

## Flame tests (Li, Na, K, Ba, Sr, Cu)

### Theory

The characteristic colours given off when salts of certain metals are heated in the flame of a Bunsen burner are noted. The colours obtained can then be used to identify the metals present in unknown compounds.

### Procedure

**NB:** Wear your safety glasses.

Crush a little of the salt to be tested with a pestle and mortar.

Label 6 beakers, and place a small quantity of the corresponding salt in each.

Dip the soaked splint in the salt to be tested. Some of the salt should stick to the splint.

Gently wave the splint in the flame of the Bunsen burner and note the colour given off. Be careful not to hold the splint too long in the flame, as charring may occur and give a false colour.

Repeat the experiment for each of the other salts. To avoid cross contamination, use a separate splint for each salt. Again, note the colour in each case.

If you are given an unknown salt, you should be able to identify the metal in the salt from the results of your experiment.



### Student Questions

***What colour is observed in each case when the following salts are heated in a flame: copper sulfate, lithium carbonate, sodium sulfate, strontium nitrate, barium nitrate, potassium sulfate?***

Copper sulfate: Blue-green  
Lithium carbonate: Deep red  
Sodium sulfate: Yellow  
Strontium nitrate: Red  
Barium nitrate: Yellow-green  
Potassium sulfate: Lilac

***Why do metals give off a characteristic colour in a flame?***

The energy differences between energy levels in metal atoms vary from metal to metal. Using energy from the flame, electrons in the metal atoms move to higher energy levels, and then return to lower energy levels, emitting light whose energies in each case is equal to the energy difference between the higher energy level and the lower energy level.

***What procedure is used to avoid cross contamination?***

If wooden splints are used, a separate splint is used for each test.