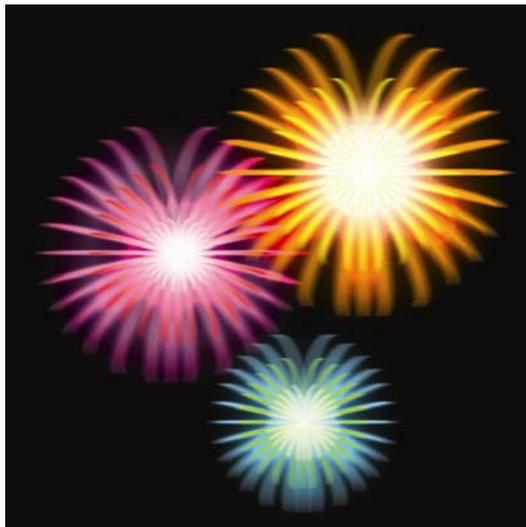


The Chemistry of Fireworks



Introduction

Kaboom! Oooh! Aaahh! The golden sparkles explode and float down the darkened sky, thrilling everyone watching below. Every Fourth of July, millions of Americans go to local parks to watch exciting fireworks presentations. Fireworks have been a familiar part of celebrations for centuries. For most of that time, the designing of fireworks was a craft. Only recently have people begun to try and understand the science involved in creating the spectacular fireworks displays we all enjoy. What are the component parts of fireworks? What chemical compounds cause fireworks to explode? What chemical compounds are responsible for the colors of fireworks? In this WebQuest, you will explore the chemistry of fireworks and answer some of these questions.

Task

In this WebQuest, you will discover the component parts of fireworks and identify the chemical compounds that are responsible for the brilliant colors that light up the sky as fireworks explode. You will explore the history of fireworks and find out when fireworks were invented. You will learn about firework design and how fireworks are built. In addition, you will find out what chemical compounds are responsible for the colors seen in fireworks. Finally, you will create your own fireworks display to present to your class.

Process

Read through the following set of questions before you begin your Internet research. As you explore each site, look for answers to the questions.

Questions about the *Chemistry of Fireworks*:

1. What exactly is a firework?
2. Where and when were the first fireworks invented?
3. Who were the first Europeans to master fireworks?
4. What type of chemical reaction occurs in fireworks?
5. What are the components of black powder?
6. What three processes cause fireworks to emit light?
7. What types of elements are responsible for the colors of fireworks?
8. What is responsible for the whistling sound that often accompanies fireworks?
9. What are the component parts of modern fireworks? What does each part do?
10. Create a table that lists the metals, often used as salts, that are used as coloring agents to create the following colors of fireworks: blue, yellow, orange, red, green, purple, white, and silver (or electric white). Include the element name and symbol.

After completing your research, use the table that you created to design your very own fireworks display. Be sure to indicate what your fireworks display is celebrating. Your display should have an opening set of fireworks, a middle set, and a grand finale. Your presentation should be done using presentation software. Use a black background to represent the night sky. Underneath each firework in your display, indicate what chemicals you used to create the color. Be sure to use different patterns to keep your audience's attention.

Resources

Use the Web sites given here to find the information that will enable you to answer questions about the chemistry of fireworks. Keep in mind that not all Web sites are written specifically for students. Some of what you read might be challenging. Look for information that will be useful in completing this WebQuest.

Fireworks

<http://pubs.acs.org/cen/whatstuff/stuff/7927sci3.html>

Lights and Colours

<http://cc.oulu.fi/~kempmp/colours.html>

How Fireworks Work

<http://www.howstuffworks.com/fireworks.htm>

NOVA Online: Kaboom!

<http://www.pbs.org/wgbh/nova/kaboom/anatomy.html>

The Chemistry of Fireworks

<http://library.thinkquest.org/15384/chem/>

Chemistry of Fireworks Colors

<http://chemistry.about.com/od/fireworkspyrotechnics/a/fireworkcolors.htm>

Chemical of the Week Fireworks!

<http://scifun.chem.wisc.edu/CHEMWEEK/fireworks/fireworks.htm>

Evaluation

Read this rubric to determine how you will be scored in this WebQuest.

Criteria					Points
	1	2	3	4	
Task	The task was not completed.	It appears that some effort was made to complete the task, but major ideas are missing.	The task was completed as assigned, but lacked detail.	The task was completed with great attention to detail and thorough documentation.	
Process	The process was not followed.	The process was followed, but some of the questions were not addressed.	The process was followed thoroughly; some ideas need additional supporting information.	It is clear that much effort went into the project. The ideas show a high degree of originality and imagination.	
Presentation	Presentation was sloppy and not well prepared.	The presentation included key ideas but lacked general cohesiveness.	The presentation was well organized with only minor errors.	Presentation is well organized, ideas are clearly stated, and visual aids are well utilized.	

Conclusion

In the process of completing this WebQuest, you've become informed about the chemistry behind fireworks, the chemical compounds that are responsible for the brilliant colors seen in fireworks, and the component parts of modern fireworks. You have also learned about the history of fireworks. You have developed research skills as you explored the Web sites given and identified the relevant information to answer the set of questions above. Were you surprised to discover how complex modern fireworks are? Can you see why fireworks can be dangerous for those who don't understand how they work?