Difference in mass (Δm) = Mass of reactant - Mass of product
= 236.054398 u - 235.829095 u
= 0.225303 u

Hence, energy released in a fission (E) = Δm x 931 MeV
= 0.225303 x 931 MeV
= 209.76 MeV
≈ 200 MeV

Again $B.E\ per\ nucleon = \frac{E}{A} = \frac{200\ MeV}{236} = 0.8\ MeV$

Note:

- Nuclear fission was discovered by two German scientists Fritz Stresemann & Otto Hahn in 1939.
- *The energy released by 1 Kg of $_{92}U^{235}$ is about 8.2 x 10^{13} J or 2.7 x 10^{7} KWh, which is equivalent to energy liberated in an explosion of 3000 tons of coal.*
- *A neutron having energy less than 10eV is called slow neutron.*
- $1KWh = 3.6X10^{6}J$ *KWh = kilo watt hour.*

NUCLEAR FUSION:

The phenomenon in which two (or more) lighter nuclei are combined together to form a relatively heavier nucleus with the release of large amount of energy is called as Nuclear Fusion.

It takes place at very high pressure & temperature (about 10^7K). Therefore, the fusion reaction is also known as Thermonuclear Reaction.

Example: Nuclear fusion in sun, where two Deuterium nuclei $_1H^2$ are fused together to form a helium nucleus $_2He^4$ and huge amount of energy is released

i.e., $_1\mathbf{H^2} + {}_1\mathbf{H^2} \rightarrow {}_2\mathbf{He^4} + \mathbf{Q}$

Where Q is energy released in the process is about 24MeV. Here, the total initial mass of two Deuterium is greater than the total final mass of Helium nucleus. The decrease in mass is converted into energy 'Q' according to mass - energy relation ($E = mc^2$).

Energy released in Fusion:

Mass of Deuterium $_1\mathbf{H^2} = 2.014102\ u$

Mass of Helium $_2\mathbf{He^4} = 4.002604\ u$

Mass of reactant $= 2 \times 2.014102 = 4.028204\ u$

Mass of product $= 4.002604\ u$

$Difference\ in\ mass\ (\Delta m) = Mass\ of\ reactant - Mass\ of\ product$
$= 4.028204\ u - 4.002604\ u$
$= 0.0256\ u$

Hence, energy released in a fission $E = \Delta m\ x\ 931\ MeV$
$= 0.0256\ x\ 931\ MeV$
$= 23.83\ MeV$
$\approx 24\ MeV$

Again, BE per nucleon $= \frac{E}{A}$
$= \frac{24\ Mev}{4} = 6$ MeV

This shows that huge amount of energy is released during nuclear fusion.