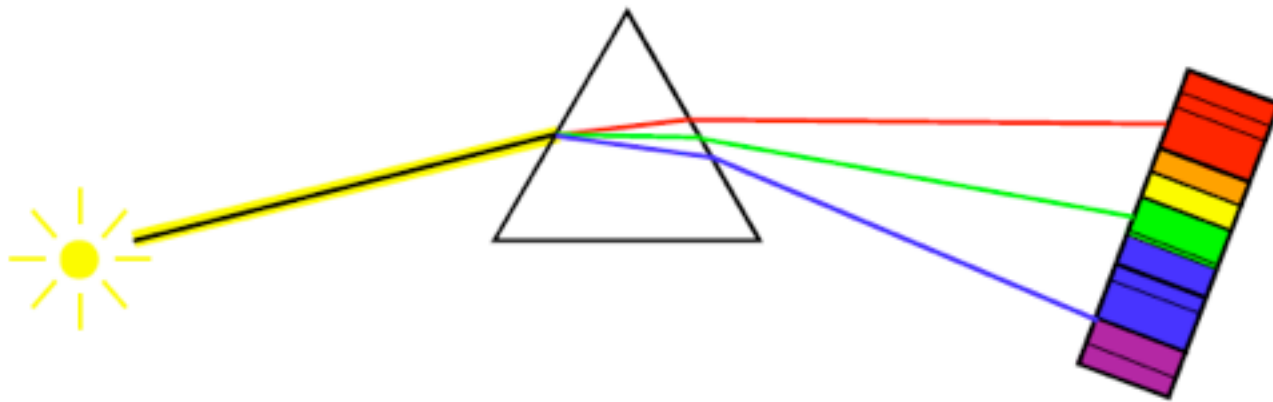
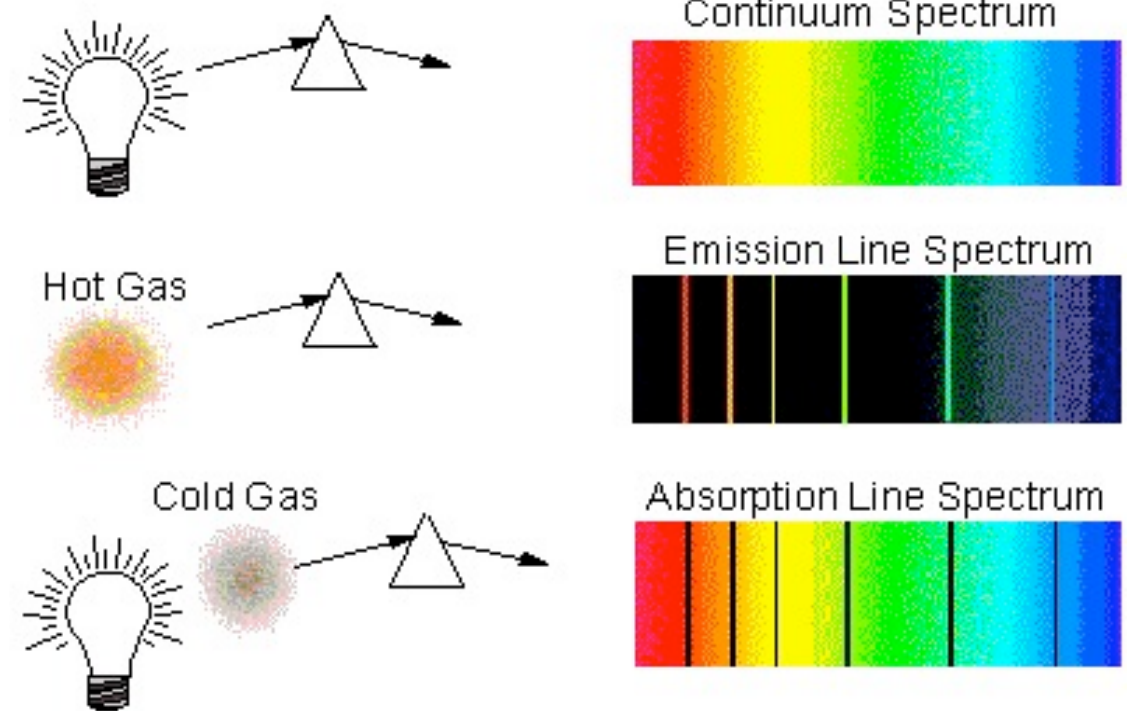


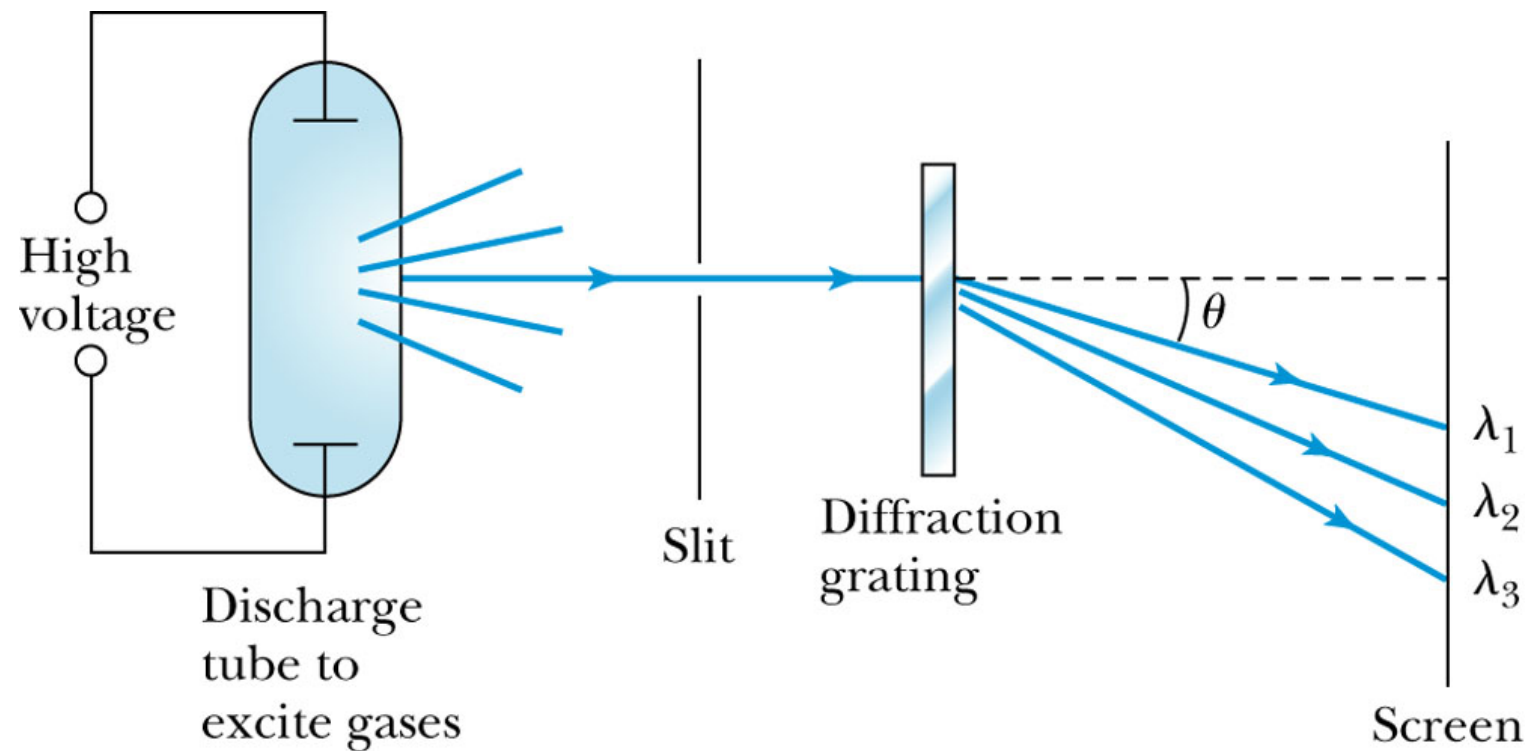
Spectral Lines



- 1814-1824: Von Fraunhofer discovered absorption lines in sun.
- 1850's: Kirchhoff discovered characteristic emission lines of elements
- 1859: Kirchhoff and Bunsen discovered new elements, Cesium and Rubidium, by first observing their spectral lines.



Demo



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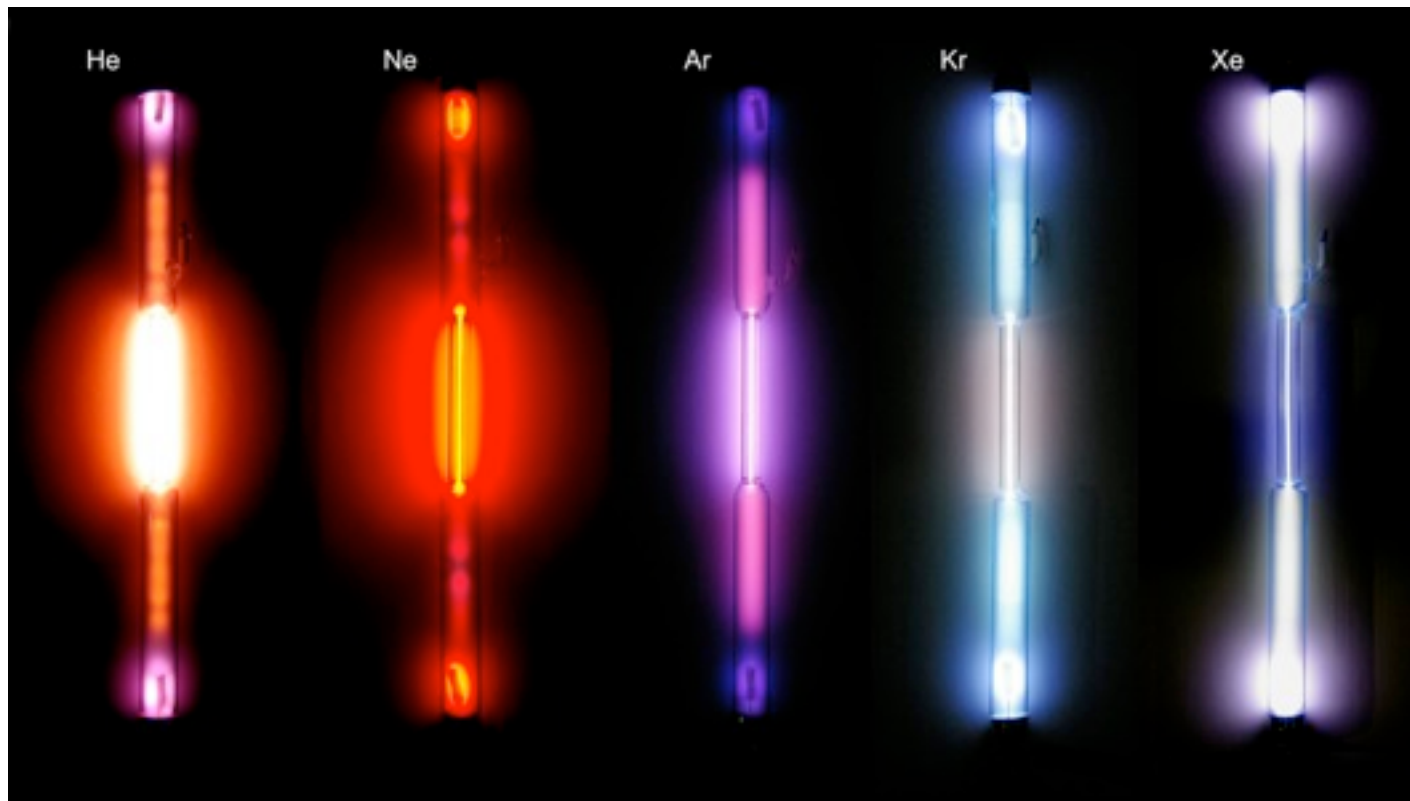


Image: <http://arborsci.com>
<http://chemistry.about.com>
Thornton & Rex

Concept Test

- A bright star shines through a dark gaseous nebula. The spectrum of this star will consist primarily of
 - Bright Lines
 - Dark Lines  Star = “light bulb”
 - Neither

Balmer Series

- 1885: Balmer found a formula for the wavelengths of the spectral lines in Hydrogen:

$$\frac{1}{\lambda} = R_H \left(\frac{1}{4} - \frac{1}{n^2} \right)$$

where $n=3,4,5,\dots$

The constant R_H is Rydberg's constant:

$$R_H = 1.096776 \times 10^7 \text{ m}^{-1}$$

Rydberg Equation

Table 3.2 Hydrogen Series of Spectral Lines

Discoverer (year)	Wavelength	n	k
Lyman (1916)	Ultraviolet	1	>1
Balmer (1885)	Visible, ultraviolet	2	>2
Paschen (1908)	Infrared	3	>3
Brackett (1922)	Infrared	4	>4
Pfund (1924)	Infrared	5	>5

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$$\frac{1}{\lambda} = R_H \left(\frac{1}{n^2} - \frac{1}{k^2} \right) \quad R_H = 1.096776 \times 10^7 \text{ m}^{-1}$$

Image: Thornton and Rex