



And Then There Was Light ...



Introduction:

The skin on the tips of your fingers, the palms of your hands, and the soles of your feet has tiny little ridges. These ridges give your skin a better grip for holding onto things. Every person has a unique pattern of fingerprint ridges. The pattern gets bigger as you grow, but it does not change shape. These fingerprints are signatures of your identity and come in handy when the police attempt to solve a crime or even find a missing child.

Similarly, gases that exist on the earth and in outer space exhibit their own type of “fingerprinting.” Energy from stars, especially the Sun, reach the Earth in the form of electromagnetic waves. We can study the chemical composition of stars by studying the colors present in spectrograms of the light emitted by each star. In addition to the colors one can observe, there are also absorption lines (black lines) which indicate the energy that has already been used by the star. Since each gas has its own distinct colored spectrum and pattern of absorption lines, it is like a fingerprint which makes it easy to identify the elements contained in that star.

Objective:

By observing the spectrograms of several gases, you will be able to identify each gas by their spectral “fingerprint”.

Procedure:

1. Using a spectroscope, observe the light emitted by the bulbs in your room. In Box #1 on your report Sheet, using colored pencils, draw the spectrogram of what you see. Be very specific and detailed about your drawing.
2. Observe the spectra from the gas tube sources supplied by your instructor. Once again, draw the spectrogram of each gas tube in the appropriate box on your Report Sheet. Make sure that you are very specific about the spectral lines you draw.
3. Using the chart provided by your instructor, match your spectrogram to the spectra on the chart and identify the gas in each tube.

REPORT SHEET

	Element Name	Spectrum
1.	Continuous Spectrum	
2.		
3.		
4.		
5.		
6.		
EXTRAS (in case of errors)		

Discussion Questions: *(Answer in Complete Sentences)*

1. What are the colors of the visible portion of the electromagnetic spectrum in order of increasing wavelengths?
2. What is the main difference between the spectra of the gas tubes and the spectrum of the light bulb?
3. According to the *ESRT*, how does the width of the visible spectrum compare to the entire electromagnetic spectrum?
4. How is it possible to identify an element by looking at its spectrum?