2022 Ph H1 Q14

Section: Particles and Waves

Topic: Nuclear Reactions

Question Summary

Reaction: $^{240}_{94}\text{Pu} \rightarrow {}^{236}_{92}\text{U} + {}^{4}_{2}\text{He}$. Mass before = 398.626×10^{-27} kg, after = 398.615×10^{-27} kg.

Worked Solution

Mass loss $\Delta m = 0.011 \times 10^{-27}$ kg = 1.1×10^{-29} kg.

$E = \Delta m\, c^2 \approx 9.9 \times 10^{-13}$ J.

Final Answer

D — 9.9×10^{-13} J

Revision Tips

• Convert mass difference to kg.

• Use $E = \Delta m\, c^2$ with $c \approx 3 \times 10^{8}$ m s^{-1}.

• Track powers of ten carefully.