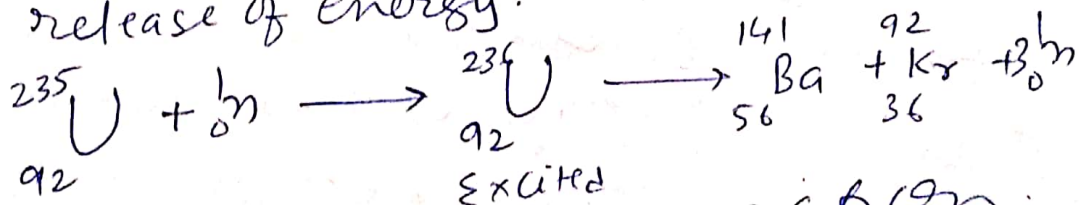


Concept of Critical Mass
in the Fission Chain Reaction

Nuclear fission reaction is accompanied by the release of enormous amount of energy as a result of capture of a neutron and further emission of two or more neutrons. The neutrons thus released may cause fission of other nuclei of ^{235}U thereby setting up a nuclear chain reaction.

Hence once started, the

fission process would be self-sustaining accompanied by a continuous release of energy.



excited
nuclear fission reaction.

— To secure a self-sustaining chain reaction in fission reaction, it is essential that the number of neutrons produced in a fission process must be at least equal to the number of neutrons absorbed in both fission and non-fission reaction plus the number of neutrons which escape from the system →

This object is achieved by decreasing
The ratio of Area of cross section to
Volume (with increase in size, the
increase in surface area is less than
the increase in volume)

Since neutrons are produced throughout
the whole volume but their escape occurs
only at the surface, hence the decrease
in surface area of cross section, the
number of neutrons which escape
from the system decreases

Thus the size of
fissionable material (whose surface
permits the escape of neutrons
to such an extent that at
least one neutron is positively
left behind per fission is
called critical size and
corresponding mass of material
is called critical mass.

Thus the mass of the fissionable
material is less than its critical mass,
nuclear fission would not be sustained.
i.e. more than critical mass is needed
for fission to be sustained