The Exploding Pringles Can Design Challenge

Many common devices, such as combustion engines in cars, use chemical compounds such as octane (main component of gasoline) to produce energy. The design of these devices is based on the careful analysis of the conditions that will lead to maximum energy production. Imagine that you worked for a company interested in designing a combustion engine that uses methane instead of octane. During the testing period, your team is interested in finding the right conditions to produce the maximum amount of energy possible in a container with a fixed volume. What would you do to face this challenge?

Your Challenge: Design an explosion with the maximum boom within a container with a fixed volume.

Materials Available:

Pringles potato chip can with lid, and with a small round hole 1" from the bottom

Methane gas, available from the gas jet in your lab

Syringe for holding methane gas

Piezoelectric lighter that fits in the hole in the Pringles can

Ring stand with iron ring to hold the Pringles can steady during explosion

Other materials may also be available in your lab. A three-pronged clamp could be used instead of an iron ring.

Extremely Important Safety Considerations:

1. ***The can must be stabilized upright (cap at top) to a ring stand by setting it upright inside an iron ring before lighting the lighter.***
2. ***You are only allowed to place methane into the can using the syringe. Do not put the hose into the can.***
3. ***Everyone should stand to the sides of the can (not in front of it) before lighting.***
4. ***Any time you try to make the explosion by using the lighter, the cap must be ON the can, and the front of the lighter (where the flame occurs) must be inserted at least 1" INSIDE the hole in the Pringles can.***

Other standard laboratory safety rules that you have followed all through your chemistry courses are also particularly pertinent:

- Tie back long hair.
- Roll up loose clothing so that it will not dangle near a flame.
- Wear goggles.
- Do not get close enough to a flame to get burned.
- Never leave a gas jet on.

Your Code Name _____

Question Set #1

Code Name of Your Teammate _____

The Exploding Pringles Can Design Challenge
After Reading the Challenge and Before Starting the Activity

Before you begin: Please write your answers to the following questions. Work by yourself on this.

1. At this stage in your work, please use a few minutes to ***brainstorm by yourself*** all of the things that your team will have to THINK ABOUT to make an explosion with the maximum boom.

2. What do you think it is most important for your team to try or figure out first?

Question Set #2

Your Code Name _____

Code Name of Your Teammate _____

The Exploding Pringles Can Design Challenge
At the End of Work Period 1

At the end of the first work period: Please write your answers to these questions. Work by yourself on this.

1. What did you determine was most important to consider in making a explosion with the most boom? Why is it important?

2. What did you determine was not important? Why is it not important?

3. Is there anything else that you and your teammates learned about how to make the explosion with the most boom?

Now, please meet with your laboratory teammates and strategize what you will do next.

Question Set #3

Your Code Name _____

Code Name of Your Teammate _____

The Exploding Pringles Can Design Challenge
At the Beginning of the Second Work Period (before starting work)

Brainstorm with your teammate what you will do for the second work period. Please write your answers to the following questions. Work WITH YOUR TEAMMATE to answer these questions. Turn in one paper per lab team.

1. Based on what you experienced in the first work period, what do you PLAN TO TRY next to make an explosion with the maximum boom?

2. What do you and your teammates need to THINK ABOUT now in order to successfully complete this challenge? **Why are those things important?**

Question Set #4

Your Code Name _____

Code Name of Your Teammate _____

The Exploding Pringles Can Design Challenge
At the End of the Second Work Period

At the end of the second work period: Please write your answers to these questions. Work by yourself on this.

1. What was successful? What did you learn about making the boom?

2. What obstacles did you encounter? What did you learn about what doesn't work?

3. What do you think is the most important thing to try next? Why? What will you learn from it about making the biggest boom?

Question Set #5

Your Code Name _____

Code Name of Your Teammate _____

The Exploding Pringles Can Design Challenge
At the Beginning of the Third Work Period (before starting work)

Brainstorm with your teammate what you will do for the third and final work period. Please write your answers to the following questions. Work WITH YOUR TEAMMATE to answer these questions. Turn in one paper per lab team.

1. Based on what you experienced in the second work period, what do you PLAN TO TRY next to make an explosion with the maximum boom?

2. What do you and your teammates need to THINK ABOUT now in order to successfully complete this challenge? Why are those things important?

Question Set #6

Your Code Name _____

Code Name of Your Teammate _____

The Exploding Pringles Can Design Challenge
At the End of the Third Work Period

At the end of the third and final work period: Please write your answers to these questions. Work by yourself on this.

1. What was successful? What did you learn about making the boom?

2. What obstacles did you encounter? What did you learn about what doesn't work?

3. If you had more time to do more trials, what do you think would be most important to try next?