BOHR'S THEORY

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1 Introduction

In atomic physics, the Rutherford–Bohr model or Bohr model, introduced by Niels Bohr in 1913, depicts the atom as a small, positively charged nucleus surrounded by electrons that travel in circular orbits around the nucleus—similar in structure to the solar system, but with attraction provided by electrostatic forces rather than gravity. After the cubic model (1902), the plum-pudding model (1904), the Saturnian model (1904), and the Rutherford model (1911) came the Rutherford–Bohr model or just Bohr model for short (1913). The improvement to the Rutherford model is mostly a quantum physical interpretation of it. The Bohr model has been superseded, but the quantum theory remains sound.

2 Bohr Theory

A theory of atomic structure in which the hydrogen atom (Bohr atom,) is assumed to consist of a proton as nucleus, with a single electron moving in distinct circular orbits around it, each orbit corresponding to a specific quantized energy state: the theory was extended to other atoms.

3 The Postulates

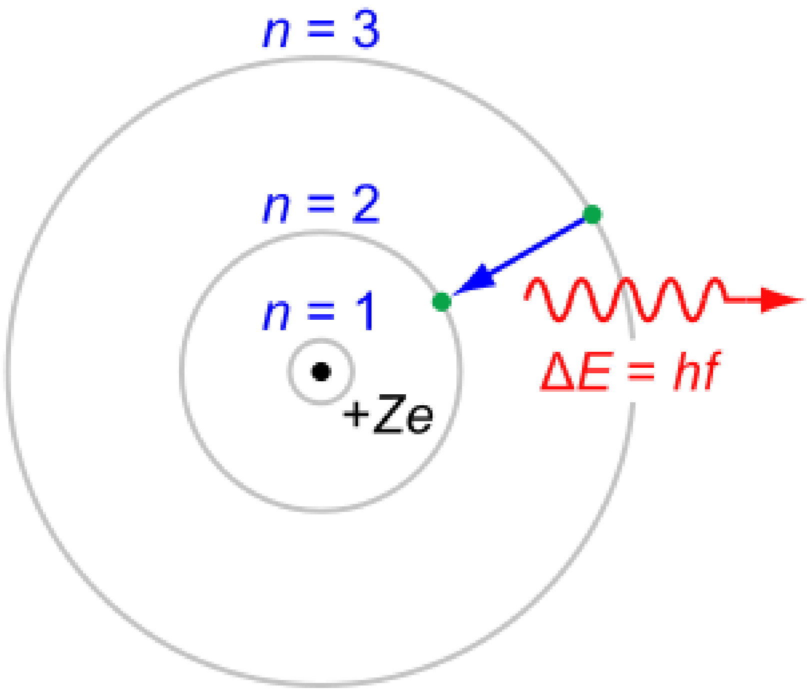
Every atom consists of nucleus and suitable number of electrons revolved around the nucleus in circular orbits.

Electrons revolved only in certain non-radiating orbits called stationery orbits for which the total angular momentum is an integral multiple of h/2p where h is plank's constant.

Radiation occurs when an electron jumps from one permitted orbit to another. It is emitted when electron jumps from higher orbit to a lower orbit

4 Bohr model

The Rutherford–Bohr model of the hydrogen atom (Z = 1) or a hydrogen-like ion (Z ¿ 1), where the negatively charged electron confined to an atomic shell encircles a small, positively charged atomic nucleus and where an electron jump between orbits is accompanied by an emitted or absorbed amount of electromagnetic energy (h).[1] The orbits in which the electron may travel are shown as grey circles; their radius increases as n2, where n is the principal quantum number. The 3 2 transition depicted here produces the first line of the Balmer series, and for hydrogen (Z = 1) it results in a photon of wavelength 656 nm (red light).



5 Lyman Series

In physics and chemistry, the Lyman series is a hydrogen spectral series of transitions and resulting ultraviolet emission lines of the hydrogen atom as an electron goes from n 2 to n = 1 (where n is the principal quantum number) the lowest energy level of the electron.

$$\frac{1}{lambda} = R_H \left(1 - \frac{1}{n^2}\right) \qquad \left(R_H \approx 1.0968{\times}10^7\, m^{-1} \approx \frac{13.6\, eV}{hc}\right)$$

6 Balmer Series

The Balmer series or Balmer lines in atomic physics, is the designation of one of a set of six named series describing the spectral line emissions of the hydrogen atom.

$$\lambda \ = B\left(\frac{n^2}{n^2 - m^2}\right) = B\left(\frac{n^2}{n^2 - 2^2}\right)$$

7 Paschen Series

The Paschen lines all lie in the infrared band.[9] This series overlaps with the next (Brackett) series

$$\frac{1}{lambda} = R\left(\frac{1}{1^2}\frac{1}{n^2}\right)$$