Defects of Bohr's Model

(i) It cannot explain the spectrum of atoms containing more than one electron.

(ii) If the source of atom is placed in magnetic or electric field, each spectral line of H-spectrum gets split into two or more closely spaced lines.

This splitting of spectral lines in magnetic field is called Zeeman's effect and in electric field it is called Stark-effects.

Sommerfeld Modifications

In order to explain the splitting of spectral lines in magnetic and electric field, Sommerfeld modified the Bohr model of atomic structure as given below:

(a) Each orbit except the first orbit is made up of sub-orbit which may be circular or elliptical.

(b) The various sub-orbits of an orbit have very slightly different energies. The energies of sub-orbits are also quantized.

He introduced subsidiary quantum no. k.

So that $\frac{\text{Principal Quantum no.}}{\text{Subsidiary quantum no.}} = \frac{n}{k}$

$= \frac{\text{length of major axis of sub-orbit}}{\text{length of minor axis of the same sub-orbit.}}$