

Fireworks Experiment

Introduction

Legend has it that the Chinese made the first fireworks in the 800's, filling bamboo shoots with gunpowder and exploding them at the New Year with the hope that the sound would scare away evil spirits. Fireworks became known in Europe during the 1300's, probably after returning crusaders brought them from the East.

Early fireworks were enjoyed more for the sound than the show. In its simplest forms, gunpowder explodes quickly leaving a terrific bang, but not much to see other than a rather brief golden glow. Over time people discovered that using chemical compounds with greater amounts of oxygen made the explosives burn brighter and longer.

In modern day fireworks, metals are added that burn at high temperatures, creating a variety of different colours, e.g. copper salts produce blue, strontium salts produce red and barium salts green. Other additives are also used to create other effects. For example, calcium deepens colours, titanium makes sparks and zinc creates smoke clouds.

In this experiment, you are going to be focusing on the Group 1 metals (the Alkali Metals) and looking at the various trends within the group. You will also create your own mini fireworks, by exploring the different coloured flames each of these metals produce.

Practical

1. Observe the video demonstration about the reactivity's of the Group 1 metals with water.
2. Take the lithium salt and make a saturated solution in methanol.
3. Repeat this for the other metal salts, potassium and sodium.
4. Take a flameproof dish and pour in approximately 20cm³ of the saturated lithium salt solution.
5. Repeat this procedure for the remaining solutions, using the remaining 2 flameproof dishes.
6. Carefully light each of the solutions, and observe the coloured flames when the methanol has all been burnt off.

Questions

1. Why does the reactivity of the metals with water increase as we move down the group?
2. Why do we see different colours when we burn each of the metals?
3. Write down a word equation describing the reaction of a metal with water:
4. Write out the electron configuration for each of the Group 1 Metals; lithium, sodium, potassium and rubidium.
5. As you move down the group, the reactivity of the metals increases. What other trends do you notice within the group?