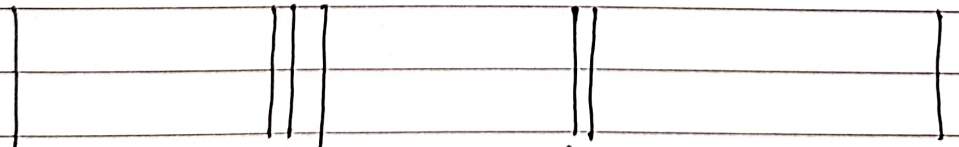
History of Spectroscopy:

In 1966 Newton observed seven colours in the solar rays through dispersion from a prism. He named band of seven colours a spectrum. This was the birth of this new branch of science which was later on known as spectroscopy. (study of a light source through its spectrum.

Though Newton produced solar spectrum for the first time yet he was not a keen observer of the spectrum because he could not observe many dark lines present in it.

1817 Fraunhofer

Nearly 150 yrs later, Fraunhofer observed many dark lines present in the solar spectrum. He designated eight prominent visible dark lines by the first eight alphabet of English letter as A, B, C ----- H.



H	E	D	A
Violet	Green	Yellow	Red
Ionized Calcium	Iron	Sodium	Hydrogen

But Fraunhofer could not explain the origin of these dark lines. These are known as Fraunhofer dark lines of solar spectrum.

1859 - Kirchoff

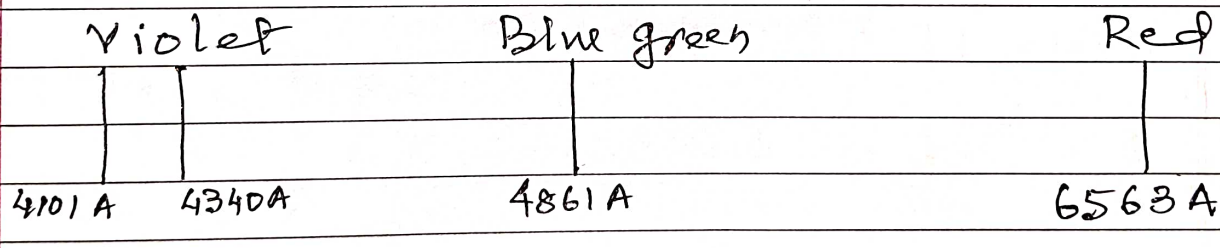
Kirchoff observed that
(i) Every substance emits light which depends on its temperature and the substance itself.
(ii) Every substance absorbs light which is maximum for those which it tends to emit.

1882 - Rowland

Rowland developed gratings with which he managed to measure the wavelength of entire dark lines of solar spectrum.

1885 - Balmer

Balmer observed the four lines of hydrogen in the visible region with the following wavelength



He also obtained the following relation

$$\lambda = h \frac{n_2^2}{n_2^2 - n_1^2} \quad \text{---} \quad (1)$$

where $n_1 = 2$
$n_2 = 3, 4, 5$
$h = 3645.6$

Rydberg :

He developed relation in terms of frequency

$$\frac{c}{\nu} = h \frac{n_2^2}{n_2^2 - n_1^2}$$

$$\& \quad \frac{\nu}{c} = \frac{1}{h} \frac{n_2^2 - n_1^2}{n_2^2}$$

$$\& \quad \nu = \frac{c}{h}\left(1 - \frac{n_1^2}{n_2^2}\right)$$

$$= \frac{c}{h} - \frac{c}{h}\frac{n_1^2}{n_2^2}$$

$$= \nu_\infty - \frac{\text{Const.}}{n_2^2}$$

$$= \nu_\infty - \frac{R}{(n+\mu)} \quad \text{---} (2)$$

$n = 2, 3, 4$

μ = a constant.

1913 - Bohr

Bohr put forwarded the proper explanation and obtained the expression

$$\nu = R Z^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

where for hydrogen

$Z = 1$

$n_1 = 2$

$n_2 = 2, 3, 4$

$$R = \frac{2\pi^2 m e^4}{ch^3} = 109722 \text{ cm}^{-1}$$

Bohr for the first time linked the internal mechanism with the production of light.