

NATIONAL SCIENCE EDUCATION STANDARDS

Dirt Alert—The Chemistry of Cleaning

GRADE	CATEGORY	SUB-CATEGORY	STANDARD
5-8	Earth and Space Science	Structure Of The Earth System	Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.
5-8	Life Science	Structure And Function In Living Systems	Disease is a breakdown in structures or functions of an organism. Some diseases are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.
5-8	Physical Science	Properties And Changes Of Properties In Matter	A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.
5-8	Physical Science	Properties And Changes Of Properties In Matter	Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if they react in similar ways; metals is an example of such a group.
5-8	Physical Science	Transfer Of Energy	Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.
5-8	Science and Technology	Abilities In Technical Design	Communicate the process of technological design.
5-8	Science and Technology	Abilities In Technical Design	Design a solution or product.
5-8	Science and Technology	Abilities In Technical Design	Evaluate completed technological designs or products.
5-8	Science and Technology	Abilities In Technical Design	Identify appropriate problems for technological design.
5-8	Science and Technology	Abilities In Technical Design	Implement a proposed design.

5-8	Science and Technology	Understanding About Science And Technology	Science and technology are reciprocal. Science helps drive technology.
5-8	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Design and conduct a scientific investigation.
5-8	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Develop descriptions, explanations, predictions, and models using evidence.
5-8	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Recognize and analyze alternative explanations and predictions.
5-8	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Think critically and logically to make the relationships between evidence and explanations.
5-8	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Use mathematics in all aspects of scientific inquiry.
9-12	History and Nature of Science	Historical Perspectives	In history, diverse cultures have contributed scientific knowledge and technological inventions.
9-12	History and Nature of Science	Science as a Human Endeavor	Individuals and teams have contributed and will continue to contribute to the scientific enterprise.
9-12	History and Nature of Science	Science as a Human Endeavor	Scientists are influenced by societal, cultural, and personal beliefs and ways of viewing the world.
9-12	Life Science	The Interdependence of Organisms	Organisms both cooperate and compete in ecosystems.
9-12	Physical Science	Chemical Reactions	Catalysts, such as metal surfaces, accelerate chemical reactions. Chemical reactions in living systems are catalyzed by protein molecules called enzymes.
9-12	Physical Science	Chemical Reactions	Chemical reactions can take place in time periods ranging from the few femtoseconds (10^{-15} seconds) required for an atom to move a fraction of a chemical bond distance to geologic time scales of billions of years.
9-12	Physical Science	Chemical Reactions	Chemical reactions occur all around us, for example in health care, cooking, cosmetics, and automobiles.
9-12	Physical Science	Conservation of Energy and the Increase In Disorder	Everything tends to become less organized and less orderly over time. Thus, in all energy transfers, the overall effect is that the energy is spread out uniformly.
9-12	Physical Science	Motions and Forces	The electric force is a universal force that exists between any two charged objects.

9-12	Physical Science	Structure and Properties of Matter	Carbon atoms can bond to one another in chains, rings, and branching networks to form a variety of structures, including synthetic polymers, oils, and the large molecules essential to life.
9-12	Physical Science	Structure and Properties of Matter	The physical properties of compounds reflect the nature of the interactions among its molecules.
9-12	Science and Technology	Abilities of Technological Design	Communicate the Problem, Process, and Solution
9-12	Science and Technology	Abilities of Technological Design	Evaluate the solution and its consequences.
9-12	Science and Technology	Abilities of Technological Design	Identify a problem or design an opportunity.
9-12	Science and Technology	Abilities of Technological Design	Implement a proposed solution.
9-12	Science and Technology	Understandings About Science and Technology	Science often advances with introduction of new technologies.
9-12	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Design and conduct scientific investigations.
9-12	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Formulate and revise scientific explanations and models using logic and evidence.
9-12	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Recognize and analyze alternative explanations and models.
9-12	Science as Inquiry	Abilities Necessary To Do Scientific Inquiry	Use technology and mathematics to improve investigations and communications.
9-12	Science in Personal and Social Perspectives	Personal and Community Health	Personal choice concerning fitness and health involves multiple factors.