tool that uses carefully selected information and guided inquiry questions. Guided inquiry helps readers reach true understanding of concepts as they develop greater ownership over the material presented. First, background information or data is presented. Then, concept invention questions lead the students to construct their own understanding of the fundamental concepts represented. Finally, application questions provide the reader with practice in solving problems using the concepts that they have derived from their own valid conclusions. KEY TOPICS: What is Guided Inquiry?; What is Materials Science and

Engineering?; Bonding; Atomic Arrangements in Solids; The Structure of Polymers; Microstructure: Phase Diagrams; Diffusion; Microstructure: Kinetics; Mechanical Behavior; Materials in the Environment; Electronic Behavior; Thermal Behavior; Materials Selection and Design.

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pogil periodic trends: Principles of Biology Lisa Bartee, Walter Shiner, Catherine Creech, 2017 The Principles of Biology sequence (BI 211, 212 and 213) introduces biology as a scientific discipline for students planning to major in biology and other science disciplines. Laboratories and classroom activities introduce techniques used to study biological processes and provide opportunities for students to develop their ability to conduct research.

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