

Physics 111 Homework Solutions Collected on Monday 9/15

Thursday, September 10, 2014

Chapter 14

Questions

- None

Multiple-Choice

-None

Problems

- None

Thursday, September 10, 2014

Chapter 14

Questions

14.1 We have an initial charge of $+15 e$ and when we remove 20 protons, the charge decreases to $-5 e$. Then removing $5 e$ makes the system neutral with a charge of $0 e$.

14.2 Since both the charge and mass has to be conserved we have ${}^{127}_{81}X \rightarrow {}^0_{-1}e + {}^{127}_{82}Y$. Thus there are 82 protons in the nucleus (we converted a neutron from the original nucleus into a proton) and $127 - 82 = 45$ neutrons in the nucleus.

Multiple-Choice

14.9 C

Problems

1.

The number of e^- is given by :

$$\frac{1e^-}{1.6 \times 10^{-19} C} \times 1C = 6.25 \times 10^{18} e^-.$$

The mass of these e^- is given by :

$$\frac{9.11 \times 10^{-31} \text{kg}}{e^-} \times 6.25 \times 10^{18} e^- = 5.69 \times 10^{-12} \text{kg}.$$

2.

The number of e^- is roughly given by :

$$\frac{1}{2} \left[\frac{M_{\text{Earth}}}{2M_{\text{proton}}} \right] = 9 \times 10^{50} e^-.$$

