# Experiment of the Month: Flame Coloring

■ *Maximilian Ruppert*

When we think of New Year's Eve, the first thing that comes to mind, of course, are the fireworks. Loud popping and colorful lights in the night sky. What happens exactly? We want to explain this to you today.

The colorful lights are usually alkali metal salts, but also other compounds that are heated by the explosion of propellant (often black powder) and dispersed in the night sky.

Depending on the alkali metal used, other colors occur. This is called flame coloring.

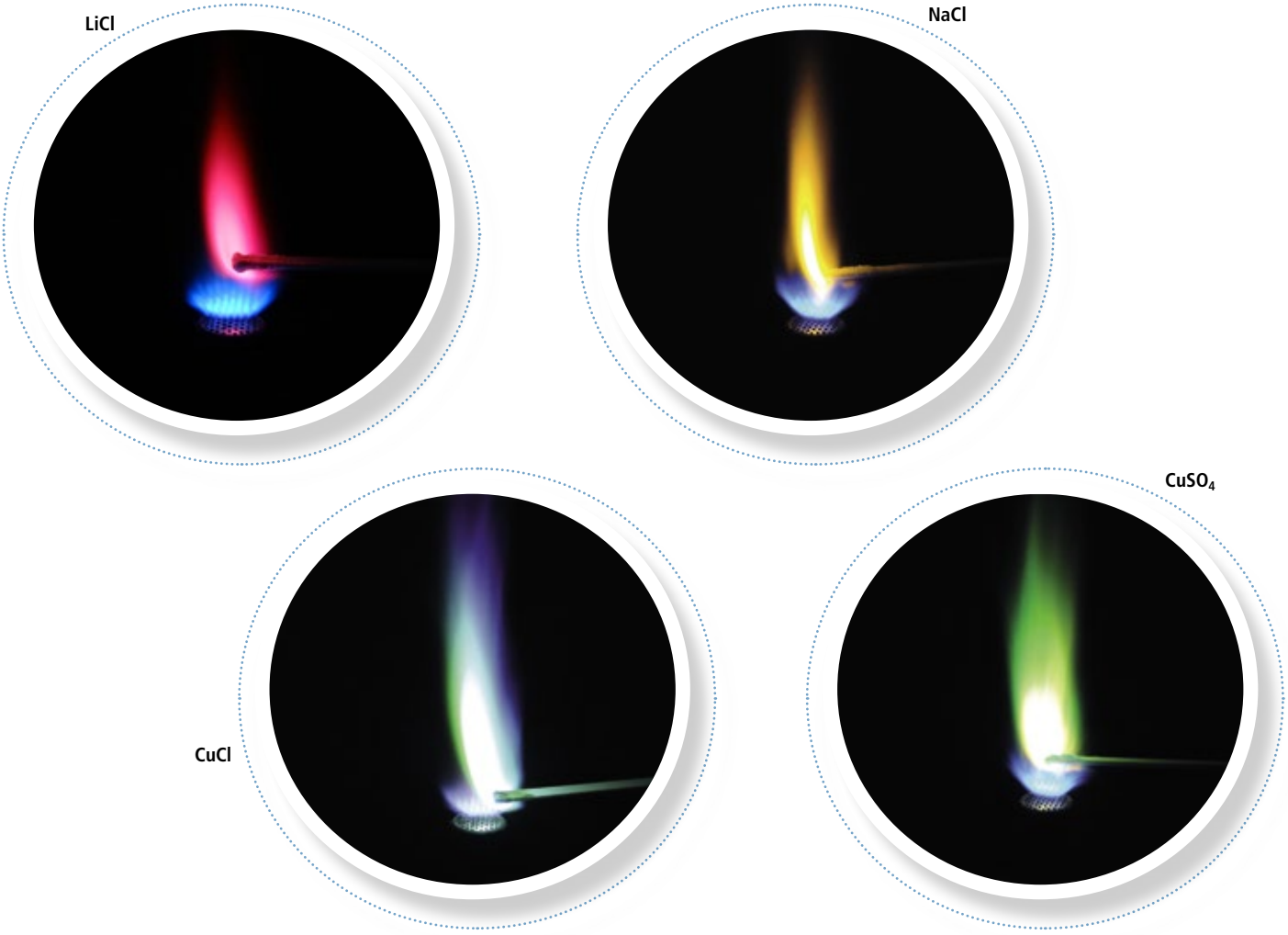
**Materials:** Magnesia grooves, Teclu or Bunsen burner, water, lithium chloride, sodium chloride, copper (I) chloride and copper (II) sulfate.

**Procedure:** The magnesia grooves are moistened with water and then dipped in about 0.5g of one of the salts, so that the salt adheres to the magnesia. The burner is ignited and set to a roaring flame.

Then the Magnesia groove is held in the cone of the burner. The experiment is over when the flame is no longer colored.

**Note:** It is essential to wear protective goggles during the experiment. If possible, the experiment should be carried out in the fume cupboard. Already used Magnesia grooves must be purified over the flame of a burner for 5 minutes.

**Explanation:** Since multiple chloride ions were used and yet different flame colors were observed, it can be concluded that the anions do not contribute, or only to a small extent, to the flame coloration. So the respective cations $Li^+$, $Na^+$, $Cu^+$ and $Cu^{2+}$ should be responsible. In the burner flame, metal ions are reduced to atoms. The high temperature (over 1200 °C) now lifts individual electrons of the metals to a higher energy level, which is further away from the atomic nucleus. When the electrons return to their original energy level, they release the previously absorbed energy in the form of a light quantum (= a photon). Depending on the amount of absorbed energy, light quanta of different wavelengths are emitted, therefore the elements differ in their flame color.




More Information:
http://bit.ly/GLJ-Exp0618-FC

Video:
http://bit.ly/GLJ618-Experiment