

## Achievement of Liquid drop model.

1. Stable nucleus - We can explain the stability of a nucleus on the liquid drop model. The stability of a liquid drop is due to the force of cohesion between the molecules. Similarly the stability of a nucleus is due to the binding energy of each nucleus. Just as to remove a molecule from a liquid drop energy <sup>has</sup> to be supplied to it in the form of heat, energy will have to be supplied to the nucleus equal to or greater than its binding energy to remove it. Hence the stability of the nucleus.

2. Radioactive nucleus - In a liquid with the increase of temperature, the thermal agitation of its molecules becomes more and more rapid and at a particular stage evaporation may take place. A molecule in a liquid drop, evaporates by gaining energy from its neighbouring molecules during the process of collisions. Similarly a nucleon or a group of nucleons may leave the nucleus by gaining energy from the neighbouring nucleons during the process of collisions, thus exhibiting the phenomenon of radioactivity.

3. Artificial radioactivity - The liquid drop model explains the phenomenon of artificial radioactivity. It is supposed that when a nucleus is bombarded by fast moving particles, an incoming particle enters the target nucleus forming a compound nucleus. It quickly shares its energy with the nucleus already present so that no single particle has sufficient energy for escape. The decay or disintegration of the compound nucleus occurs when the energy is again accidentally concentrated on some one particle which escapes giving rise to the phenomenon of artificial radioactivity or the energy may be lost by emission of a  $\gamma$ -ray.

4. Fission - The liquid drop model also explains the phenomenon of nuclear fission. According to the liquid drop model, the nucleus is assumed to be like a drop of a liquid with certain analogies.

Then if a thermal neutron hits the nucleus, a

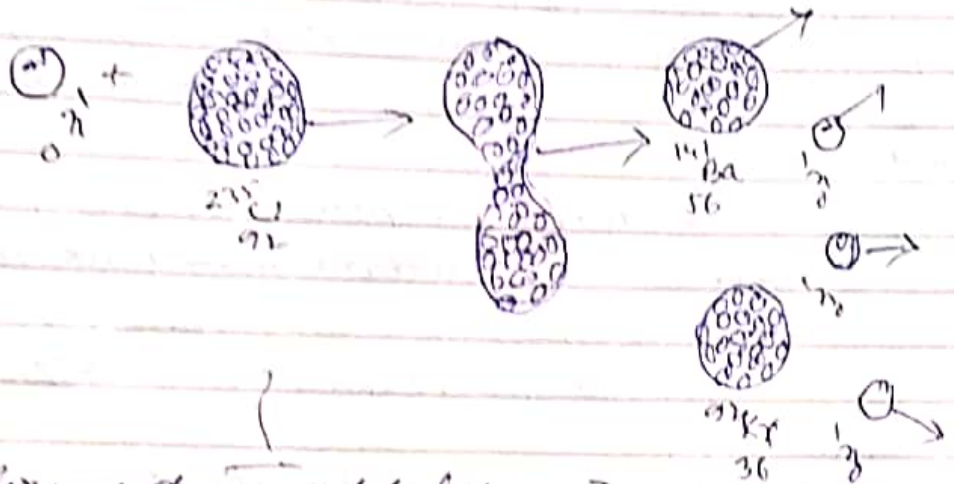
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Compound nucleus is formed with certain exciting energy due to the extra neutron. This energy set off the compound liquid drop nucleus into a rapid oscillation. As a result, the nucleus takes the dumbbell like shape as shown in the fig and due to the positive charge repulsion on the two ends splits into two fragments hence forming daughter two nuclei.

This is the phenomena of nuclear fission and the liquid drop model explains it quite well.



(5) The liquid drop model help us to calculate the atomic masses and binding energies of the nuclei quite accurately.