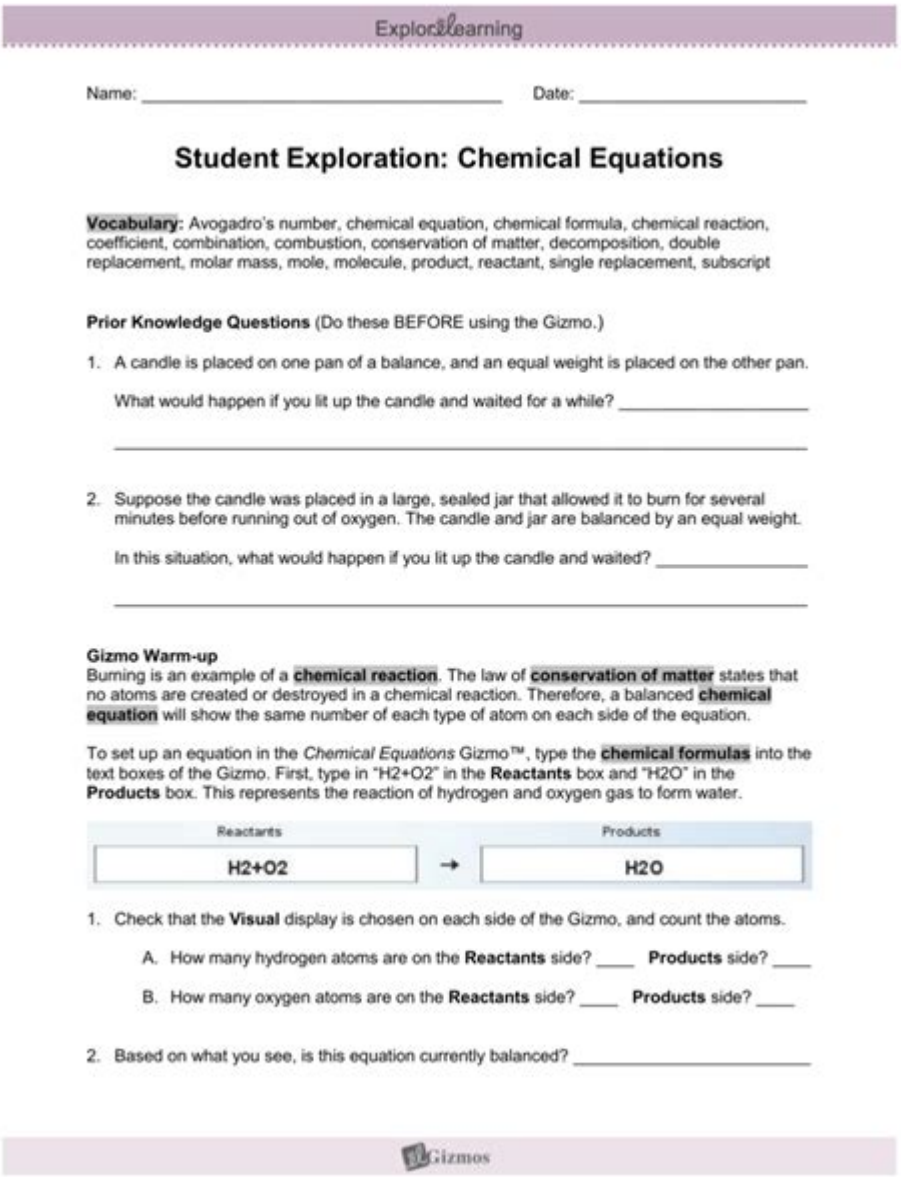
Chemical Equations Gizmo



Explore Learning

Name: _____ Date: _____

Student Exploration: Chemical Equations

Vocabulary: Avogadro's number, chemical equation, chemical formula, chemical reaction, coefficient, combination, combustion, conservation of matter, decomposition, double replacement, molar mass, mole, molecule, product, reactant, single replacement, subscript

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. A candle is placed on one pan of a balance, and an equal weight is placed on the other pan.

   What would happen if you lit up the candle and waited for a while? _____

   _____

2. Suppose the candle was placed in a large, sealed jar that allowed it to burn for several minutes before running out of oxygen. The candle and jar are balanced by an equal weight.

   In this situation, what would happen if you lit up the candle and waited? _____

   _____

Gizmo Warm-up

Burning is an example of a **chemical reaction**. The law of **conservation of matter** states that no atoms are created or destroyed in a chemical reaction. Therefore, a balanced **chemical equation** will show the same number of each type of atom on each side of the equation.

To set up an equation in the *Chemical Equations* Gizmo™, type the **chemical formulas** into the text boxes of the Gizmo. First, type in "H2+O2" in the **Reactants** box and "H2O" in the **Products** box. This represents the reaction of hydrogen and oxygen gas to form water.

Reactants		Products
H2+O2	→	H2O

1. Check that the **Visual** display is chosen on each side of the Gizmo, and count the atoms.
   A. How many hydrogen atoms are on the **Reactants** side? ____ **Products** side? ____
   B. How many oxygen atoms are on the **Reactants** side? ____ **Products** side? ____

2. Based on what you see, is this equation currently balanced? _____

Gizmos

Mastering Chemical Equations: A Deep Dive into the Chemical Equations Gizmo

Are you struggling to grasp the intricacies of chemical equations? Do you find balancing equations a daunting task? Then you've come to the right place! This comprehensive guide will explore the amazing "Chemical Equations Gizmo," a powerful online tool that can transform your understanding of chemical reactions. We'll delve into its features, functionalities, and how to effectively utilize it to master the art of writing and balancing chemical equations. Prepare to unlock a new level of understanding in chemistry!

What is the Chemical Equations Gizmo?

The Chemical Equations Gizmo is an interactive simulation designed to help students learn about chemical reactions and equation balancing. Unlike static textbooks, this dynamic tool allows for hands-on experimentation and immediate feedback. It provides a visual representation of chemical reactions, enabling students to manipulate elements and compounds, observe changes in stoichiometry, and ultimately, develop a deeper intuitive understanding of the process. This makes learning chemistry far more engaging and effective.

Key Features and Functions of the Chemical Equations Gizmo

The Chemical Equations Gizmo boasts a range of features that cater to diverse learning styles. Let's explore some of its core functionalities:

1. Interactive Equation Building:

The gizmo allows you to construct chemical equations by selecting elements and compounds from a readily available list. You can drag and drop elements to build molecules, visually representing the reactants and products involved in the reaction. This visual approach strengthens understanding and avoids the common pitfalls of abstract chemical notation.

2. Real-Time Balancing:

One of the most challenging aspects of chemistry is balancing equations. The Chemical Equations Gizmo simplifies this process by providing real-time feedback as you adjust the coefficients. It highlights imbalances, making it easier to identify where adjustments are needed and guiding you toward the correctly balanced equation. This iterative process reinforces the concepts of conservation of mass and the law of definite proportions.

3. Diverse Reaction Types:

The gizmo covers a wide range of chemical reaction types, including synthesis, decomposition, single displacement, double displacement, and combustion reactions. This breadth of coverage makes it a valuable resource for students studying various aspects of chemistry. By practicing with different reaction types, users develop a comprehensive understanding of chemical reactivity.

4. Visual and Auditory Feedback:

The gizmo isn't just about numbers; it employs visual and auditory cues to enhance the learning experience. For instance, color-coded elements and clear animations visually represent the rearrangement of atoms during a reaction. Combined with helpful audio prompts, this approach facilitates understanding for all types of learners.

5. Multiple Difficulty Levels:

The Chemical Equations Gizmo offers adjustable difficulty levels, allowing users to progress

gradually. Beginners can start with simpler equations and gradually tackle more complex reactions as their skills improve. This adaptive learning approach fosters confidence and prevents frustration, ensuring a positive learning journey.

How to Effectively Utilize the Chemical Equations Gizmo

To maximize the benefits of the Chemical Equations Gizmo, follow these tips:

Start with the basics: Begin with simpler reactions to build a strong foundation.
Experiment: Don't be afraid to try different combinations of elements and compounds. Experimentation is key to understanding.
Utilize the feedback: Pay close attention to the gizmo's feedback on balancing and stoichiometry.
Practice regularly: Consistent practice is essential for mastering chemical equation balancing.
Explore different reaction types: Once you're comfortable with the basics, move on to more complex reactions.

Conclusion

The Chemical Equations Gizmo is an invaluable tool for anyone learning about chemical equations. Its interactive nature, real-time feedback, and diverse features make learning engaging and effective. By utilizing this resource effectively, you can significantly improve your understanding of chemical reactions and develop essential problem-solving skills in chemistry. So, dive in, experiment, and watch your understanding blossom!

FAQs

1. Is the Chemical Equations Gizmo free to use? The availability and cost of the gizmo may vary depending on the platform it is accessed from. Check the specific platform (like ExploreLearning Gizmos) for pricing details.

2. What age group is the Chemical Equations Gizmo suitable for? The gizmo is adaptable to various learning levels, making it appropriate for high school and introductory college chemistry students.

3. Does the Chemical Equations Gizmo require any specific software or plugins? Generally, it requires a standard web browser with a stable internet connection. Check the specific platform for any additional requirements.

4. Can the Chemical Equations Gizmo be used for offline learning? No, the Chemical Equations Gizmo is an online interactive tool and requires an internet connection to function.

5. Are there alternative resources to the Chemical Equations Gizmo? Yes, several online resources and educational websites offer interactive simulations and tutorials on balancing chemical equations. However, the Chemical Equations Gizmo's comprehensive features and user-friendly interface make it a highly recommended option.

chemical equations gizmo: Science Units for Grades 9-12 Randy L. Bell, Joe Garofalo, 2005 Sample topics include cell division, virtual dissection, earthquake modeling, the Doppler Effect, and more!

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chemical equations gizmo: *Road and Track* , 1985

chemical equations gizmo: Principles and Applications of Hydrochemistry Erik Eriksson, 2012-12-06 The International Hydrological Decade (which ended in 1975) led to a revival of hydrological sciences to a degree which, seen in retrospect, is quite spectacular. This research programme had strong government support, no doubt due to an increased awareness of the role of water for prosperous development. Since water quality is an essential ingredient in almost all water use, there was also a considerable interest in hydrochemistry during the Decade. As many concepts in classical hydrology had to be revised during and after the Decade there was also a need for revising hydrochemistry to align it with modern hydrology. A considerable input of fresh knowledge was also made in the recent past by chemists, particularly geochemists, invaluable for understanding the processes of mineralization of natural waters. With all this in mind it seems natural to try to assemble all the present knowledge of hydrochemistry into a book and integrate it with modern hydrology as far as possible, emphasizing the dynamic features of dissolved substances in natural waters. Considering the role of water in nature for transfer of substances, this integration is essential for proper understanding of processes in all related earth sciences. The arrangement of subjects in the book is as follows. After a short introductory chapter comes a chapter on elementary chemical principles of particular use in hydrochemistry.

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sections on teaching: geologic time, space, complex systems, and field-work. Each section includes an introduction, a thematic paper, and commentaries.

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chemical equations gizmo: Parallel Computing Technologies Victor Malyshkin, 2019-08-01 This book constitutes the proceedings of the 15th International Conference on Parallel Computing Technologies, PaCT 2019, held in Almaty, Kazakhstan, in August 2019. The 24 full papers and 10 short papers presented were carefully reviewed and selected from 72 submissions. The papers are organized in topical sections on Programming Languages and Execution Environments; Methods and Tools for Parallel Solution of Large-Scale Problems; Data Processing; Cellular Automata; and Distributed Algorithms.

chemical equations gizmo: Biotechnology Fundamentals Firdos Alam Khan, 2011-09-20 The focus of Biotechnology Fundamentals is to educate readers on both classical and modern aspects of biotechnology and to expose them to a range of topics, from basic information to complex technicalities. Other books cover subjects individually, but this text offers a rare topical combination of coverage, using numerous helpful illustrations to explore the information that students and researchers need to intelligently shape their careers. Keeping pace with the rapid advancement of the field, topics covered include: How biotechnology products are produced Differences between scientific research conducted in universities and industry Which areas of biotechnology offer the

best and most challenging career opportunities Key laboratory techniques and protocols employed in the field The contents of this book are derived from discussions between teachers and undergraduate students and designed to address the concepts and methods thought useful by both sides. Starting with the fundamentals of biotechnology, coverage includes definitions, historical perspectives, timelines, and major discoveries, in addition to products, research and development, career prospects, ethical issues, and future trends. The author explains that even before it had been classified as its own field, biotechnology was already being applied in plant breeding, in vitro fertilization, alcohol fermentation, and other areas. He then delves into new developments in areas including stem cell research, cloning, biofuels, transgenic plants, genetically modified food/crops, pharmacogenomics, and nanobiotechnology. Incorporating extensive pedagogy into the content, this book provides plenty of examples, end-of-chapter problems, case studies, and lab tutorials to help reinforce understanding.

chemical equations gizmo: *The Microbiology of Anaerobic Digesters* Michael H. Gerardi, 2003-09-19 Anaerobic digestion is a biochemical degradation process that converts complex organic material, such as animal manure, into methane and other byproducts. Part of the author's Wastewater Microbiology series, Microbiology of Anareboic Digesters eschews technical jargon to deliver a practical, how-to guide for wastewater plant operators.

chemical equations gizmo: Sci-Book Aaron D. Isabelle, 2017-12-06 A “Sci-Book” or “Science Notebook” serves as an essential companion to the science curriculum supplement, STEPS to STEM. As students learn key concepts in the seven “big ideas” in this program (Electricity & Magnetism; Air & Flight; Water & Weather; Plants & Animals; Earth & Space; Matter & Motion; Light & Sound), they record their ideas, plans, and evidence. There is ample space for students to keep track of their observations and findings, as well as a section to reflect upon the use of “Science and Engineering Practices” as set forth in the Next Generation Science Standards (NGSS). Using a science notebook is reflective of the behavior of scientists. One of the pillars of the Nature of Science is that scientists must document their work to publish their research results; it is a necessary part of the scientific enterprise. This is important because STEPS to STEM is a program for young scientists who learn within a community of scientists. Helping students to think and act like scientists is a critical feature of this program. Students learn that they need to keep a written record if they are to successfully share their discoveries and curiosities with their classmates and with the teacher. Teachers should also model writing in science to help instill a sense of purpose and pride in using and maintaining a Sci-Book. Lastly, students’ documentation can serve as a valuable form of authentic assessment; teachers can utilize Sci-Books to monitor the learning process and the development of science skills.

chemical equations gizmo: *Circles* James Burke, 2009-11-24 From the bestselling author of The Knowledge Web come fifty mesmerizing journeys into the history of technology, each following a chain of consequential events that ends precisely where it began. Whether exploring electromagnetic fields, the origin of hot chocolate, or DNA fingerprinting, these essays -- which originally appeared in James Burke's popular Scientific American column -- all illustrate the serendipitous and surprisingly circular nature of change. In Room with (Half) a View, for instance, Burke muses about the partly obscured railway bridge outside his home on the Thames. Thinking of the bridge engineer, who also built the steamship that laid the first transatlantic telegraph cable, causes him to recall Samuel Morse; which, in turn, conjures up Morse's neighbor, firearms inventor Sam Colt, and his rival, Remington. One dizzying connection after another leads to Karl Marx's daughter, who attended Socialist meetings with a trombonist named Gustav Holst, who once lived in the very house that blocks Burke's view of the bridge on the Thames. Burke's essays all evolve in this organic manner, highlighting the interconnectedness of seemingly unrelated events and innovations. Romantic poetry leads to brandy distillation; tonic water connects through Leibniz to the first explorers to reach the North Pole. Witty, instructive, and endlessly entertaining, Circles expands on the trademark style that has captivated James Burke fans for years. This unique collection is sure to stimulate and delight history buffs, technophiles, and anyone else with a healthy intellectual curiosity.

chemical equations gizmo: *Bebop to the Boolean Boogie* Clive Maxfield, 2008-12-05 This entertaining and readable book provides a solid, comprehensive introduction to contemporary electronics. It's not a how-to-do electronics book, but rather an in-depth explanation of how today's integrated circuits work, how they are designed and manufactured, and how they are put together into powerful and sophisticated electronic systems. In addition to the technical details, it's packed with practical information of interest and use to engineers and support personnel in the electronics industry. It even tells how to pronounce the alphabet soup of acronyms that runs rampant in the industry. - Written in conversational, fun style that has generated a strong following for the author and sales of over 14,000 copies for the first two editions - The Third Edition is even bigger and better, with lots of new material, illustrations, and an expanded glossary - Ideal for training incoming engineers and technicians, and for people in marketing or other related fields or anyone else who needs to familiarize themselves with electronics terms and technology

chemical equations gizmo: Five Equations That Changed the World Dr. Michael Guillen, 2012-06-05 A Publishers Weekly best book of 1995! Dr. Michael Guillen, known to millions as the science editor of ABC's Good Morning America, tells the fascinating stories behind five mathematical equations. As a regular contributor to daytime's most popular morning news show and an instructor at Harvard University, Dr. Michael Guillen has earned the respect of millions as a clear and entertaining guide to the exhilarating world of science and mathematics. Now Dr. Guillen unravels the equations that have led to the inventions and events that characterize the modern world, one of which -- Albert Einstein's famous energy equation, E=mc2 -- enabled the creation of the nuclear bomb. Also revealed are the mathematical foundations for the moon landing, airplane travel, the electric generator -- and even life itself. Praised by Publishers Weekly as a wholly accessible, beautifully written exploration of the potent mathematical imagination, and named a Best Nonfiction Book of 1995, the stories behind The Five Equations That Changed the World, as told by Dr. Guillen, are not only chronicles of science, but also gripping dramas of jealousy, fame, war, and discovery.

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chemical equations gizmo: The Democratization of Artificial Intelligence Andreas Sudmann,

2019-10-31 After a long time of neglect, Artificial Intelligence is once again at the center of most of our political, economic, and socio-cultural debates. Recent advances in the field of Artifical Neural Networks have led to a renaissance of dystopian and utopian speculations on an AI-rendered future. Algorithmic technologies are deployed for identifying potential terrorists through vast surveillance networks, for producing sentencing guidelines and recidivism risk profiles in criminal justice systems, for demographic and psychographic targeting of bodies for advertising or propaganda, and more generally for automating the analysis of language, text, and images. Against this background, the aim of this book is to discuss the heterogenous conditions, implications, and effects of modern AI and Internet technologies in terms of their political dimension: What does it mean to critically investigate efforts of net politics in the age of machine learning algorithms?

chemical equations gizmo: 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.

chemical equations gizmo: Black Swan Green David Mitchell, 2006-04-11 By the New York Times bestselling author of The Bone Clocks and Cloud Atlas | Longlisted for the Man Booker Prize Selected by Time as One of the Ten Best Books of the Year | A New York Times Notable Book | Named One of the Best Books of the Year by The Washington Post Book World, The Christian Science Monitor, Rocky Mountain News, and Kirkus Reviews | A Los Angeles Times Book Prize Finalist | Winner of the ALA Alex Award | Finalist for the Costa Novel Award From award-winning writer David Mitchell comes a sinewy, meditative novel of boyhood on the cusp of adulthood and the old on the cusp of the new. Black Swan Green tracks a single year in what is, for thirteen-year-old Jason Taylor, the sleepiest village in muddiest Worcestershire in a dying Cold War England, 1982. But the thirteen chapters, each a short story in its own right, create an exquisitely observed world that is anything but sleepy. A world of Kissingeresque realpolitik enacted in boys' games on a frozen lake; of "nightcreeping" through the summer backyards of strangers; of the tabloid-fueled thrills of the Falklands War and its human toll; of the cruel, luscious Dawn Madden and her power-hungry boyfriend, Ross Wilcox; of a certain Madame Eva van Outryve de Crommelynck, an elderly bohemian emigré who is both more and less than she appears; of Jason's search to replace his dead grandfather's irreplaceable smashed watch before the crime is discovered; of first cigarettes, first kisses, first Duran Duran LPs, and first deaths; of Margaret Thatcher's recession; of Gypsies camping in the woods and the hysteria they inspire; and, even closer to home, of a slow-motion divorce in four seasons. Pointed, funny, profound, left-field, elegiac, and painted with the stuff of life, Black Swan Green is David Mitchell's subtlest and most effective achievement to date. Praise for Black Swan Green "[David Mitchell has created] one of the most endearing, smart, and funny young narrators ever to rise up from the pages of a novel. . . . The always fresh and brilliant writing will carry readers back to their own childhoods. . . . This enchanting novel makes us remember exactly what it was like."—The Boston Globe "[David Mitchell is a] prodigiously daring and imaginative young writer. . . . As in the works of Thomas Pynchon and Herman Melville, one feels the roof of the narrative lifted off and oneself in thrall."—Time

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chemical equations gizmo: *A People's Curriculum for the Earth* Bill Bigelow, Tim Swinehart, 2014-11-14 A People's Curriculum for the Earth is a collection of articles, role plays, simulations,

stories, poems, and graphics to help breathe life into teaching about the environmental crisis. The book features some of the best articles from Rethinking Schools magazine alongside classroom-friendly readings on climate change, energy, water, food, and pollution—as well as on people who are working to make things better. A People's Curriculum for the Earth has the breadth and depth ofRethinking Globalization: Teaching for Justice in an Unjust World, one of the most popular books we've published. At a time when it's becoming increasingly obvious that life on Earth is at risk, here is a resource that helps students see what's wrong and imagine solutions. Praise for A People's Curriculum for the Earth To really confront the climate crisis, we need to think differently, build differently, and teach differently. A People's Curriculum for the Earth is an educator's toolkit for our times. — Naomi Klein, author of The Shock Doctrine and This Changes Everything: Capitalism vs. the Climate This volume is a marvelous example of justice in ALL facets of our lives—civil, social, educational, economic, and yes, environmental. Bravo to the Rethinking Schools team for pulling this collection together and making us think more holistically about what we mean when we talk about justice. — Gloria Ladson-Billings, Kellner Family Chair in Urban Education, University of Wisconsin-Madison Bigelow and Swinehart have created a critical resource for today's young people about humanity's responsibility for the Earth. This book can engender the shift in perspective so needed at this point on the clock of the universe. — Gregory Smith, Professor of Education, Lewis & Clark College, co-author with David Sobel of Place- and Community-based Education in Schools

chemical equations gizmo: Dirty Electricity Samuel Milham MD MPH, 2012-12-06 When Thomas Edison began wiring New York City with a direct current electricity distribution system in the 1880s, he gave humankind the magic of electric light, heat, and power; in the process, though, he inadvertently opened a Pandoras Box of unimaginable illness and death. Dirty Electricity tells the story of Dr. Samuel Milham, the scientist who first alerted the world about the frightening link between occupational exposure to electromagnetic fields and human disease. Milham takes readers through his early years and education, following the twisting path that led to his discovery that most of the twentieth century diseases of civilization, including cancer, cardiovascular disease, diabetes, and suicide, are caused by electromagnetic field exposure. In the second edition, he explains how electrical exposure does its damage, and how electricity is causing our current epidemics of asthma, diabetes and obesity. Dr. Milham warns that because of the recent proliferation of radio frequency radiation from cell phones and towers, terrestrial antennas, Wi-Fi and Wi-max systems, broadband internet over power lines, and personal electronic equipment, we may be facing a looming epidemic of morbidity and mortality. In Dirty Electricity, he reveals the steps we must take, personally and as a society, to coexist with this marvelous but dangerous technology.

chemical equations gizmo: Wandering Significance Mark Wilson, 2008 Mark Wilson presents a highly original and broad-ranging investigation of the way we get to grips with the world conceptually, and the way that philosophical problems commonly arise from this. He combines traditional philosophical concerns about human conceptual thinking with illuminating data derived from a large variety of fields including physics and applied mathematics, cognitive psychology, and linguistics. Wandering Significance offers abundant new insights and perspectives for philosophers of language, mind, and science, and will also reward the interest of psychologists, linguists, and anyone curious about the mysterious ways in which useful language obtains its practical applicability.--Publisher's description.

chemical equations gizmo: *Nelson Science Perspectives 10* Christy C. Hayhoe, Doug D. Hayhoe, Christine Adam-Carr, Katharine K. Hayhoe, Milan Sanader, Martin Gabber, 2009-06-16 Best Value Bundle: Each Student Text purchase includes online access to the Student eBook EXTRA. Nelson Science Perspectives 10 offers a variety of features that engage, motivate, and stimulate student curiosity while providing appropriate rigour suitable for Grade 10 academic students. Student interest and attention will be captured through a powerful blend of engaging content, impactful visuals, and the dynamic use of cutting-edge technology. Instructors will be able to create a dynamic learning environment through the use of the program's comprehensive array of

multimedia tools for teaching and learning. This visually engaging student resource includes: * Newly written content developed for students in an age-appropriate and accessible language * Real-world connections to science, technology, society, and the environment (STSE) that make the content relevant to students * 100% match to the Ontario 2009 revised science curriculum * A variety of short hands-on activities and more in-depth lab investigations * Skills Handbook that provides support for the development of skills and processes of science, safety, and communication of science terms *Hardcover

chemical equations gizmo: Essentials of Metaheuristics (Second Edition) Sean Luke, 2012-12-20 Interested in the Genetic Algorithm? Simulated Annealing? Ant Colony Optimization? Essentials of Metaheuristics covers these and other metaheuristics algorithms, and is intended for undergraduate students, programmers, and non-experts. The book covers a wide range of algorithms, representations, selection and modification operators, and related topics, and includes 71 figures and 135 algorithms great and small. Algorithms include: Gradient Ascent techniques, Hill-Climbing variants, Simulated Annealing, Tabu Search variants, Iterated Local Search, Evolution Strategies, the Genetic Algorithm, the Steady-State Genetic Algorithm, Differential Evolution, Particle Swarm Optimization, Genetic Programming variants, One- and Two-Population Competitive Coevolution, N-Population Cooperative Coevolution, Implicit Fitness Sharing, Deterministic Crowding, NSGA-II, SPEA2, GRASP, Ant Colony Optimization variants, Guided Local Search, LEM, PBIL, UMDA, cGA, BOA, SAMUEL, ZCS, XCS, and XCSF.

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and enabling its crew to remain underwater indefinitely. It had a steam engine for propulsion, a chemical furnace to heat the engine as it generated oxygen for the crew, external lights, portholes, and pincers for harvesting coral and other objects from the deep. It was the first true submarine; the world would not see its equal for another twenty years. And we watch as Monturiol's revolutionary friends, making use of his utopian ideals and notions of urban planning (a term he originated), forge a new culture for Catalonia and its capital city and create the radical design that resulted in an entirely new Barcelona.

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but to explore and comment on the content, agendas, and possibilities. Indeed, proposes Stephen Wilson, the role of the artist is not only to interpret and to spread scientific knowledge, but to be an active partner in determining the direction of research. Years ago, C. P. Snow wrote about the two cultures of science and the humanities; these developments may finally help to change the outlook of those who view science and technology as separate from the general culture. In this rich compendium, Wilson offers the first comprehensive survey of international artists who incorporate concepts and research from mathematics, the physical sciences, biology, kinetics, telecommunications, and experimental digital systems such as artificial intelligence and ubiquitous computing. In addition to visual documentation and statements by the artists, Wilson examines relevant art-theoretical writings and explores emerging scientific and technological research likely to be culturally significant in the future. He also provides lists of resources including organizations, publications, conferences, museums, research centers, and Web sites.

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