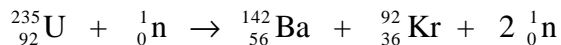


Unit 6 • What is the Nucleus Like?

ENERGY FROM NUCLEAR REACTIONS

1. Calculate the mass difference (mass defect) when one atom of uranium-235 is split by the impact of a neutron into barium-142 and krypton-92 releasing two neutrons. Answer in **amu** and in **kg**.



Atomic masses:

$${}_{92}^{235}\text{U} \quad 235.04 \text{ amu}$$

$${}_{56}^{142}\text{Ba} \quad 141.92 \text{ amu}$$

$${}_{36}^{92}\text{Kr} \quad 91.92 \text{ amu}$$

$${}_0^1\text{n} \quad 1.0087 \text{ amu}$$

$$1 \text{ amu} = 1.66 \times 10^{-27} \text{ kg}$$

2. Calculate the quantity of energy released when one **atom** of uranium-235 undergoes fission.

Useful constant: c (speed of light) = 3.00×10^8 m/sec

Useful formula: $E=mc^2$ (if mass is in kg and c is in m/sec, E is in Joules)

(1 Joule is enough energy to heat 5 drops of water by 1°C .) Answer in **Joules** and **kJ**.

3. Calculate the quantity of energy released when one **gram** of uranium-235 undergoes fission.

Molar Mass of U-235 = 235.0 g/mol

To compare, when we burn one gram of methane gas, CH_4 , we get **56 kJ** of energy.