SHOW WORK

1. Provide the missing species to balance the following. (10 pts)

a) \(^{252}\text{Cf} + ^{10}\text{B} \rightarrow 3^1\text{n} + \frac{259}{103} \text{Lr}

b) ^3\text{He} + ^2\text{H} \rightarrow ^4\text{He} + \frac{1}{2} \text{P} + \text{H}

c) ^1\text{H} + ^{11}\text{B} \rightarrow 3\frac{4}{2}\text{H} + \text{e}

d) ^{122}\text{I} \rightarrow ^{122}\text{Xe} + \frac{5}{2}\text{e}

e) ^{59}\text{Fe} \rightarrow 0\frac{1}{4}\text{e} + \frac{59}{27}\text{Na}\text{O}

2. Predict the type of radioactive decay the following isotopes are likely to exhibit (4pts)

\(^{32}\text{P}\) decay

\(^{68}\text{Cu}\) decay

3. Calculate the age in years of a mummy shroud that has a present activity of 9.7 dpm if the initial activity was 16.3 dpm. The half life of \(^{14}\text{C}\) is 5715 years. (6 pts)

\[ t = \frac{t_0 \ln \frac{A_0}{A}}{\ln 2} \]

\[ t = \frac{1 \times \frac{16.3}{9.7} \times 5715 \text{ years}}{0.693} \]

\[ t = 4.3 \times 10^3 \text{ years} \]