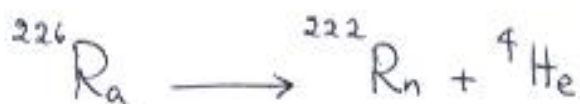


b # 39.

$$a) E = mc^2 \Rightarrow m = \frac{E}{c^2} = \frac{4 \times 10^{26} \text{ J}}{(3 \times 10^8 \text{ m/s})^2} = \boxed{4.44 \times 10^9 \text{ Kg}}$$

$$b) t = \frac{M}{m} = \frac{2 \times 10^{30}}{4.44 \times 10^9} = 4.5 \times 10^{20} \text{ sec} = \boxed{1.4 \times 10^{13} \text{ years}}$$

b # 42.



$$\Delta m = m_{\text{Ra}} - (m_{\text{Rn}} + m_{\text{He}})$$

$$= (226.0254 - 222.0175 - 4.0026) \times u$$

$$1 u = \frac{\text{mass of Carbon}}{12} = 1.6605 \times 10^{-27} \text{ Kg}$$

$$\Delta m = 0.0053 u = 8.8 \times 10^{-29} \text{ Kg}$$

$$E = \Delta m c^2 = (8.8 \times 10^{-29}) (3 \times 10^8)^2$$

$$= 7.9 \times 10^{-12} \text{ J} = \boxed{4.9 \times 10^7 \text{ eV}}$$