

Name _____

Period 1 / 2 / 4 / 5

Lesson 3.1 Energy

Engage Watch the video your teacher shows you <https://www.youtube.com/watch?v=fcc6a0zmJ48>

Explore I Read the following excerpt about grain dust danger. Respond to the questions that follow the article.

Grain Dust Danger

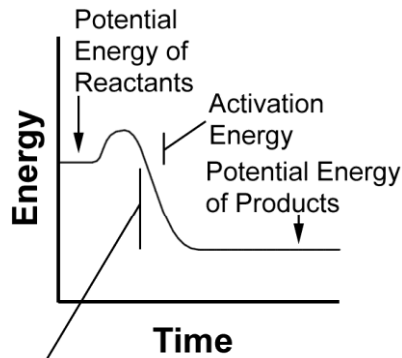
Billions of tiny, highly combustible particles of grain are generated by grain kernels rubbing together as they move along conveyer belts and are shifted between bins. Inside the enclosed chambers, those particles rise in a cloud.

When the dust gets in with the right mixture of oxygen and then comes in contact with a spark or another source of heat it is extremely explosive.

It is similar to what happens when kernels of popcorn explode when subjected to heat.

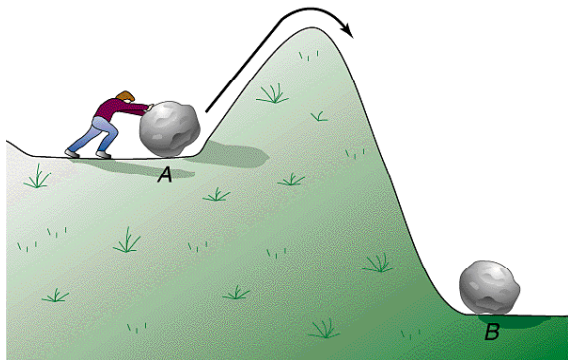
Explain I: Please answer all questions in complete sentences.

1. What is the danger with grain dust?
2. What element must be available for the grain dust to become explosive? (Hint: It begins with "O")
3. What energy source must be available to start the explosive chemical reaction?



Examine this graphic.

4. What do you think provided the activation energy for the grain elevator fire? (*Hint: What provided the heat?*)
5. What type of energy-rich macromolecule do you think is in the grains of wheat?
6. What molecule do you think is left after the combustion (burning) of those energy rich molecules? (*Hint: It begins with a "C"*)
7. Compare the energy of these product molecules to the energy of the reactant molecules. Which energy level is higher and which energy level is lower?



Label the diagram using the information below:

8. Flour and oxygen are reactants. **Label on the diagram where they belong.**

9. Energy, carbon dioxide, and water are produced. **Label on the diagram where they belong.**

10. Enzymes work by lowering activation energy. Without enzymes, what types of chemical reactions may not occur in the body?

If there's time, your teacher will show the news video of a recent grain explosion in LaPorte County, Indiana.

<http://www.wndu.com/home/headlines/1-dead-after-plant-explosion-in-LaPorte-212802461.html>

Explore II

11. The teacher will now demonstrate the energy stored in three different organic media. Record your observations from each.

Material	Observations
Nothing	
Flour (<i>starch</i>)	
Coffee creamer (<i>sugar</i>)	

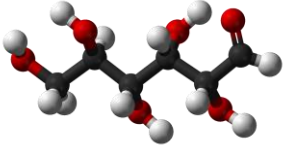
Explain II

12. What did the flame do when there was nothing added? Why do you think this occurred?

13. Compare the outcome of the coffee creamer versus the flour. Explain.

Explore III

Follow your teachers' instructions to build a glucose molecule.



14. How many of each atoms does your glucose molecule have?

___ Carbon (black atoms)

___ Hydrogen (white atoms)

___ Oxygen (red atoms)

15. How many "bonds" (the grey sticks that link the atoms together) are in the glucose molecule?

16. Predict where you think the energy is stored in your glucose and starch molecules. (*Hint: It's either the atoms or the bonds.*)

Using existing glucose molecules your teacher will show you how to start to build a starch molecule, which contains 200-3000 glucose molecules!

Volunteers will demonstrate metabolism.



Explain III

17. Which molecule (glucose or starch) was broken down first?

18. Which molecule took longer to break and why?

19. As molecules are broken apart, energy is released. Therefore, where is energy stored in this molecule?

20. If you were going to hike a mountain tomorrow, would you like your Power Bar made of starch or sugar? Explain your answer.