Did you know?

When the solar spectrum was first being studied, a set of spectral lines was found that did not correspond to any known element. A new element had been discovered. Because the Greek word for sun is *helios*, this new element was named helium. Helium was later found on Earth.

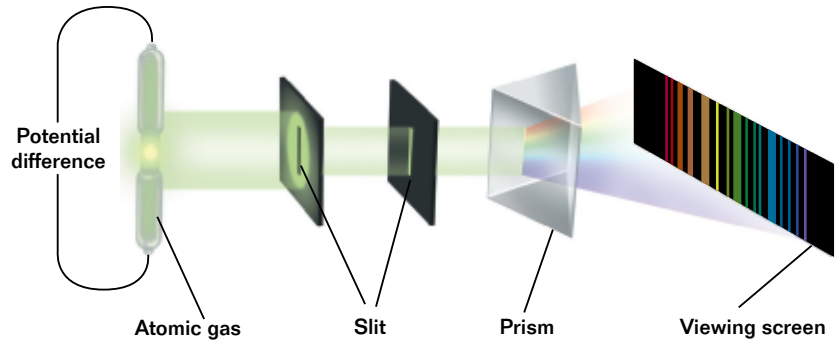

Figure 11
When the light from an atomic gas is passed through a prism or a diffraction grating, the dispersed light appears as a series of distinct, bright spectral lines.

Each gas has a unique emission and absorption spectrum

When the light given off (emitted) by an atomic gas is passed through a prism, as shown in **Figure 11,** a series of distinct bright lines is seen. Each line corresponds to a different wavelength, or color, of light. Such a series of spectral lines is commonly referred to as an **emission spectrum.**

emission spectrum
a diagram or graph that indicates the wavelengths of radiant energy that a substance emits

As shown in **Figure 12,** the emission spectra for hydrogen, mercury, and helium are each unique. Further analysis of other substances reveals that every element has a distinct emission spectrum. In other words, the wavelengths contained in a given spectrum are characteristic of the element giving off the light. Because no two elements give off the same line spectrum, it is possible to use spectroscopy to identify elements in a mixture.

In addition to giving off light at specific wavelengths, an element can also absorb light at specific wavelengths. The spectral lines corresponding to this process form what is known as an **absorption spectrum.** An absorption spectrum can be seen by passing light containing all wavelengths through a

absorption spectrum
a diagram or graph that indicates the wavelengths of radiant energy that a substance absorbs

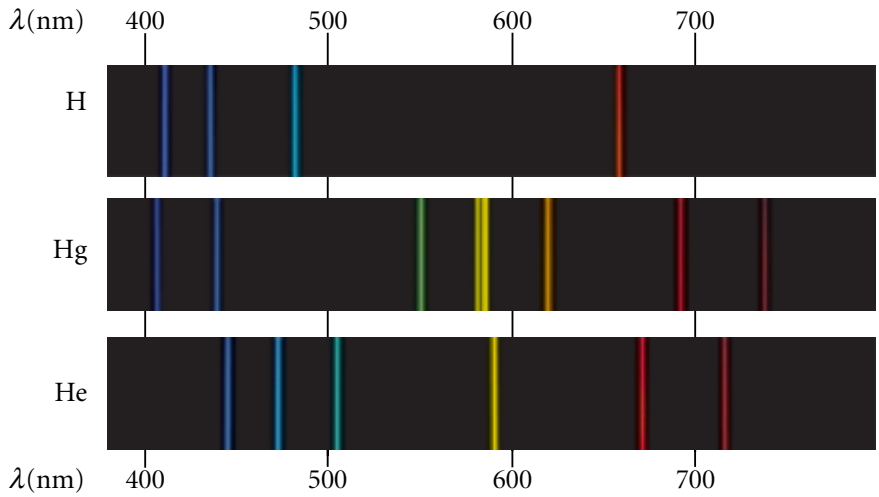

Figure 12
Each of these gases—hydrogen, mercury, and helium—has a unique emission spectrum.