

# Overview of Year

## 9-12 Grade Chemistry Curriculum

Your curriculum overview may have more than 6 units. Please adjust the template accordingly.

SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE
Unit 1 Movie Special Effects 9/8 - 10/16	Unit 2 Fun With the Periodic Table 10/16 - 12/4		Unit 3 Artist as Chemist 12/4 - 1/15		Unit 6 Cool Chemistry Show 2/1 - 3/11		Unit 4 Chemical Dominoes 3/11 - 4/26		Unit 5 Ideal Toy 4/26 - 5/27

Unit 1	Understanding	Essential Question
	<ul style="list-style-type: none"> <li>Chemistry concepts are used for special effects in movies.</li> <li>Elements and compounds undergo changes of state and re-arrangements of atoms that accompany changes in energy. Their behaviors correspond to the nature of each element involved, the polarities, the arrangement of atoms in compounds and molecules, and the amounts of energy added to or removed from the system.</li> </ul>	<ul style="list-style-type: none"> <li>How does chemistry relate to moviemaking?</li> <li>How can you predict the behavior of elements, compounds and molecules in order to use them in special effects?</li> </ul>

### Performance Task:

Your challenge is to create a storyline and produce special effects based on the chemistry you have learned in your Active Chemistry class. You will need to demonstrate the special effects you created. Your special effects will be evaluated on their quality, entertainment, and the knowledge of chemistry you exhibited in putting them together.

- Develop a script for a simple scene in a movie.
- Choose some special effects to include as part of your scene.
- Write a procedure on how your special effect is done.
- Demonstrate the special effect to the "producer."
- Write an explanation of how the special effect works, including the chemistry behind the demonstration.

Unit 2	Understanding	Essential Question
	<ul style="list-style-type: none"> <li>The model of the atom is the result of experiments, observations and deductive reasoning.</li> <li>The nuclear forces holding the nucleus together are many times larger than the electrostatic forces holding the atom together.</li> <li>A chemical reaction is a process where one or more substances are changed into new</li> </ul>	<ul style="list-style-type: none"> <li>What is the purpose of models? How do they evolve?</li> <li>How does the structure of atoms affect their function and properties?</li> <li>How can you create an organizational chart to assist in understanding?</li> </ul>

	<p>substances by the exchange and sharing of electrons.</p> <ul style="list-style-type: none"> <li>• Nuclear reactions are due to changes in the nucleus and may have many times the energy of chemical reactions.</li> <li>• When elements are listed by their atomic numbers, properties of the elements repeat over and over again.</li> <li>• There are only approximately 100 elements in the world and all materials are made of these elements or a combination of them.</li> </ul>	<ul style="list-style-type: none"> <li>• How do you investigate things you cannot see?</li> </ul>
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**Performance Task:**

Your challenge in this chapter is to develop a game related to Mendeleev's periodic table of the elements.

How the game is played—on a table, with cards, on a computer—is up to you. You might emphasize some aspects of the periodic table over others, such as why the elements are grouped the way they are or how the electrons of the elements are configured. You may choose to focus on some types of information related to the table, like the discovery of atomic structure, how the elements combine to form compounds, or why some are radioactive. Keep in mind the criteria you and your teacher establish.

<b>Unit 3</b>	<b>Understanding</b>	<b>Essential Question</b>
	<ul style="list-style-type: none"> <li>• Chemistry enhances the quality of life.</li> <li>• Chemistry is found in art.</li> <li>• The structure of matter determines its chemical and physical properties.</li> <li>• Behavior of matter is predictable.</li> </ul>	<ul style="list-style-type: none"> <li>• What makes something art?</li> <li>• What determines properties of matter?</li> <li>• How can we use the predictable nature of matter to produce art works?</li> </ul>

**Performance Task:**

Art is the result of the human need for self-expression. It tells stories of social injustice, different eras, nationalities, and expresses individuals' feelings from sorrow to joy. Your challenge is to create a work of art that represents you and your culture using appropriate artistic techniques. But before you get anxious, rest assured that you don't need to be "artistically talented" to do well on this challenge. Hard work and creativity will count more than natural ability.

Also, there are many ways to express yourself in art. You will be introduced to topics and techniques that you might never have dreamed you had a talent for. So relax and enjoy your voyage into the world of art.

In addition to the artwork, you will also need to create an informative museum display that includes the following:

- a demonstration of the techniques involved
- your original work
- a museum placard or pamphlet explaining the chemistry involved

<b>Unit 6</b>	<b>Understanding</b>	<b>Essential Question</b>
	<ul style="list-style-type: none"> <li>• There are two basic types of changes that matter can undergo:</li> </ul>	<ul style="list-style-type: none"> <li>• How can changes in matter be demonstrated in an exciting way?</li> </ul>

	<ul style="list-style-type: none"> <li>• chemical and physical.</li> <li>• When chemical change occurs, new substances are produced.</li> <li>• Pure substances are assigned chemical names with specific chemical formulas.</li> <li>• Chemical change can be represented using word equations and chemical equations.</li> <li>• Heat energy is either absorbed or released during chemical change.</li> <li>• The rate of chemical reactions can vary.</li> <li>• Aqueous solutions can be classified as acids or bases.</li> <li>• Chemical change occurs when atoms or molecules collide with each other.</li> <li>• During chemical change, electrons are transferred from one substance to another.</li> </ul>	<ul style="list-style-type: none"> <li>• How does matter change?</li> <li>• How can chemical change be expressed in writing?</li> <li>• How can chemical change be classified?</li> <li>• Why does chemical change occur?</li> </ul>
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**Performance Task:**

You and your classmates are being challenged to present an entertaining and informative chemistry science show to fourth- and fifth-grade students.

- The content of the show should meet the needs and interest of your audience. Keep in mind that you will need to tailor your shows to address the specific needs of both the fourth and fifth-grade teachers' requests. Your class may choose to add other presentations to enhance the show.
- All presentations must include a demonstration and an audience-appropriate explanation of the chemistry concepts involved.
- You must provide the teachers with a written summary including directions for your chemistry show with explanations of the chemistry. Although you are giving a presentation to elementary students, your understanding of your chosen demonstrations should be appropriate for high-school students.
- As always, safety is a top priority. You and your classmates will wear safety gear, including safety goggles, appropriate to the presentation being conducted. Presentations including flammable or explosive reactions are not appropriate for the elementary audience and may not be included in the show.

The class as a whole is responsible for putting on this *Cool Chemistry Show*. You will need to coordinate your selection of presentations to provide a show that addresses a variety of chemistry concepts in an entertaining and informative manner.

<b>Unit 4</b>	<b>Understanding</b>	<b>Essential Question</b>
	<ul style="list-style-type: none"> <li>• Design processes are open-ended and involve principles as well as practical experience.</li> <li>• Why change happens is controlled by various factors that compete with each other.</li> <li>• Structure informs properties of materials.</li> </ul>	<ul style="list-style-type: none"> <li>• How do you design a robust and repeatable process that makes something?</li> <li>• How do you control the direction a change will take?</li> <li>• How can you take advantage of knowledge of a material's properties to make the material do something?</li> </ul>
<b>Performance Task:</b>		

You have been asked to develop a Chemical Dominoes toy that meets all the requirements set by the company. The sequence must run successfully if set up properly. This will require testing to make sure the process works reliably. You will demonstrate your final product to an audience of executives at the toy company. You will be required to present a prototype of your product and all the accompanying materials. During your demonstration, you will briefly explain the chemistry behind each step of the sequence. You will also provide a detailed written explanation of how the chemistry behind your Chemical Dominoes works.

If the company decides to produce your product, they will want to patent it. To make this possible, you must keep an extremely complete notebook, carefully recording everything you try in developing this product and the results of each experiment (for every component, not just the whole product all together). This will allow the company to show the lawyers the extent of your investigation into the effects you studied, and document the failures as well as the successes that went into your invention. Pay particular attention to recording each step you go through in setting up the completed sequence, as well as any troubleshooting you do to make everything work together in a sequence (including any problems that must be solved at the last minute).

Unit 5	Understanding	Essential Question
	<ul style="list-style-type: none"> <li>• Chemical principles are involved in many toys.</li> <li>• The nature of matter determines its use.</li> <li>• The behavior of gases is predictable.</li> <li>• Energy can be transferred in many ways; energy is transformed in chemical reactions.</li> </ul>	<ul style="list-style-type: none"> <li>• How are chemical principles used by the toy industry?</li> <li>• How do physical and chemical properties of matter relate to its use?</li> <li>• How do gases behave?</li> <li>• How is energy released from matter?</li> <li>• How can energy be harnessed to do useful work?</li> </ul>
<p><b>Performance Task:</b>            Your challenge is to create a toy that uses various chemical and/or gas principles. The toy should be appealing to a certain age group of your choice. You will need to prepare a presentation for the board of the toy company. Your presentation should include:            A written proposal, either a detailed drawing or a mock prototype of the toy, any potential hazards or waste-disposal issues, and a cost analysis of the item for manufacturing. Your presentation will be evaluated on the quality of your visual aids or your prototype, the quality of your presentation, the explanation of the chemistry involved, and the quality of your written proposal.            You will need to complete the following tasks:</p> <ul style="list-style-type: none"> <li>• Create a toy targeted for a specific age group.</li> <li>• Prepare a written proposal about your toy to submit to the board.</li> <li>• Prepare a three-minute presentation for the board to promote your toy.</li> </ul>		