

3.8 Spectroscopy and Kirchhoff's Laws

PRE-LECTURE READING 3.8

- *Astronomy Today*, 8th Edition (Chaisson & McMillan)
- *Astronomy Today*, 7th Edition (Chaisson & McMillan)
- *Astronomy Today*, 6th Edition (Chaisson & McMillan)

VIDEO LECTURE

- Spectroscopy and Kirchhoff's Laws¹ (17:55)

SUPPLEMENTARY NOTES

Spectroscopy is the science of dispersing light into its component colors and measuring—and interpreting—the intensity of the light at each color (i.e., at each frequency/wavelength).

Types of Spectra

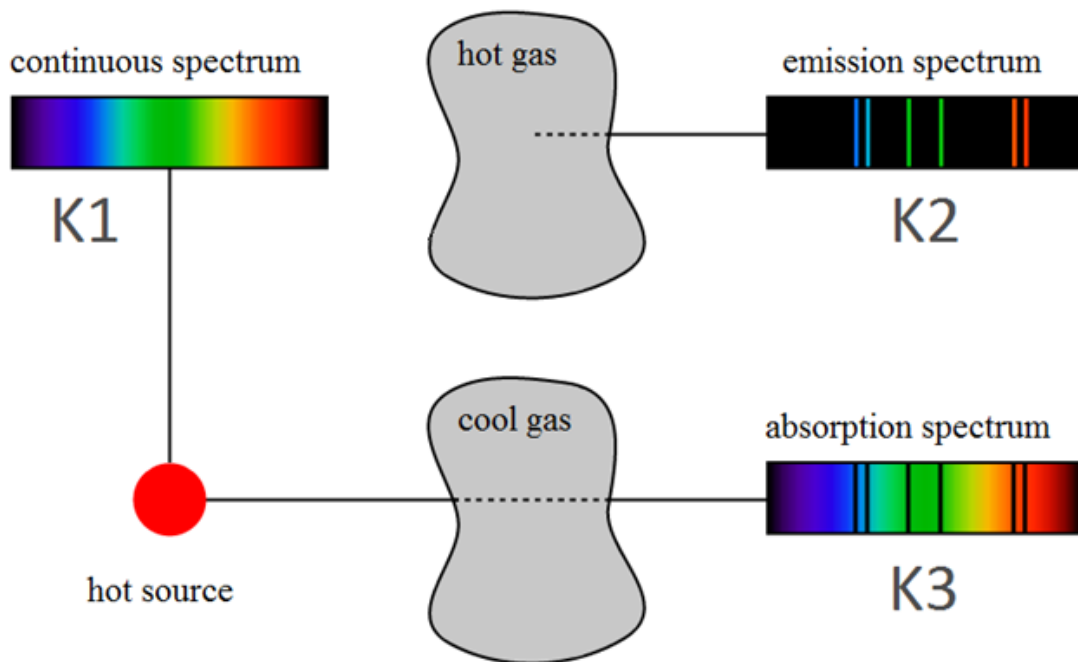


Figure 1

¹<http://youtu.be/HjVw8PKmtgA>

Kirchhoff's Laws

Kirchhoff's First Law

A continuous spectrum is produced by a:

- Luminous solid
- Luminous liquid
- Hot, opaque gas

Kirchhoff's Second Law

An emission line spectrum is produced by a:

- Hot or heated, transparent gas

Kirchhoff's Third Law

An absorption line spectrum is produced by a:

- Backlit, cool, transparent gas

- Absorption of light by a cool, transparent gas heats that component of the gas, which later reemits the light in all directions.
- Absorption and emission lines occur at the same frequencies/wavelengths, but not necessarily in the same proportions.

Astronomical Application

- Absorption and emission line spectra can be used to determine both the chemical composition and the temperature of a transparent gas.

EXERCISE

Experiment with UNL's Three Views Spectrum Demonstrator².

ASSIGNMENT 3

- Do Question 6.

²<http://astro.unl.edu/classaction/animations/light/threeviewsspectra.html>