Flame test transcript

Different metal ions will produce different flame colours when heated in a hot flame, and this variation is due to their energetic properties. This video will show you how to use a virtual chemistry laboratory to carry out a series of flame tests on a selection of metal ion salts.

On the bench, you have all the equipment and reagents needed for this experiment. There is:

* a Bunsen burner
* an ignitor to light the flame
* an acid wash solution
* a nichrome wire
* a spectroscope
* and a selection of solid metal salts.

To use the equipment in the laboratory, all you have to do is to click on the item of interest.

To start the experiment, you must first light the Bunsen burner.

Turn on the gas by clicking on the yellow tap.

You will hear a hissing sound when it is turned on.

To light the flame, use the ignitor.

You will notice that the flame is yellow – this is a cool flame and it is not hot enough to heat the metal ions.

For this, you will need a hot flame.

A hot flame is produced by increasing the mixing of the gas with air, in other words, mixing it with more oxygen, and in doing so creating a hotter flame.

This is achieved by opening an air hole at the base of the Bunsen burner.

The increased mixing of gas and air now produces a hotter flame which burns with a blue colour.

Before introducing a metal ion salt into the flame, the nichrome wire must first be cleaned in the acid wash solution. To check that it is clean, place the tip of the wire into the hot flame. If it is clean, there will be no change in the colour of the flame.

To load the wire with a few grains of metal ions, place it in one of the metal ion salt samples. Let's see what happens if we load the wire with a copper salt.

The flame burns with a different colour.

However, this is not the only way you can use the Virtual Laboratory to analyse the energetic properties of metal ions.

Another approach is to use a spectroscope to exam the light spectrum emitted by the heated metal ions in the flame.

So, let us reload the nichrome wire with the copper salt and reintroduce it into the flame and look at the emission line spectrum.

Every metal ion will produce its own unique flame colour and emission spectrum.

Use this Virtual Laboratory to explore the properties of the other metal ions provided. In addition to copper chloride, there are metal chloride salts of lithium, strontium and potassium. There are also two mystery samples for you to identify.

And remember to clean the wire between each test to avoid cross contamination.

Finally, a few words about laboratory safety.

When working in a laboratory, a lit Bunsen burner should not be left unattended. If you do not require to use it for a few minutes, always leave it with a yellow flame. This is called the 'safety flame' because it is highly visible, and it is therefore less likely that you will accidentally put your hand in the flame.

A flame will be yellow when the air hole is closed.

When gas is mixed with less oxygen, it burns less efficiently, producing a cooler but brighter flame.