



11th & 12th Grade Chemistry

In high school, the Iowa Science standards blend core science ideas with scientific and engineering practices and crosscutting concepts to support students in developing useable knowledge to explain ideas across all the science disciplines: life, earth, and physical. These standards include the most fundamental scientific concepts but are intended to leave room for expanded study in upper-level high school courses.

High school students will be expected to use data and evidence as the foundation for developing claims. At the high school level students are expected to engage with major global issues at the interface of science, technology, society and the environment, and to use the analytical and strategic thinking that prior training and increased maturity make possible. They will need to be able to examine, review, and evaluate their own knowledge and ideas and critique those of others.

Over the course of their high school studies, students will become increasingly proficient at posing questions that request relevant empirical evidence; that seek to refine a model, an explanation, or an engineering problem; or that challenge the premise of an argument or the suitability of a design.

Students examine the fundamental principles of chemistry by describing and distinguishing between the properties of matter and how it reacts. The Normandy Schools Collaborative is preparing your child for successful completion of Chemistry through in-depth qualitative and quantitative analysis of chemical reactions. Students will explore various labs to promote problem solving and critical thinking skills.

- Evaluate trends on the periodic table.
- Illustrate the release and absorption of energy (during chemical reactions) through various models
- Predict the properties of elements based on patterns of electrons in the outermost energy level.
- Employ my knowledge of gas, pressure and volume laws in laboratory experiments.
- Utilize critical thinking skills to plan and conduct an experiment using proper laboratory technique to produce qualitative and quantitative data.
- Support a claim by applying mathematical representations of chemical reactions.

Examples of Your Child's Work at School:

Your child will have experience such as:

- Represent and explain phenomena with multiple types of models—for example, represent molecules with 3-D models or with bond diagrams.
- Recognize that different patterns may be observed at each of the scales at which a system is studied.
- Predict and describe system behavior using models of the concept of conservation of energy.
- Plan experimental or field-research procedures, identifying relevant independent and dependent variables, recognizing that it is not always possible to control variables and that other methods can be used in such cases.
- Ask probing questions that seek to identify the premises of an argument, request further elaboration, refine a research question or engineering problem, or challenge the interpretation of a data set—for example: How do you know? What evidence supports that argument?
- Engage in a critical reading of primary scientific literature (adapted for classroom use) or of media reports of science in order to communicate understanding, ask questions, and discuss the validity and reliability of data, hypotheses, and conclusions using appropriate scientific vocabulary, tables, diagrams, graphs and mathematical expressions. (Earth and Space)

How to Help Your Child at Home:

- Encourage participation in science summer camps and post-secondary options.
- If your child expresses an interest in a specific science area, encourage them to talk to their teachers and counselors about internships, college and career opportunities available to them during high school.
- Encourage participation in their school's science organizations and STEM- related competitions.
- Share and critically discuss current science events, articles, and new reports.

21st Century Skills Learned by the End of 12th Grade

- Ability to plan, organize and prioritize work
- Ability to communicate verbally with people inside and outside an organization
- Ability to obtain and process information
- Ability to analyze quantitative and qualitative data
- Ability to manipulate scientific equipment to design an experiment
- Proficiency with computer software programs
- Ability to summarize observations and data in a scientific report
- Ability to collaborate with peers
- Ability to produce a claim and justify it with researched based evidence