Balmer and Rydberg

The frequencies of lines in the visible spectrum of the Hydrogen atom were known for some time and the pattern they formed was not deduced until 1885 when Johann Balmer showed that the frequencies (in wavenumbers) satisfied the equation

$$\tilde{\nu} = 109680\left(\frac{1}{2^2} - \frac{1}{n^2}\right) cm^{-1} \quad n = 3,4,5,\cdots$$

Sometime latter when the ultraviolet and infrared frequencies were known Johannes Rydberg accounted for all observed frequencies with a generalized Balmer formula

$$\tilde{\nu} = 109680\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) cm^{-1} \quad n_2 > n_1$$

The constant 109680 cm^{-1} is represented by R_H and is called the Rydberg and this equation is usually written as

$$\tilde{\nu} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) cm^{-1} \quad n_2 > n_1$$