

## Example Q's

Q mass of an Oxygen atom  
 = 16 (relative atomic mass)

Actual mass of an Oxygen atom  
 16u

where u is called unified atomic mass and

$1u = 1.66 \times 10^{-27} \text{ kg}$ . (given in data booklet).

Mass of Oxygen atom in kg.

$$16 \times (1.66 \times 10^{-27}) \\ = 2.7 \times 10^{-26} \text{ kg}.$$

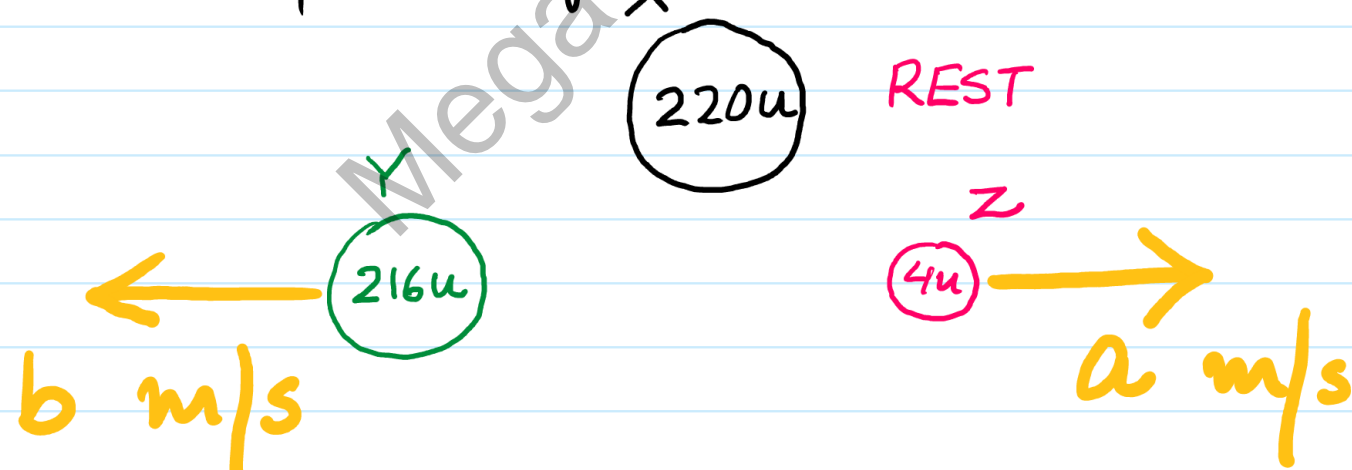
Q. mass of an Helium atom

Relative = 4

Actual = 4u

$$\text{Calculate} = 4 \times (1.66 \times 10^{-27}) \\ = 6.6 \times 10^{-27} \text{ kg}.$$

Q :: A nucleus X (220u) is initially at REST. It splits into 2 fragments Y and Z of masses (216u) and (4u) respectively as shown.



(i) Given that K.E of Z is  $1.0 \times 10^{-13} \text{ J}$

(a) Cal Speed of Z ?

$$\text{K.E} = 1.0 \times 10^{-13} \text{ J} \\ \frac{1}{2} \times (4u) \times a^2 = 1.0 \times 10^{-13} \\ \frac{1}{2} \times (4 \times 1.66 \times 10^{-27}) \times a^2 = 1.0 \times 10^{-13} \\ a = 5.5 \times 10^6 \text{ m/s}.$$

(b) Hence calculate Speed of Y ?

$$\text{M.I} \quad \rightarrow \quad 0 = (4u)(5.5 \times 10^6) + (216u)(-b) \\ (216u)(b) = (4u)(5.5 \times 10^6) \\ b = 1.0 \times 10^5 \text{ m/s}$$

$$\text{M.2} \quad \text{general formula} \quad MV = mv \\ (216u)(b) = (4u)(5.5 \times 10^6) \\ b = 1.0 \times 10^5 \text{ m/s}$$

M.3 Compare mass of Y : Z

$$\frac{m_Y}{m_Z} = \frac{216u}{4u} = \frac{54}{1}$$

$$\frac{v_Y}{v_Z} = \frac{1}{54}$$

$$\text{hence } v_Y = \frac{1}{54} \times 5.5 \times 10^6$$

$$b = v_Y = 1.0 \times 10^5 \text{ m/s}.$$