

Close Reading and Text Dependent Questions in Science The Surprisingly Scientific Flash Behind the Fireworks (Chemistry – HS)

The text selection, *The Surprisingly Scientific Flash Behind the Fireworks*, can be found at the following link: http://www.nbcnews.com/id/3077329/ns/technology_and_science-science/#.UkR5P7y2DvY

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Look in the Student Learning Outcome (SLO) Documents for guidance on when this should be taught. These can be found on the BPS Science Department's website: <http://bpsscience.weebly.com/> You will find the Student Learning Outcomes documents organized there by grade level.

The Surprisingly Scientific Flash Behind the Fireworks (Chemistry – HS)

Student Questions

1. According to the text, what three things about fireworks would you not have guessed?
2. Identify the two basic ingredients in all fireworks, and describe their functions.
3. The next section of the article is titled “Slower is better”? What are two things that pyrotechnic chemists do?

Science and Technology/Engineering

4. Explain why poorly mixed ingredients produce a longer, brighter effect?
5. The author states that the colors we see in fireworks are an example of the first law of thermodynamics. Create a paragraph describing the movement of electrons in fireworks and how this demonstrates conservation of energy.
6. What is the relationship between consumption of fireworks and the number of fireworks-related injuries?

The Surprisingly Scientific Flash Behind the Fireworks (Chemistry – HS)

Sample Answers

- 1. According to the text, what three things about fireworks would you not have guessed?**

The three things are that they are designed not to explode, that there is conservation of energy going on, and that the most vibrant part of a firework is not when it's hot but when it's cooling off.

- 2. Identify the two basic ingredients in all fireworks, and describe their functions.**

Fireworks contain a fuel source to provide heat and an oxidizer to increase the availability of oxygen in the ambient air to speed up the burn.

- 3. The next section of the article is titled "Slower is better"? What are two things that pyrotechnic chemists do?**

The title signals that pyrotechnic chemists design fireworks to be slow reactions to create better effects. By lengthening the burn time for fireworks they improve the visual effect.

- 4. Explain why poorly mixed ingredients produce a longer, brighter effect?**

The fuel and the oxidizer are not combined evenly so they don't mix well, drawing out the burn longer.

- 5. The author states that the colors we see in fireworks are an example of the first law of thermodynamics. Create a paragraph describing the movement of electrons in fireworks and how this demonstrates conservation of energy.**

Energy from the fire enters the atoms of the colorant chemicals, elevating their energy states; as they cool, they return to their lower energy states, and by the first law, energy must be released – in this case, in the form of light.

- 6. What is the relationship between consumption of fireworks and the number of fireworks-related injuries? What can you infer based on that information?**

Interestingly, while consumption has gone up, injuries have actually declined during the same time interval, suggesting that fireworks are being made safer to use.