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An atom emits spectral lines when, after its electrons are excited and move to higher energy levels, they fall back to the lower energy levels and release energy while doing so. This energy is released as light, which is both a wave and a particle called a photon. Planck’s Quantum Theory says that the frequency (which affects the color) of this light is proportional to the energy the light has.

Each element had a different spectrum because each element has different amounts of electrons arranged in different ways. Thus, when their electrons fall back to lower energy levels after being excited, their electrons release different amounts of energy. Since energy is proportional to frequency, the colors released by these elements are different.

Helium was discovered in the sun when French astronomer Pierre-Jules-César Janssen noticed a yellow line in the sun's spectrum with a wavelength of about 587.49 nanometers while studying a total solar eclipse. English astronomer Sir Norman Lockyer realized this line could not be produced by any known element, and, guessing that this line was from an unknown element, named the element helium. Helium was likely discovered in the sun before on earth because there is little of it in the atmosphere and it is found mostly in natural gas deposits, so it was easier to spot it in the sun, which is visible often, rather than in a gas deposit if scientists did not know to look for it.

A practical application of this lab is imaging spectroscopy. Imaging spectroscopy is detecting materials and chemical bonds in spatial images by measuring the spectrum produced when these materials interact with electromagnetic radiation.

Works Cited

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