

*Chemistry*

*Investigatory*

*Project:*

*Preparation of Smoke Bomb.*

**2015-2016**

*Submitted to:*

*Dr. Padma Jaiswal Mam*

*Submitted By:*

*Akash Semil*

*Xii-A*

*Roll no: 03*

# CERTIFICATE

*It is hereby to certify that, the original and genuine investigation work has been carried out to investigate about the subject matter and the related data collection and investigation has been completed solely, sincerely and satisfactorily by Akash Semil of class 12<sup>th</sup> A, St. Paul's school, Morar, Gwalior, regarding her project titled "Preparation of Smoke bomb".*

*Teacher's Signature.*

# Acknowledgement

I place my sincere thanks to my chemistry teacher Dr. Padma Jaiswal for her guidance and advices to complete my work successfully. I also thank our principal Fr. N. John Xavier for providing me all the facilities to finish the project on time. I also take this opportunity to place on record my deep gratitude to god for the countless blessings showered on me while doing the work and to complete it. Last but not least I thank my parents for their encouragement and support in my humble venture.

# *Contents*

- ✓ *Aim*
- ✓ *Theory*
- ✓ *Material Requirement*
- ✓ *Procedure*
- ✓ *Equation & Uses*
- ✓ *Bibliography*

# Aim

To Prepare a Smoke Bomb.

# Theory

A smoke bomb is a firework designed to produce smoke upon ignition. Smoke bombs are useful to military units, self-defense and pranks. The smoke bomb was first created in 1848, by the inventor Robert Yale.

Colored smoke devices use a formula that consists of an oxidizer (typically potassium chlorate,  $KClO_3$ ), a fuel (generally sugar), a moderate (such as sodium bicarbonate) to keep the reaction from getting too hot, and a powdered organic dye for color. The burning of this mixture evaporates the dye and forces it out of the device, where it condenses in the atmosphere to form a "smoke" of finely dispersed particles.

# *Material Requirement*

- Sugar
- Potassium nitrate,  $KNO_3$ , also known as saltpeter
- Skillet or pan
- Aluminum foil or a used tissue paper roll
- Fuse for easy ignition (from fireworks)
- Cotton and tape
- Burner

# Procedure

1. Pour about 3 parts potassium nitrate to 2 parts sugar into the skillet (5:3 ratio is also good).

Measurements don't need to be exact, but you want more  $\text{KNO}_3$  than sugar. For example, you can use 1-1/2 cups  $\text{KNO}_3$  and 1 cup sugar. If you use equal amounts of  $\text{KNO}_3$  and sugar, your smoke bomb will be harder to light and will burn more slowly. As you approach the 5:3  $\text{KNO}_3$ : sugar ratio, you get a smoke bomb that burns more quickly.

2. Apply low heat to the pan. Stir the mixture with a spoon using long strokes. If you see the grains of sugar starting to melt along the edges where you are stirring, remove the pan from the heat and reduce the temperature before continuing.

3. Basically you are caramelizing sugar. The mixture will melt and become a caramel or chocolate color. Continue heating/stirring until the ingredients are liquefied. Remove from heat.

4. Pour the liquid onto a piece of foil or into the cardboard roll. You can pour a smaller amount onto a separate piece, to test the batch. You can pour the smoke bomb into any shape, onto an object, or into a mold. The shape and size will affect the burning pattern.

5. If you aren't going to clean your skillet immediately, pour hot water into the pan to dissolve the sugar (or else it will be harder to clean). Clean up any residue you may have spilled out of the pan, unless you want mini-smoke bombs on your stovetop.

6. While the mix is still hot, push a pen lightly down the mold and don't remove it. Allow the smoke bomb to cool. (About an hour) Now, remove the pen and insert the fuse.

7. Secure the fuse with cotton.



# Equation



# Uses

Smoke bombs are primarily used in military warfare as smoke screens. Smoke screens are usually used by infantry to conceal their movement in areas of exposure to enemy fire and to conceal a withdrawal.

The use of smoke screens was common in the naval battles of World War I & II. Another application is in smoke grenades: Smoke grenades are canister-type grenades used as ground-to-ground or ground-to-air signaling devices, target or landing zone marking devices, or as screening devices for unit movements. Smoke grenades are normally considered non-lethal, although incorrect use may cause death.

# *Bibliography*

<http://wiki.answers.com>

<http://wikipedia.com>

<http://chemistry.about.com>

<http://wikihow.com>