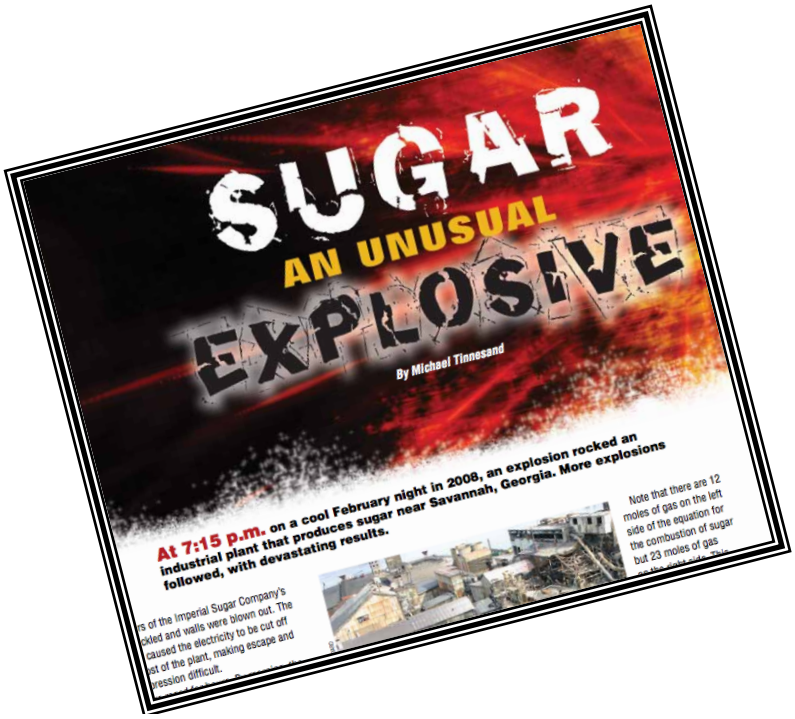
Close Reading and Text Dependent Questions in Science
Sugar an Unusual Explosive (Chemistry – HS)

The text selection, *Sugar an Unusual Explosive,* can be found at the following link: http://www.acs.org/content/dam/acsorg/education/resources/highschool/chemmatters/archive/chemmatters-december-2010-sugar-an-unusual-explosive.pdf

We apologize that we cannot include this reading directly; it is copyrighted material and we do not have special permissions that would allow us to post it publically. If you have difficulty accessing this article at the site above, please check the **Science Page of Aspen/SIS** for assistance accessing it.



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.

Sugar an Unusual Explosive (Chemistry – HS)
Student Questions

1. What are three characteristics of all explosions?

2. Why does the author compare the burning of a marshmallow and sugar?

3. The author states explosive reactions show an increase in volume. Based on the chemical equation of combustion and the author's explanation, what is the evidence for an increase in volume?

4. What was the explosion more like – digesting a marshmallow or combusting a marshmallow?

5. Based on the reading, what factors affect the rates of chemical reactions?

6. According to the author, what was the most important factor in the case of the Imperial Sugar plant explosion?

7. How can finely-ground substances be used safely to help us?

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Sample Answers

1. **What are three characteristics of all explosions?**
   The three characteristics are a large release of energy, production of quickly expanding gas molecules, and a rapid reaction rate.

2. **Why does the author compare the burning of a marshmallow and sugar?**
   Marshmallows are primarily made of sugar, and therefore react in much the same way when caught on fire as sugar does.

3. **The author states explosive reactions show an increase in volume. Based on the chemical equation of combustion and author's explanation, what is the evidence for an increase in volume?**
   The number of moles of gas is almost double at the end of the reaction than at the beginning.

4. **What was the explosion more like – digesting a marshmallow or combusting a marshmallow?**
   It is more like combustion, because enzymes control the pace of the reaction in digestion, unlike in combustion.

5. **Based on the reading, what factors affect the rates of chemical reactions?**
   The article lists the nature of the reactants, their physical state, and the surrounding temperature and surface area.

6. **According to the author, what was the most important factor in the case of the Imperial Sugar plant explosion?**
   It was the available surface area that oxygen could react with (as illustrated by the browning apple example and the fact that it was airborne and not just a pile of dust).

7. **How can finely-ground substances be used safely to help us?**
   Coal that is finely ground burns more cleanly, as does gasoline, reducing pollution.