Fireworks

1. Abstract

Fireworks serve as an engaging topic for students to relate to which is very well known and appreciated amongst children of all ages. This realistic context fosters cultural diversity in chemistry education, because the usage and importance of fireworks ranges widely across countries. Furthermore, when examined from an environmental or communal perspective, fireworks give rise to many different views and opinions on its use and impact.

The range of opinions and views on the cultural, environmental and social scale makes this context a great start for an IBL-lesson. Students can investigate statements and cultures that spur their interest. For the students there are numerous possibilities to investigate additional relating topics or views that are not directly handed to them by the teacher.

2. Lesson implementation

Texts and/or videos about fireworks and related issues are provided as an appetizer at the start of the lesson.

Several lesson activities with a focus on the chemistry of fireworks are given below.

- Explore the metal ion component in fireworks by using spray bottles with salt solutions and a Bunsen burner. Spray the salts into the flame and take note of the observed colors. This can lead to the following questions:
  - What do you think happens to the metal ions in fireworks?
  - What are the dangers of the presence of these metal ions in the environment?

- Investigate the thermal composition and combustion of gunpowder to predict reactions what can occur when it alights.

- Investigate the environmental consequences of the use of gunpowder.

- The composition of fireworks has changed through the ages. Try to find some of these changes and explain the reasons for this change. (One important change for students to find is the replacement of potassium perchlorate by potassium chlorate)

After investigation of these content related chemistry issues the social impact of fireworks can be explored. The following activities are set in a hypothetical case:

> *Suppose you belong to a new village in Malta called Tadama. Your mayor has received requests to introduce fireworks at their feast. Some of the Tadama residents have however objected.*

Student activities:

- Investigate the possible opinions of town residents. Potential views may include ideas about: storage and handling, noise pollution, chemical pollution, danger of explosion, treatment of waste, expense, celebratory feature and tradition.
- Take on the role of scientist and investigate these issues. Use your findings to help cater these fears without eliminating the use of fireworks altogether.
- Present your findings from the research activity to the rest of the class. Prepare slides or make charts to support your presentation.
- Role-play debate: with your peers take on the roles of city council and city residents. Try to find a solution that suits everyone's goals and needs.

3. Note from the designer

This lesson activity was designed by Julia Alexander, a teacher from maltha. In designing this activity she had the following intention:'

> *"I used to hear my students talking about village feasts passionately as summer would be approaching. I want that same passion about science. Using events and activities which are important to students on a cultural or social level such as fireworks is an effective skeleton to teach big ideas in science and help students acquire skills needed to develop arguments and debate, skills needed to explore diverse views and make decisions. "*