Dragon Breath Summary Paragraph Activity

Name_____

Date _____ Period_____

Text: 641-642

Topic Note directions:

Highlight the underlined sections from the PowerPoint.
Indicate the likely source for the note material in the left margin by each bullet.

Notes for paragraph 1: Conditions for combustion (burning)

- A combustion reaction occurs when a substance reacts with oxygen to produce heat and light.
- The reaction that creates dragon breath required specific conditions.
- Placing a match directly on a small pile of flour did not cause a combustion reaction.
- However, spreading the fuel out by blowing the pile of flour off of a card over a stronger flame produced dramatic, almost explosive combustion.
- This means that combustion needs more than heat, fuel, and oxygen.
- For combustion to occur you need the right amount of heat, fuel, and oxygen.
- Spreading the flour out over the flame allowed enough oxygen to reach the individual particles of flour.
- The stronger flame (from the burner) assured there was enough energy to begin the reaction.
- Once the reaction started there was enough heat from the burning flour to ignite the particles next to them, causing a chain reaction.
- Knowing the conditions which cause flour to burn has helped reduce the possibility of grain elevator from blowing up.
- While it would be difficult to prevent the spread of flour particles as the grain is poured into the elevator, preventing sparks from forming due to static electricity helps reduce the source of heat which would start the reaction.
- The possibility of igniting fine dust is not limited to grain elevator operations.
- Coal mines, sawmills, sugar mills, fertilizer plants, even facilities that produce powdered milk have the potential of igniting highly combustible particles – especially coal mines which may also have dangerous levels of methane gas mixed in with the dust.
- Finally, even after the flame is gone, the effects of the reaction could possibly cause more problems. According to some, increased levels of carbon dioxide, a product from burning carbon-based fuels, is a possible cause for global climate change.
- It seems that dragons should think twice before lighting up.

Notes for paragraph 2: Classification of reactions

- Burning flour may be classified into different types of reactions, combustion, decomposition, and/or synthesis
- The first is fairly obvious. Combustion reactions occur when a substance reacts with oxygen to produce heat and light.
- Spreading the flour out allowed enough oxygen for the reaction to occur which produced a lot of heat and light – definitely a combustion reaction.
- Deciding whether the reaction was either decomposition or synthesis is not as easy.
- According to the formula for the reaction, $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O$, it looks as if a complex carbohydrate molecule is broken down into simpler molecules of water and carbon dioxide.
- The evidence for decomposition would be that the flour was broken down into invisible gases (H_2O vapor, CO_2) which could not be easily identified.
- There was little evidence for anything more complicated being formed.
- The text states the reaction between carbon and oxygen is a synthesis reaction ($C + O_2 \rightarrow CO_2$).
- Since flour has a lot of carbon in it, it could have the same classification, but there is little observable evidence to confirm this either.
- Also, flour is not pure carbon; it has hydrogen and oxygen in it as well.
- Therefore, based on the text, decomposition seems to be the most likely classification based on what was observed or not observed, in these conditions.
- It is important to note that conditions in which a reaction occurs vary considerably which affects our understanding of the reaction. An example is a jet airplane burning fuel at high altitudes. According to the text, water vapor is formed when the fuel burns. Sometimes jets leave obvious contrails (condensation trails) that may be from the water vapor condensing in air that has a much higher humidity than drier air that does not leave a contrail because the vapor does not condense. When a contrail forms, it would be easier to collect and identify the contents of the exhaust and determine the products of the reaction, making classification of the reaction easier.