

^2H components

^2H atom

1.007276 amu



1.008665 amu



0.000549 amu



2.016490 amu

2.014102 amu

Mass defect = 0.002388 amu

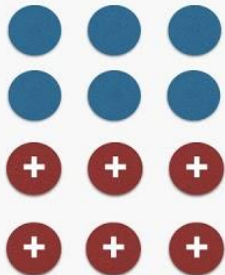
Mass Defect and Binding Energy

Binding Energy

The **binding energy** of a nucleus is the energy required to combine individual protons and neutrons into the nucleus. Some of the mass of protons and neutrons is lost to create the binding energy (following $E = mc^2$). This is where the mass defect goes. So binding energy is equal to mass defect $\times c^2$.

Before:

$$\begin{aligned} & 6(1.007276 \text{ u}) \\ & + 6(1.008665 \text{ u}) \\ \hline m & = 12.095646 \text{ u} \end{aligned}$$



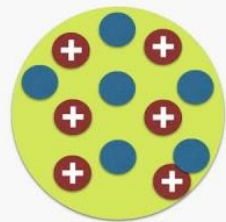
$$\begin{aligned} & \frac{12.095646 \text{ u}}{-12.000000 \text{ u}} \\ \text{Mass Defect} & = 0.095646 \text{ u} \quad m = 12.000000 \text{ u} \end{aligned}$$

$$(0.095646 \text{ u}) \frac{1.661 \times 10^{-27} \text{ kg}}{1 \text{ u}} = 1.589 \times 10^{-28} \text{ kg}$$

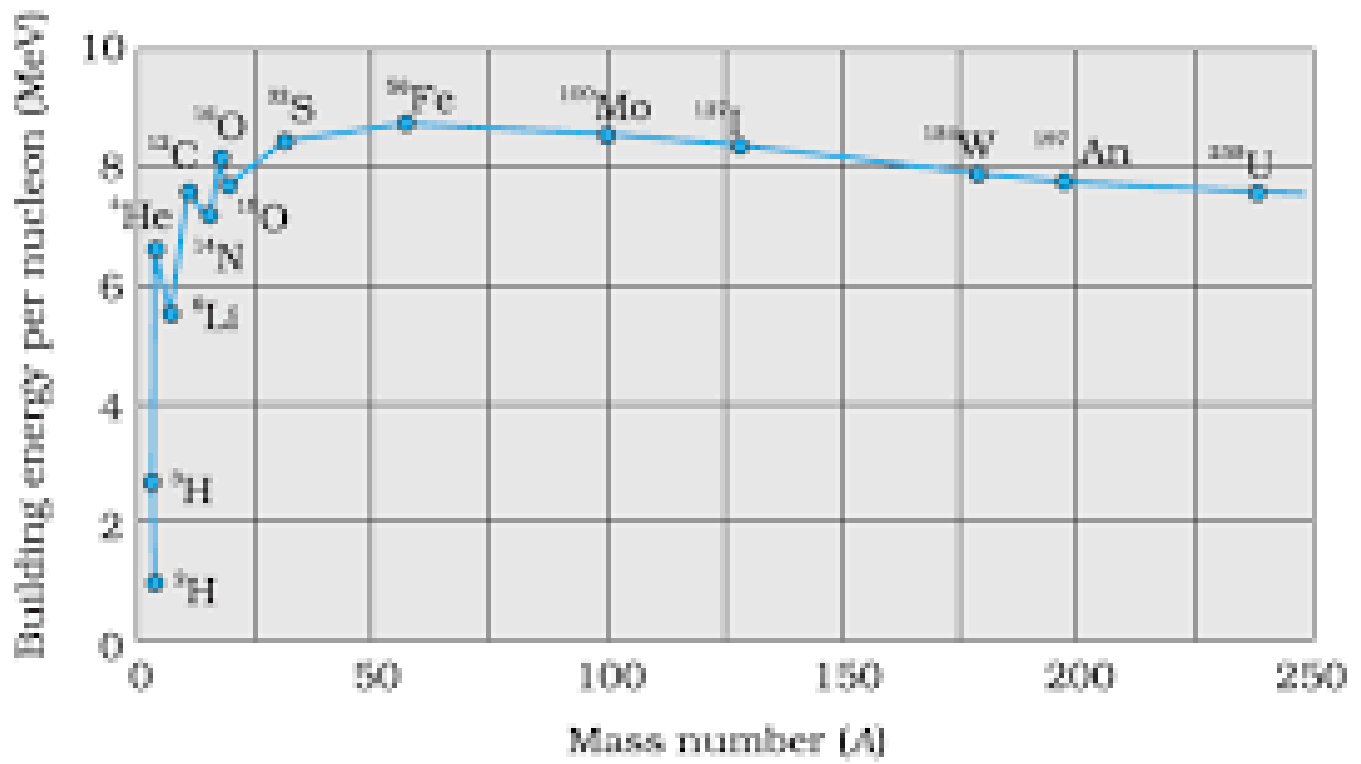
$$\text{Binding Energy} = (1.589 \times 10^{-28} \text{ kg}) \times (3.00 \times 10^8 \text{ ms}^{-1})^2$$

$$= 1.430 \times 10^{-11} \text{ J}$$

After:



$$\text{Binding Energy} = (\text{Mass Defect}) \times c^2$$



The binding energy per nucleon as a function of mass number.