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## Introduction & Origin of Liquid Drop Model

The **Liquid Drop Model** is an important nuclear model used to explain the structure and stability of atomic nuclei.

### Points:

- The Liquid Drop Model was proposed by **Niels Bohr** and **John Archibald Wheeler**.
- In this model, the nucleus is treated as a **drop of incompressible liquid**.
- Protons and neutrons (nucleons) are assumed to be closely packed, similar to molecules in a liquid.
- The model explains the **collective behavior** of nucleons.
- It is most suitable for **medium and heavy nuclei**.

### Diagram :

- Draw a **spherical nucleus**
- Label inside: *Uniform nuclear matter*
- Caption: *Nucleus as a liquid drop*

## Basic Assumptions of Liquid Drop Model

The model is based on the following assumptions:

### Points:

- The nucleus behaves like an **incompressible liquid drop**.
- Nuclear forces are **short-range** and act only between neighboring nucleons.
- Each nucleon interacts with a limited number of nearby nucleons.
- Nucleons at the **surface** are less tightly bound than those inside.
- Nuclear density remains **almost constant** for all nuclei.

### Diagram :

- Draw a circle
- Show surface nucleons with fewer bonds
- Label: *Surface nucleons are less bound*

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The Liquid Drop Model explains nuclear binding energy using the **Semi-Empirical Mass Formula (SEMF)**.

### Diagram :

- Draw a nucleus with outward arrows
  - Label: *Coulomb repulsion between protons*
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## Explanation of Nuclear Fission

The Liquid Drop Model successfully explains the process of **nuclear fission**.

### Points:

- In heavy nuclei, Coulomb repulsion competes with surface tension.
- The nucleus becomes elongated and develops a narrow neck.
- When repulsive forces exceed surface tension, the nucleus splits.
- Two smaller nuclei and a large amount of **energy** are released.
- This model explains the fission of **U-235** and **Pu-239**.

### Diagram :

- Draw an elongated nucleus
- Show splitting into two smaller drops
- Label: *Nuclear fission (liquid drop analogy)*

## Merits, Limitations & Applications

### Merits:

- Explains nuclear **binding energy** successfully.
- Accounts for **nuclear fission and fusion**.
- Useful for understanding **medium and heavy nuclei**.

### Limitations:

- Cannot explain **magic numbers**.
- Fails to explain nuclear **spin and magnetic moments**.
- Not accurate for **light nuclei**.

### Applications:

- Nuclear reactor design
- Calculation of nuclear energy
- Understanding nuclear stability and fission processes