

Standards and Indicators: Chemistry

Quarter	Standard	Indicator
1	Matter	SC12.2.1.f Recognize the charges and relative locations of subatomic particles (neutrons, protons, electrons)
		SC12.2.1.g Describe properties of atoms, ions, isotopes
2	Matter	SC12.2.1.h Describe the organization of the periodic table of elements with respect to patterns of physical and chemical properties
3	Matter	SC12.2.1.b Describe the energy transfer associated with phase changes between solids, liquids, and gases
		SC12.2.1.c Describe the three normal states of matter (solid, liquid, gas) in terms of energy, particle arrangement, particle motion, and strength of bond between molecules
3	Energy	SC12.2.3.d Distinguish between temperature (a measure of the average kinetic energy of atomic or molecular motion) and heat (the quantity of thermal energy that transfers due to a change in temperature)
4	Matter	SC12.2.1.a Recognize bonding occurs when outer electrons are transferred (ionic) or shared (covalent)
		SC12.2.1.d Recognize a large number of chemical reactions involve the transfer of either electrons (oxidation/reduction) of hydrogen ions (acid/base) between reacting ions, molecules, or atoms
		SC12.2.1.e Identify factors affecting rates of chemical reactions (temperature, particle size, surface area)
4	Energy	SC12.2.3.h Recognize that nuclear reactions (fission, fusion, and radioactive decay) convert a fraction of the mass of interacting particles into energy, and this amount of energy is much greater than the energy in chemical interactions
		SC12.2.3.k Identify endothermic and exothermic reactions
4	Earth and Space	SC12.4.1.a Describe the formation of the universe using the Big Bang Theory
		SC12.4.1.b Recognize that stars, like the Sun, transform matter into energy by nuclear reactions which leads to the formation of other elements
		SC12.4.1.c Describe stellar evolution
1, 2, 3, & 4	Inquiry	SC12.1.1.a Formulate a testable hypothesis supported by prior knowledge to guide an investigation
		SC12.1.1.b Design and conduct logical and sequential scientific investigations with repeated trials and apply findings to new investigations
		SC12.1.1.c Identify and manage variables and constraints
		SC12.1.1.d Select and use lab equipment and technology appropriately and accurately
		SC12.1.1.e Use tools and technology to make detailed qualitative and quantitative observations
		SC12.1.1.f Represent and review collected data in a systematic, accurate, and objective manner
		SC12.1.1.g Analyze and interpret data, synthesize ideas, formulate and evaluate models, and clarify concepts and explanations
		SC12.1.1.h Use results to verify or refute a hypothesis
		SC12.1.1.i Propose and/or evaluate possible revisions and alternate explanations
		SC12.1.1.j Share information, procedures, results, conclusions, and defend findings to a scientific community (peers, science fair audience, policy makers)

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		SC12.1.1.k Evaluate scientific investigations and offer revisions and new ideas as appropriate
		SC12.1.1.l Use appropriate mathematics in all aspects of scientific inquiry
1, 2, 3, & 4	Nature of Science	SC12.1.2.a Recognize that scientific explanations must be open to questions, possible modifications, and must be based upon historical and current scientific knowledge
		SC12.1.2.b Describe how society influences the work of scientists and how science, technology, and current scientific discoveries influence and change society
		SC12.1.2.c Recognize that the work of science results in incremental advances, almost always building on prior knowledge, in our understanding of the world
		SC12.1.2.d Research and describe the difficulties experienced by scientific innovators who had to overcome commonly held beliefs of their times to reach conclusions that we now take for granted