

64. The original amount of ^{238}U the rock contains is given by

$$m_0 = me^{\lambda t} = (3.70 \text{ mg}) e^{(\ln 2)(260 \times 10^6 \text{ y}) / (4.47 \times 10^9 \text{ y})} = 3.85 \text{ mg} .$$

Thus, the amount of lead produced is

$$m' = (m_0 - m) \left(\frac{m_{206}}{m_{238}} \right) = (3.85 \text{ mg} - 3.70 \text{ mg}) \left(\frac{206}{238} \right) = 0.132 \text{ mg} .$$