

Fireworks

Anticipation Guides

Anticipation guides help engage students by activating prior knowledge and stimulating student interest before reading. If class time permits, discuss students' responses to each statement before reading each article. As they read, students should look for evidence supporting or refuting their initial responses.

Directions: *Before reading*, in the first column, write "A" or "D" indicating your agreement or disagreement with each statement. As you read, compare your opinions with information from the article. In the space under each statement, cite information from the article that supports or refutes your original ideas.

Me	Text	Statement
		1. The colors of fireworks are produced by metals.
		2. Gunpowder is used to explode fireworks.
		3. During the explosion of fireworks, gases are moving faster than the speed of sound, so a sonic boom is produced.
		4. The color produced by incandescence can be controlled by the temperature.
		5. Colored light can be produced when electrons change energy levels inside atoms.
		6. Firework explosions can be designed to look like flowers or trees in the sky.

		7. Fireworks that can be legally purchased in most states contain less than 10 mg of gunpowder.
		8. The highest temperatures produced by firecrackers are only about 500 °C.
		9. The United States is the world's leading producer of fireworks.
		10. Chemists who design fireworks are experts on many kinds of explosions.
		11. Pyrotechnic chemists are working to make fireworks safer for both people and the environment.
		12. This article may change my views on fireworks.

Directions: As you read, complete the chart below describing how fireworks work, and what pyrotechnic chemists do.

		Chemistry	Safety Issues
Explosion	Step 1		
	Step 2		

Color	Luminescence		
	Incandescence		
Pyrotechnic Chemists	Products made		
	Safety concerns		
	Advice		

Find references to the various chemical named in the article. Write their formulas, names and uses below.

Formulas	Names	Uses

Write a “Tweet” (140 characters) of the most important chemical idea that you learned from reading the article.

Discussion:

1. There are three types of fireworks – aerial displays, sparklers and firecrackers. Explain these three types of fireworks.
2. Regardless of whether the pyrotechnics are used in the air or on the ground, they require the same four basic kinds of chemical substances – an oxidizer, a fuel, a colorant and a binder. Explain these four basic kinds of chemical substances.
3. Find 3 interesting facts or amazing stories that could have been included in the article. Listed below are some websites that you can look at for more information.
 - a. How Stuff Works provides information on fireworks at <http://www.howstuffworks.com/fireworks.htm>.
 - b. The trade association for the fireworks industry is the American Pyrotechnics Association. Their website is <http://www.americanpyro.com/index.html>.
 - c. The see an interactive website on the structure of fireworks, see http://www.pbs.org/wgbh/nova/fireworks/anat_flash.html.
 - d. A nice explanation of the chemistry of fireworks comes from Bassam Shakhashiri's SciFun at the University of Wisconsin, Madison at <http://scifun.chem.wisc.edu/chemweek/fireworks/fireworks.htm>.
 - e. Part of the Chemical & Engineering News series call "What's That Stuff?" is this article on fireworks: <http://pubs.acs.org/cen/whatstuff/stuff/7927sci3.html>.
 - f. The NOVA website for fireworks: http://www.pbs.org/wgbh/nova/teachers/overviews/2903_firework.html.