Similarity between de-Broglie's Wave character of the electron and Bohr's Theory

1. Quantisation of Angular Momentum:-

According to de-Broglie the electron is not a Solid Particle revolving round the Nucleous in a Circular orbit, but it is a standing Wave extended round the Nucleous in a Circular Orbit.

If r be the Radius of the Circular Orbit then its Circumference of the Orbit is equal to $2\pi r$.

Now if λ is Wave length (Which is a Wholenumber like 1,2,3... associated with the electron Wave extending round the Nucleous.

For the Wave to remain Continually in Phase the Circumference of the Orbit should be integral multiple of Wave length λ.

i.e $$2\pi r = n\lambda \quad \text{——(ii)}$$

we know, $$\lambda = \frac{h}{mv}$$

Now Substituting the value λ in equation (ii)

$$2\pi r = n \cdot \frac{h}{mv}$$

or $$mvr = n \cdot \frac{h}{2\pi} \quad \left[mvr = n \cdot \frac{h}{2\pi}\right] \text{—(iii)}$$

It is same as Bohr's Second Postulate.

Electron Can move only in Such Orbits for Which the angular momentum must be integral multiple of $\frac{h}{2\pi}$.

Thus de-Broglie relation Provides a theoretical basis for the Bohr's 2nd Postulate.

——×——

Note:- The verification of Wave Nature of Electron by Davision & Germer Expt.