

NUCLEAR ENERGY

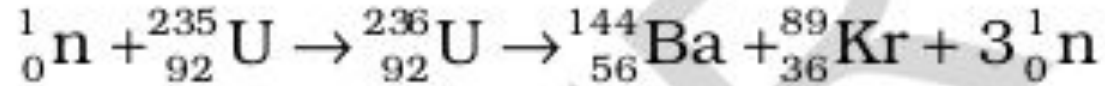
The curve of binding energy per nucleon E_{bn} has a long flat middle region between **$A = 30$ and $A = 170$** . In this region the binding energy per nucleon is nearly constant (**8.0 MeV**).

For the lighter nuclei region, **$A < 30$** , and for the heavier nuclei region, **$A > 170$** , the binding energy per nucleon is less than **8.0 MeV** , as we have noted earlier.

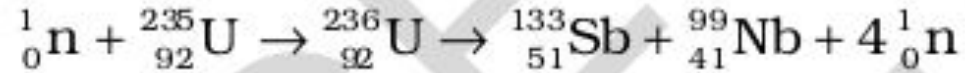
Now, the greater the binding energy, the less is the total mass of a bound system, such as a nucleus

Consequently, if nuclei with less total binding energy transform to nuclei with greater binding energy, there will be a net energy release. This is what happens when a heavy nucleus decays into two or more intermediate mass fragments (**fission**) or when light nuclei fuse into a heavier nucleus (**fusion**.)

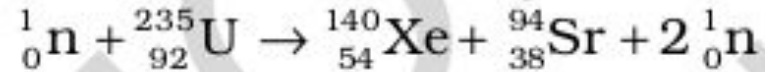
Fission



The same reaction can produce other pairs of intermediate mass fragments



Or, as another example,



the total gain in binding energy is 216 MeV

Nuclear reactor

There is a release of extra neutron (s) in the fission process. Averagely, 2.5 neutrons are released per fission of uranium nucleus (ie 2 or 3)