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.

Name _____

Team _____

The Exploding Pringles Can Design Challenge
At the Beginning of Day 1 - Before Starting the Laboratory Work

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*** 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?

Name _____

Team _____

The Exploding Pringles Can Design Challenge
At the End of Day 1

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

1. What did you determine was important to consider in making an 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?

Name _____

Team _____

The Exploding Pringles Can Design Challenge
At the Beginning of Day 2 (before starting laboratory work)

After discussing with your teammates what you will do for the second day: Please write your answers to the following questions. Work by yourself on this.

1. Based on what you experienced yesterday, what do you PLAN TO TRY today to make an explosion with the maximum boom?

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

Name _____

Team _____

The Exploding Pringles Can Design Challenge
At the End of Day 2

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

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

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

Name _____

Team _____

The Exploding Pringles Can Design Challenge
At the Beginning of Day 3 (before starting laboratory work)

Remember that there will be a shorter time for laboratory work today because the "boom" competition will be today. Be ready to compete!

After discussing with your teammates what you will do for the third and final day: Please write your answers to the following questions. Work by yourself on this.

1. Now that this is the last day, what do you PLAN TO TRY today to make an explosion with the maximum boom?

2. Make a list of all of the things that your team will have to THINK ABOUT to successfully complete this challenge.

Name _____

Team _____

The Exploding Pringles Can Design Challenge
At the End of Day 3

After the "boom" competition: Please write your answers to these questions. Work by yourself on this.

1. Now that you have finished the challenge and observed the competition, what did you determine was important to consider in making an explosion with the most boom? **Why is it important?**

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