

Atomic Spectra

Lab 9

In the early 20th century, gaseous elements were found to have a unique atomic spectra when subjected to a high voltage so that they emitted a light. This light when looked at through a prism or a transmission grating shows that the light is made up of individual wavelengths of light. The spectrum produced by these gaseous elements is called an emission spectrum. Each gas has its own unique emission spectrum. The four that you will encounter in today's lab are shown on page 381 in your textbook.

The reasoning for this phenomena baffled scientist until Niels Bohr discovered what is now called the Bohr's model. Bohr model is that electrons spin around the nucleus like planets spin around the sun. Also that the electron orbits are quantized, that is electrons can be in one fixed orbit or another fixed orbit but not between the orbits and that each of the orbits related to a certain energy level of the electron. Lastly, electrons can move from a lower orbit to a higher orbit if it is given energy by an external source such as a high voltage power supply. This energy is given in electron-volts or eV. The orbit that it jumps to will vary depending upon the amount of energy the electron absorbs. The electron will not remain in this orbit but will decay back to its original orbit. This decay may be in a single step or in multiple steps however each time the electron decays to a lower orbit energy is lost and a photon is emitted. The wavelength or color of the photon is dependent on the amount of energy that is lost.

In this lab you will look at four different gaseous elements and from the emission spectra of each with the aid of the picture on page 381 in your textbook determine what each element is.

Point the large end of the spectroscope towards the light source look into the small end. Off to the side you should view a spectrum along a scale. From this and using your text book determine what each element is.

Element 1 _____

Element 2 _____

Element 3 _____

Element 4 _____

Note you will need your text book for this lab