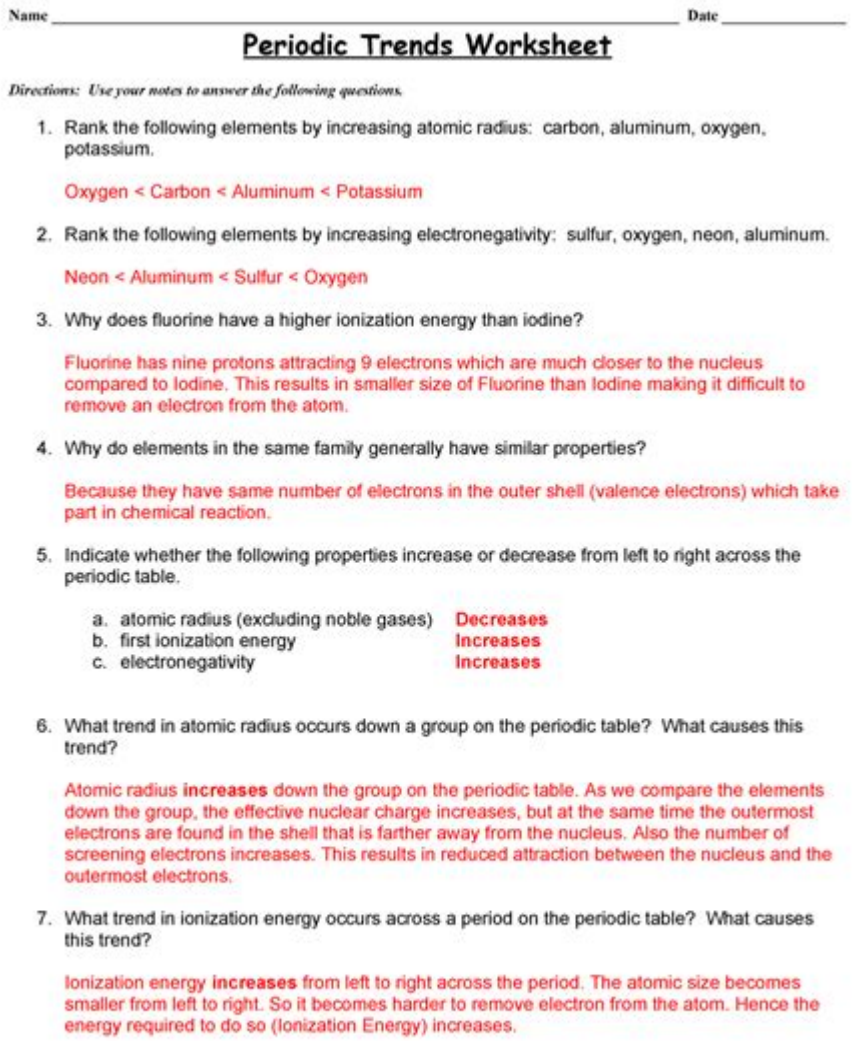
# Periodic Trends Answer Key



Name _____ Date _____

**Periodic Trends Worksheet**

*Directions: Use your notes to answer the following questions.*

1. Rank the following elements by increasing atomic radius: carbon, aluminum, oxygen, potassium.

   Oxygen < Carbon < Aluminum < Potassium

2. Rank the following elements by increasing electronegativity: sulfur, oxygen, neon, aluminum.

   Neon < Aluminum < Sulfur < Oxygen

3. Why does fluorine have a higher ionization energy than iodine?

   Fluorine has nine protons attracting 9 electrons which are much closer to the nucleus compared to Iodine. This results in smaller size of Fluorine than Iodine making it difficult to remove an electron from the atom.

4. Why do elements in the same family generally have similar properties?

   Because they have same number of electrons in the outer shell (valence electrons) which take part in chemical reaction.

5. Indicate whether the following properties increase or decrease from left to right across the periodic table.

   a. atomic radius (excluding noble gases) **Decreases**
   b. first ionization energy **Increases**
   c. electronegativity **Increases**

6. What trend in atomic radius occurs down a group on the periodic table? What causes this trend?

   Atomic radius **increases** down the group on the periodic table. As we compare the elements down the group, the effective nuclear charge increases, but at the same time the outermost electrons are found in the shell that is farther away from the nucleus. Also the number of screening electrons increases. This results in reduced attraction between the nucleus and the outermost electrons.

7. What trend in ionization energy occurs across a period on the periodic table? What causes this trend?

   Ionization energy **increases** from left to right across the period. The atomic size becomes smaller from left to right. So it becomes harder to remove electron from the atom. Hence the energy required to do so (Ionization Energy) increases.

## Periodic Trends Answer Key: Mastering the Periodic Table's Patterns

Are you struggling to grasp the fascinating patterns hidden within the periodic table? Understanding periodic trends is crucial for success in chemistry, but memorization alone isn't enough. You need a deep understanding of why these trends exist. This comprehensive guide provides a detailed "periodic trends answer key," breaking down the key trends and offering explanations that will help you truly master this essential concept. We'll explore each trend with clear examples and insightful explanations, making this complex topic accessible and understandable. Forget rote memorization; let's unlock the secrets of the periodic table together!

# Understanding Key Periodic Trends

The periodic table isn't just a random arrangement of elements; it's a meticulously organized system reflecting the fundamental properties of atoms. Understanding periodic trends allows us to predict the behavior of elements and compounds based on their position on the table. These trends are primarily driven by two key atomic properties: effective nuclear charge and atomic radius.

## 1. Atomic Radius: Size Matters

What is it? Atomic radius refers to the size of an atom. It's the distance from the nucleus to the outermost electron.

Trend: Atomic radius generally increases down a group (column) and decreases across a period (row).

Why? Down a group, you add electron shells, increasing the atom's overall size. Across a period, the nuclear charge increases, pulling electrons closer to the nucleus, resulting in a smaller radius. Shielding effects from inner electrons also play a significant role.

## 2. Ionization Energy: The Energy of Electron Removal

What is it? Ionization energy is the energy required to remove an electron from a gaseous atom.

Trend: Ionization energy generally increases across a period and decreases down a group.

Why? Across a period, increasing nuclear charge makes it harder to remove an electron. Down a group, the increasing distance between the nucleus and the valence electrons makes it easier to remove an electron.

## 3. Electronegativity: The Tug of War

What is it? Electronegativity is a measure of an atom's ability to attract electrons in a chemical bond.

Trend: Electronegativity generally increases across a period and decreases down a group.

Why? Similar to ionization energy, the stronger nuclear charge across a period makes atoms more effective at attracting electrons. Down a group, the increased distance weakens this attractive force.

## 4. Electron Affinity: Adding an Electron

What is it? Electron affinity is the energy change when an electron is added to a neutral gaseous atom.

Trend: Electron affinity generally increases across a period (with some exceptions). The trend down a group is less predictable.

Why? The increase across a period is due to the increasing nuclear charge. However, exceptions arise due to electron shell configurations and electron-electron repulsions.

## 5. Metallic Character: Metal vs. Non-metal

What is it? Metallic character describes the properties associated with metals, such as conductivity and malleability.

Trend: Metallic character generally decreases across a period and increases down a group.

Why? Metals readily lose electrons, and this tendency is enhanced down a group due to weaker nuclear attraction. Across a period, the increasing nuclear charge makes it harder to lose electrons, reducing metallic character.

# Applying Your Knowledge: Example Problems

Let's apply what we've learned. Consider the following elements: Lithium (Li), Beryllium (Be), and Boron (B). Based on periodic trends, which element would have the highest ionization energy? The answer is Boron (B), as ionization energy generally increases across a period.

Another example: Which element, Sodium (Na) or Potassium (K), would have a larger atomic radius? Potassium (K) would have the larger atomic radius because atomic radius increases down a group.

# Conclusion: Mastering the Periodic Trends

Understanding periodic trends is fundamental to mastering chemistry. By understanding the underlying principles of effective nuclear charge, atomic radius, and electron configuration, you can predict the chemical behavior of elements and compounds with confidence. This "periodic trends answer key" has provided you with the tools and knowledge to move beyond simple memorization

and achieve a deeper understanding of this crucial aspect of chemistry.

# Frequently Asked Questions (FAQs)

1. Are there any exceptions to these periodic trends? Yes, there are some exceptions, particularly with electron affinity and some properties of transition metals, due to complex electron configurations and interactions.

2. How can I use periodic trends to predict chemical reactions? By understanding the relative electronegativities of elements, you can predict the polarity of bonds and the overall behavior of molecules.

3. What resources can I use to further my understanding? Textbooks, online resources like Khan Academy, and interactive periodic tables are excellent tools for further learning.

4. Why are these trends important in real-world applications? Understanding periodic trends is crucial in material science, designing new compounds with specific properties, and understanding chemical processes in various industries.

5. Can I use this information to predict the reactivity of elements? Yes, the trends in ionization energy, electronegativity, and metallic character directly relate to the reactivity of elements. Highly reactive elements readily lose or gain electrons.

**periodic trends answer key: Chemistry** Bruce Averill, Patricia Eldredge, 2007 Emphasises on contemporary applications and an intuitive problem-solving approach that helps students discover the exciting potential of chemical science. This book incorporates fresh applications from the three major areas of modern research: materials, environmental chemistry, and biological science.

**periodic trends answer key: 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.

**periodic trends answer key: University Physics** OpenStax, 2016-11-04 University Physics is a three-volume collection that meets the scope and sequence requirements for two- and three-semester calculus-based physics courses. Volume 1 covers mechanics, sound, oscillations, and waves. Volume 2 covers thermodynamics, electricity and magnetism, and Volume 3 covers optics and modern physics. This textbook emphasizes connections between between theory and application, making physics concepts interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. Frequent, strong examples focus on how to approach a

problem, how to work with the equations, and how to check and generalize the result. The text and images in this textbook are grayscale.

**periodic trends answer key:** E3 Chemistry Review Book - 2018 Home Edition (Answer Key Included) Effiong Eyo, 2017-10-20 With Answer Key to All Questions. Chemistry students and homeschoolers! Go beyond just passing. Enhance your understanding of chemistry and get higher marks on homework, quizzes, tests and the regents exam with E3 Chemistry Review Book 2018. With E3 Chemistry Review Book, students will get clean, clear, engaging, exciting, and easy-to-understand high school chemistry concepts with emphasis on New York State Regents Chemistry, the Physical Setting. Easy to read format to help students easily remember key and must-know chemistry materials. Several example problems with solutions to study and follow. Several practice multiple choice and short answer questions at the end of each lesson to test understanding of the materials. 12 topics of Regents question sets and 3 most recent Regents exams to practice and prep for any Regents Exam. This is the Home Edition of the book. Also available in School Edition (ISBN: 978-197836229). The Home Edition contains an answer key section. Teachers who want to recommend our Review Book to their students should recommend the Home Edition. Students and and parents whose school is not using the Review Book as instructional material, as well as homeschoolers, should buy the Home Edition. The School Edition does not have answer key in the book. A separate answer key booklet is provided to teachers with a class order of the book. Whether you are using the school or Home Edition, our E3 Chemistry Review Book makes a great supplemental instructional and test prep resource that can be used from the beginning to the end of the school year. PLEASE NOTE: Although reading contents in both the school and home editions are identical, there are slight differences in question numbers, choices and pages between the two editions. Students whose school is using the Review Book as instructional material SHOULD NOT buy the Home Edition. Also available in paperback print.

**periodic trends answer key: Chemistry 2e** Paul Flowers, Richard Langely, William R. Robinson, Klaus Hellmut Theopold, 2019-02-14 Chemistry 2e is designed to meet the scope and sequence requirements of the two-semester general chemistry course. The textbook provides an important opportunity for students to learn the core concepts of chemistry and understand how those concepts apply to their lives and the world around them. The book also includes a number of innovative features, including interactive exercises and real-world applications, designed to enhance student learning. The second edition has been revised to incorporate clearer, more current, and more dynamic explanations, while maintaining the same organization as the first edition. Substantial improvements have been made in the figures, illustrations, and example exercises that support the text narrative. Changes made in Chemistry 2e are described in the preface to help instructors transition to the second edition.

**periodic trends answer key:** *E3 Chemistry Guided Study Book - 2018 Home Edition (Answer Key Included)* Effiong Eyo, 2017-12-08 Chemistry students and Homeschoolers! Go beyond just passing. Enhance your understanding of chemistry and get higher marks on homework, quizzes, tests and the regents exam with E3 Chemistry Guided Study Book 2018. With E3 Chemistry Guided Study Book, students will get clean, clear, engaging, exciting, and easy-to-understand high school chemistry concepts with emphasis on New York State Regents Chemistry, the Physical Setting. Easy to read format to help students easily remember key and must-know chemistry materials. . Several example problems with guided step-by-step solutions to study and follow. Practice multiple choice and short answer questions along side each concept to immediately test student understanding of the concept. 12 topics of Regents question sets and 2 most recent Regents exams to practice and prep for any Regents Exam. This is the Home Edition of the book. Also available in School Edition (ISBN: 978-1979088374). The Home Edition contains answer key to all questions in the book. Teachers who want to recommend our Guided Study Book to their students should recommend the Home Edition. Students and and parents whose school is not using the Guided Study Book as instructional material, as well as homeschoolers, should also buy the Home edition. The School Edition does not have the answer key in the book. A separate answer key booklet is provided to

teachers with a class order of the book. Whether you are using the school or Home Edition, our E3 Chemistry Guided Study Book makes a great supplemental instructional and test prep resource that can be used from the beginning to the end of the school year. PLEASE NOTE: Although reading contents in both the school and home editions are identical, there are slight differences in question numbers, choices and pages between the two editions. Students whose school is using the Guided Study Book as instructional material SHOULD NOT buy the Home Edition. Also available in paperback print.

**periodic trends answer key: CCEA Chemistry A2 Student Unit Guide Unit 1: Periodic Trends and Further Organic, Physical and Inorganic Chemistry** Alyn G. McFarland, 2014-01-31 Perfect for revision, these guides explain the unit requirements, summarise the content and include specimen questions with graded answers. Each full-colour Student Unit Guide provides ideal preparation for your unit exam: - Feel confident you understand the unit: each guide comprehensively covers the unit content and includes topic summaries, knowledge check questions and a reference index - Get to grips with the exam requirements: the specific skills on which you will be tested are explored and explained - Analyse exam-style questions: graded student responses will help you focus on areas where you can improve your exam technique and performance

**periodic trends answer key: The Periodic Table of Elements Coloring Book** Teresa Bondora, 2010-07-31 A coloring book to familiarize the user with the Primary elements in the Periodic Table. The Periodic Table Coloring Book (PTCB) was received worldwide with acclaim. It is based on solid, proven concepts. By creating a foundation that is applicable to all science (Oh yes, Hydrogen, I remember coloring it, part of water, it is also used as a fuel; I wonder how I could apply this to the vehicle engine I am studying...) and creating enjoyable memories associated with the elements science becomes accepted. These students will be interested in chemistry, engineering and other technical areas and will understand why those are important because they have colored those elements and what those elements do in a non-threatening environment earlier in life.

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**periodic trends answer key:** *CK-12 Chemistry - Second Edition* CK-12 Foundation, 2011-10-14 CK-12 Foundation's Chemistry - Second Edition FlexBook covers the following chapters:Introduction to Chemistry - scientific method, history.Measurement in Chemistry - measurements, formulas.Matter and Energy - matter, energy.The Atomic Theory - atom models, atomic structure, sub-atomic particles.The Bohr Model of the Atom electromagnetic radiation, atomic spectra. The Quantum Mechanical Model of the Atom energy/standing waves, Heisenberg, Schrodinger.The Electron Configuration of Atoms Aufbau principle, electron configurations.Electron Configuration and the Periodic Table- electron configuration, position on periodic table.Chemical Periodicity atomic size, ionization energy, electron affinity.Ionic Bonds and Formulas ionization, ionic bonding, ionic compounds.Covalent Bonds and Formulas nomenclature, electronic/molecular geometries, octet rule, polar molecules.The Mole Concept formula stoichiometry.Chemical Reactions balancing equations, reaction types.Stoichiometry limiting reactant equations, yields, heat of reaction.The Behavior of Gases molecular structure/properties, combined gas law/universal gas law.Condensed

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**periodic trends answer key: Introductory Chemistry** Steve Russo, Michael E. Silver, Mike Silver, 2011 Real success in your chemistry course depends on far more than memorizing equations. Introductory Chemistry, Fourth Edition helps you develop a deeper understanding of chemical concepts as well as your problem-solving skills, with a reader-friendly style and stunning illustrations that have made this text a student favorite. The authors' conceptual approach focuses on the concepts behind chemical equations, to help you become a more proficient problem solver. Unlike other books that emphasize rote memorization of problem-solving algorithms, this text helps you master the quantitative skills and understanding you'll to gain a real understanding of chemistry.

**periodic trends answer key: The Principles of Chemistry** Dmitry Ivanovich Mendeleyev, 1901

**periodic trends answer key:** Nature's Building Blocks John Emsley, 2003 A readable, informative, fascinating entry on each one of the 100-odd chemical elements, arranged alphabetically from actinium to zirconium. Each entry comprises an explanation of where the element's name comes from, followed by Body element (the role it plays in living things), Element ofhistory (how and when it was discovered), Economic element (what it is used for), Environmental element (where it occurs, how much), Chemical element (facts, figures and narrative), and Element of surprise (an amazing, little-known fact about it). A wonderful 'dipping into' source for the familyreference shelf and for students.

**periodic trends answer key: Understand Basic Chemistry Concepts You Can** Chris McMullen, 2012-08-26 EDITIONS: This book is available in paperback in 5.5 x 8.5 (portable size), 8.5 x 11 (large size), and as an eBook. The details of the figures - including the periodic tables - are most clear in this large size and large print edition, while the 5.5 x 8.5 edition is more portable. However, the paperback editions are in black-and-white, whereas the eBooks are in color. OVERVIEW: This book focuses on fundamental chemistry concepts, such as understanding the periodic table of the elements and how chemical bonds are formed. No prior knowledge of chemistry is assumed. The mathematical component involves only basic arithmetic. The content is much more conceptual than mathematical. AUDIENCE: It is geared toward helping anyone - student or not - to understand the main ideas of chemistry. Both students and non-students may find it helpful to be able to focus on understanding the main concepts without the constant emphasis on computations that is generally found in chemistry lectures and textbooks. CONTENTS: (1) Understanding the organization of the periodic table, including trends and patterns. (2) Understanding ionic and covalent bonds and how they are formed, including the structure of valence electrons. (3) A set of rules to follow to speak the language of chemistry fluently: How to name compounds when different types of compounds follow different naming schemes. (4) Understanding chemical reactions, including how to balance them and a survey of important reactions. (5) Understanding the three phases of matter: properties of matter, amorphous and crystalline solids, ideal gases, liquids, solutions, and acids/bases. (6) Understanding atomic and nuclear structure and how it relates to chemistry. (7) VErBAl ReAcTiONS: A brief fun diversion from science for the verbal side of the brain, using symbols from chemistry's periodic table to make word puzzles. ANSWERS: Every chapter includes self-check exercises to offer practice and help the reader check his or her understanding.

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research, providing the foundation for “the ethical and spiritual itinerary that follows.” Laudato Si’ outlines: The current state of our “common home” The Gospel message as seen through creation The human causes of the ecological crisis Ecology and the common good Pope Francis’ call to action for each of us Our Sunday Visitor has included discussion questions, making it perfect for individual or group study, leading all Catholics and Christians into a deeper understanding of the importance of this teaching.

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**periodic trends answer key: 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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**periodic trends answer key: Factfulness** Hans Rosling, Anna Rosling Rönnlund, Ola Rosling, 2018-04-03 INSTANT NEW YORK TIMES BESTSELLER "One of the most important books I've ever read—an indispensable guide to thinking clearly about the world." – Bill Gates "Hans Rosling tells the story of 'the secret silent miracle of human progress' as only he can. But Factfulness does much more than that. It also explains why progress is so often secret and silent and teaches readers how to see it clearly." —Melinda Gates Factfulness by Hans Rosling, an outstanding international public health expert, is a hopeful book about the potential for human progress when we work off facts rather than our inherent biases. - Former U.S. President Barack Obama Factfulness: The stress-reducing habit of only carrying opinions for which you have strong supporting facts. When asked simple questions about global trends—what percentage of the world's population live in poverty; why the world's population is increasing; how many girls finish school—we systematically get the answers wrong. So wrong that a chimpanzee choosing answers at random will consistently outguess teachers, journalists, Nobel laureates, and investment bankers. In Factfulness, Professor of International Health and global TED phenomenon Hans Rosling, together with his two long-time collaborators, Anna and Ola, offers a radical new explanation of why this happens. They reveal the ten instincts that distort our perspective—from our tendency to divide the world into two camps (usually some version of us and them) to the way we consume media (where fear rules) to how we perceive progress (believing that most things are getting worse). Our problem is that we don't know what we don't know, and even our guesses are informed by unconscious and predictable biases. It turns out that the world, for all its imperfections, is in a much better state than we might think. That doesn't mean there aren't real concerns. But when we worry about everything all the time instead of embracing a worldview based on facts, we can lose our ability to focus on the things that threaten us most. Inspiring and revelatory, filled with lively anecdotes and moving stories, Factfulness is an urgent and essential book that will change the way you see the world and empower you to respond to the crises and opportunities of the future. --- "This book is my last battle in my life-long mission to

fight devastating ignorance...Previously I armed myself with huge data sets, eye-opening software, an energetic learning style and a Swedish bayonet for sword-swallowing. It wasn't enough. But I hope this book will be." Hans Rosling, February 2017.

**periodic trends answer key:** *Understanding Medicinal Plants* Bryan Hanson, 2013-01-11 Learn how medicinal plants work from the chemical level upward Understanding Medicinal Plants: Their Chemistry and Therapeutic Action is designed to teach the chemical concepts necessary to understand the actions of medicinal plants to people who are intimidated by chemistry. This beautifully illustrated, accessibly written guide explores the molecules of medicinal plants and the pharmacology behind their actions on the human body. The book will be valuable to non-science majors, biology majors, interested scientists of different disciplines, and practitioners and students of herbalism and complementary medicine. Understanding Medicinal Plants covers the essentials, including: understanding the symbolism of chemical structure bonding—and predicting useful properties important plant compounds isolation and purification of plant molecules drug delivery and action in the human body the chemistry of antioxidants identification of plant molecules Interest in alternative medicine and herbal products has never been higher than it is now. Understanding Medicinal Plants aims for the middle ground between technical manuals for highly trained individuals and books for the general public that may oversimplify the material. This introductory work provides you with a wealth of suggested reading materials, tables, figures, and illustrations. Three case studies illustrate specific plant drugs and their molecular constituents. This resource also provides an extensive glossary for easy reference. In Understanding Medicinal Plants, you will find a lexicon of medicinally important chemical families found in plants to help you identify and understand the role of constituents such as: alkaloids flavonoids coumarins glycosides amino acids lignans tannins and many more Understanding Medicinal Plants enriches your knowledge of the science behind herbalism and increases your savvy as a consumer of herbal products. This sourcebook will help you better understand the debates about the regulation of medicinal plants and related health care policy debates. With this book, you will be able to interpret media hype about medicinal plants with greater confidence.

**periodic trends answer key:** Atomic Design Brad Frost, 2016-12-05

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**periodic trends answer key:** Introductory Chemistry Steven S. Zumdahl, Donald J. DeCoste, 2010 Resource added for the Chemistry ?10-806-165? courses.

**periodic trends answer key: Inorganic Chemistry** Tina Overton, Jonathan Rourke, Fraser A. Armstrong, 2018 Leading the reader from the fundamental principles of inorganic chemistry, right through to cutting-edge research at the forefront of the subject, Inorganic Chemistry, Seventh Edition is the ideal course companion for the duration of a student's degree. The authors have drawn upon their extensive teaching and research experience to update this text; the seventh edition retains the much-praised clarity of style and layout from previous editions, while offering an enhanced section on 'expanding our horizons'. The latest innovative applications of green chemistry have been added, to clearly illustrate the real-world significance of the subject. This edition also sees a greater used of learning features, including substantial updates to the problem solving questions, additional self-tests and walk through explanations which enable students to check their understanding of key concepts and develop problem-solving skills. Providing comprehensive coverage of inorganic chemistry, while placing it in context, this text will enable the reader to fully

master this important subject. Online Resources: Inorganic Chemistry, Seventh Edition is accompanied by a range of online resources: For registered adopters of the text: DT Figures, marginal structures, and tables of data ready to download DT Test bank For students: DT Answers to self-tests and exercises from the book DT Tables for group theory DT Web links DT Links to interactive structures and other resources on www.chemtube3D.com

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