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$E = E_{k,Pb} + E_{k,He}$

$E_{k,Pb}$ – energia kinetyczna jądra ołowiu

$E_{k,He}$ – energia kinetyczna jądra helu

$$E_{k,Pb} = \frac{m_{Pb} v_{Pb}^2}{2}$$

m_{Pb} → masa jądra ołowiu

v_{Pb} → szybkość jaką uzyskało jądro ołowiu

$$E_{k,He} = \frac{m_{He} v_{He}^2}{2}$$

m_{He} → masa jądra helu

v_{He} → szybkość jaką uzyskało jądro helu

$p_{Pb} = p_{He}$ →

$$m_{Pb} v_{Pb}^2 = m_{He}^2 v_{He}^2$$

$$v_{He}^2 = \frac{m_{Pb}^2}{m_{He}^2} v_{Pb}^2$$

$$E_{k,He} = \frac{m_{He} \cdot v_{He}^2}{2} = \frac{m_{He} \cdot \frac{m_{Pb}^2}{m_{He}^2} v_{Pb}^2}{2} = \frac{\frac{m_{Pb}^2}{m_{He}} v_{Pb}^2}{2}$$

$E_k = E_{k,Pb} + E_{k,He}$

$$E_k = \frac{m_{Pb} v_{Pb}^2}{2} + \frac{\frac{m_{Pb}^2}{m_{He}} v_{Pb}^2}{2}$$

$$E = \frac{m_{Pb} + \frac{m_{Pb}^2}{m_{He}}}{2} \cdot v_{Pb}^2$$

→ $E_{k,Pb} = \frac{m_{Pb} v_{Pb}^2}{2}$

$$v_{Pb}^2 = \frac{2E}{m_{Pb} + \frac{m_{Pb}^2}{m_{He}}}$$

$$E_{k,Pb} = \frac{m_{Pb} v_{Pb}^2}{2} = m_{Pb} \cdot \frac{E}{m_{Pb} + \frac{m_{Pb}^2}{m_{He}}} = \frac{E}{\frac{1}{m_{Pb}}\left(m_{Pb} + \frac{m_{Pb}^2}{m_{He}}\right)} = \frac{E}{1 + \frac{m_{Pb}}{m_{He}}}$$

$$E_{k,He} = \frac{m_{He} v_{He}^2}{2} = \frac{m_{He} \cdot \frac{2E}{m_{He} + \frac{m_{He}^2}{m_{Pb}}}}{2} = \frac{m_{He} \cdot \frac{2E}{m_{He} \cdot \frac{m_{He} + m_{Pb}}{m_{Pb}}}}{2} = \frac{E}{\frac{m_{He} + m_{Pb}}{m_{Pb}}} = \frac{E}{1 + \frac{m_{He}}{m_{Pb}}}$$

$$v_{He}^2 = \frac{2E}{m_{He} + \frac{m_{He}^2}{m_{Pb}}}$$

$$v_{He}^2 = \frac{2E}{\frac{m_{He} m_{Pb} + m_{He}^2}{m_{Pb}}}$$

$$v_{He}^2 = \frac{2E}{\frac{m_{He}(m_{Pb} + m_{He})}{m_{Pb}}}$$

$$v_{He}^2 = \frac{2E m_{Pb}}{m_{He}(m_{Pb} + m_{He})}$$