Station 1—α decay

The following radioisotopes undergo alpha decay. Write the equations:

Polonium-211 $^{211}_{84}Po \rightarrow {}^{4}_{2}He + {}^{207}_{82}Pb$

Thorium-232 $^{232}_{90}Th \rightarrow {}^{4}_{2}He + {}^{228}_{88}Ra$

Bismuth-214. $^{214}_{83}Bi \rightarrow {}^{4}_{2}He + {}^{210}_{81}Tl$

Practinium-225. $^{225}_{91}Pa \rightarrow {}^{4}_{2}He + {}^{221}_{89}Ac$

Station 2—β decay

Write the equation for the beta decay of:

Uranium-233 $^{233}_{92}U \rightarrow {}^{0}_{-1}e + {}^{233}_{93}Np$

Nickel-63 $^{63}_{28}Ni \rightarrow {}^{0}_{-1}e + {}^{63}_{29}Cu$

Krypton-87 $^{87}_{36}Kr \rightarrow {}^{0}_{-1}e + {}^{87}_{37}Rb$

Actinium-228 $^{228}_{89}Ac \rightarrow {}^{0}_{-1}e + {}^{228}_{90}Th$

Station 3—β^+ emission (positron)

Write the equation for the positron emission of:

Yttrium-83 $^{83}_{39}Y \rightarrow {}^{0}_{+1}e + {}^{83}_{38}Sr$

Boron-8 $^{8}_{5}B \rightarrow {}^{0}_{+1}e + {}^{8}_{4}Be$

Holmium-158 $^{158}_{67}Ho \rightarrow {}^{0}_{+1}e + {}^{158}_{66}Dy$

Titanium-43 $^{43}_{22}Ti \rightarrow {}^{0}_{+1}e + {}^{43}_{21}Sc$

Station 4—γ decay

Complete the equations for the following:

$? + {}^{1}_{1}p \rightarrow {}^{21}_{11}Na + \gamma$ ${}^{20}_{10}Ne$

${}^{20}_{10}Na + ? \rightarrow {}^{24}_{12}Mg + \gamma$ ${}^{4}_{2}He$

${}^{20}_{9}F + ? \rightarrow {}^{0}_{-1}e + {}^{20}_{10}Ne$ ${}^{0}_{0}\gamma$

Station 5—Electron capture

Write the equation for the electron capture of:

Krypton-81

Curium-239

Argon-~~18~~ 38

Iodine-~~53~~ 125

$^{81}_{36}Kr + {}^{0}_{-1}e \rightarrow {}^{81}_{35}Br$

$^{239}_{96}Cm + {}^{0}_{-1}e \rightarrow {}^{239}_{95}Am$

$^{38}_{18}Ar + {}^{0}_{-1}e \rightarrow {}^{38}_{17}Cl$

$^{125}_{53}I + {}^{0}_{-1}e \rightarrow {}^{125}_{52}Te$

Station 6—Transmutation reactions

Complete the following equations:

$^{243}_{95}Am + {}^{1}_{0}n \rightarrow {}^{244}_{96}Cm + ? + \gamma$ $^{0}_{-1}e$

$^{241}_{95}Am + ? \rightarrow 4{}^{1}_{0}n + {}^{248}_{100}Fm$ $^{11}_{5}B$

$? + {}^{1}_{0}n \rightarrow {}^{0}_{-1}e + {}^{244}_{96}Cm$ $^{243}_{95}Am$

$^{44}_{20}Ca + ? \rightarrow \gamma + {}^{48}_{22}Ti$ $^{4}_{2}He$

Station 7—More equation writing!

Determine the particle emitted and write the balanced equation for the transmutation of:

Sodium-24 to magnesium-24

$^{24}_{11}Na \rightarrow {}^{24}_{12}Mg + {}^{0}_{-1}e$

Thorium-228 to radium-224

$^{228}_{90}Th \rightarrow {}^{224}_{88}Ra + {}^{4}_{2}He$

Phosphorus-29 to silicon-29

$^{29}_{15}P \rightarrow {}^{29}_{14}Si + {}^{0}_{+1}e$

Scandium-43 to calcium-42

$^{43}_{21}Sc \rightarrow {}^{42}_{20}Ca + {}^{1}_{1}p$