BOHR'S THEORY

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1 Introduction

Niels Bohr suggested that the problem about hydrogen spectrum can be solved if we can make some assumptions. According to classical theory, the frequency of the electromagnetic waves emitted by a revolving electron is equal to the frequency of revolution. As the electrons radiate energy, their angular velocities would change continuously and they would emit a continuous spectrum against line spectrum actually observed. So, Bohr concluded that even if electromagnetic theory successfully explained the macroscopic phenomenon, it could not be applied to explain microscopic phenomenon, that in atomic scale. So he made bold suggestions called as Bohr's postulates.

2 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

3 Bohr model

Bohr began with the assumption that electrons were orbiting the nucleus, much like the earth orbits the sun.

From classical physics, a charge traveling in a circular path should lose energy by emitting electromagnetic radiation

If the "orbiting" electron loses energy, it should end up spiraling into the nucleus (which it does not). Therefore, classical physical laws either don't apply or are inadequate to explain the inner workings of the atom

Bohr borrowed the idea of quantized energy from Planck: He proposed that only orbits of certain radii, corresponding to defined energies, are "permitted".

An electron orbiting in one of these "allowed" orbits: Has a defined energy state, Will not radiate energy, Will not spiral into the nucleus.