Discharge Spectral Series Classification

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

Balmer's observations of the visible spectrum of Hydrogen lines gave:

$$\lambda = (\text{constant}) \times \frac{m^2}{m^2 - 2^2}; (\text{constant}) = 364.5\text{nm}; m > 2$$

Per Rydberg and Ritz (1890): Rydberg Equation

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

n>k

Balmer's equation becomes then:

$$\frac{1}{\lambda} = R_H \left(\frac{1}{2^2} - \frac{1}{k^2} \right); k > 2$$

Paschen series for Infrared spectrum gave

$$\frac{1}{\lambda} = R_H \left(\frac{1}{3^2} - \frac{1}{k^2} \right); k > 3$$

Lyman's observations of the UV spectrum gave:

$$\frac{1}{\lambda} = R_H \left(1 - \frac{1}{k^2} \right); k > 1$$

Brackett's observations in another Infrared spectrum gave:

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

Pfund's observations in yet another Infrared spectrum gave:

$$\frac{1}{\lambda} = R_H \left(\frac{1}{5^2} - \frac{1}{k^2} \right); k > 4$$

As a note: 1 Angstrom = 0.1 nm = 1×10^{-10}m