Nuclear Decay

Activity 1: Particle Soup

Question Group 1

Question 1

Identify the type of particle being described by each statement.

A high-speed electron
A helium nucleus
The anti-particle of an electron

Question 2

Identify the type of particle being described by each statement.

The anti-particle of an electron
A high-speed electron
A helium nucleus

Question 3

Identify the type of particle being described by each statement.

A helium nucleus
The anti-particle of an electron
A high-speed electron

Question Group 2

Question 4

Match the given symbols to the type of particle it describes.

$$\begin{matrix} {}^{4}_{2}\mathrm{He} & {}^{0}_{-1}\mathrm{e} & {}^{0}_{1}\mathrm{e} \end{matrix}$$

Question 5
Match the given symbols to the type of particle it describes.

$$^{0}_{-1}e \qquad ^{0}_{1}e \qquad ^{4}_{2}He$$

Question 6
Match the given symbols to the type of particle it describes.

$$^{0}_{1}e \qquad ^{4}_{2}He \qquad ^{0}_{-1}e$$

Question Group 3
Question 7
Identify the type of decay - alpha decay, beta decay, or positron emission - represented by each of the following processes:

$$^{14}_{6}C \longrightarrow {}^{14}_{7}N + {}^{0}_{-1}e$$

$$^{222}_{88}Ra \longrightarrow {}^{218}_{86}Rn + {}^{4}_{2}He$$

$$^{8}_{5}B \longrightarrow {}^{8}_{4}Be + {}^{0}_{1}e$$

Question 8
Identify the type of decay - alpha decay, beta decay, or positron emission - represented by each of the following processes:

$$^{222}_{88}\mathrm{Ra} \longrightarrow {}^{218}_{86}\mathrm{Rn} + {}^{4}_{2}\mathrm{He}$$

$$^{8}_{5}\mathrm{B} \longrightarrow {}^{8}_{4}\mathrm{Be} + {}^{0}_{1}\mathrm{e}$$

$$^{14}_{6}\mathrm{C} \longrightarrow {}^{14}_{7}\mathrm{N} + {}^{0}_{-1}\mathrm{e}$$

Question 9
Identify the type of decay - alpha decay, beta decay, or positron emission - represented by each of the following processes:

$$^{8}_{5}\mathrm{B} \longrightarrow {}^{8}_{4}\mathrm{Be} + {}^{0}_{1}\mathrm{e}$$

$$^{14}_{6}\mathrm{C} \longrightarrow {}^{14}_{7}\mathrm{N} + {}^{0}_{-1}\mathrm{e}$$

$$^{222}_{88}\mathrm{Ra} \longrightarrow {}^{218}_{86}\mathrm{Rn} + {}^{4}_{2}\mathrm{He}$$

Question Group 4
Question 10
Identify the type of decay - alpha decay, beta decay, or positron emission - represented by each of the following processes:

$$^{3}_{1}\mathrm{H} \longrightarrow {}^{3}_{2}\mathrm{He} + {}^{0}_{-1}\mathrm{e}$$

$$^{235}_{92}\mathrm{U} \longrightarrow {}^{231}_{90}\mathrm{Th} + {}^{4}_{2}\mathrm{He}$$

$$^{40}_{19}\mathrm{K} \longrightarrow {}^{40}_{18}\mathrm{Ar} + {}^{0}_{1}\mathrm{e}$$

Question 11
Identify the type of decay - alpha decay, beta decay, or positron emission - represented by each of the following processes:

$$^{235}_{92}\mathrm{U} \longrightarrow {}^{231}_{90}\mathrm{Th} + {}^{4}_{2}\mathrm{He}$$

$$^{40}_{19}\mathrm{K} \longrightarrow {}^{40}_{18}\mathrm{Ar} + {}^{0}_{1}\mathrm{e}$$

$$^{3}_{1}\mathrm{H} \longrightarrow {}^{3}_{2}\mathrm{He} + {}^{0}_{-1}\mathrm{e}$$

Question 12

Identify the type of decay - alpha decay, beta decay, or positron emission - represented by each of the following processes:

$$^{40}_{19}\mathrm{K} \longrightarrow {}^{40}_{18}\mathrm{Ar} + {}^{0}_{1}\mathrm{e}$$

$$^{3}_{1}\mathrm{H} \longrightarrow {}^{3}_{2}\mathrm{He} + {}^{0}_{-1}\mathrm{e}$$

$$^{235}_{92}\mathrm{U} \longrightarrow {}^{231}_{90}\mathrm{Th} + {}^{4}_{2}\mathrm{He}$$

Question Group 5

Question 13

Identify the type of decay - alpha decay, beta decay, or electron capture - represented by each of the following processes:

$$^{131}_{53}\mathrm{I} \longrightarrow {}^{131}_{54}\mathrm{Xe} + {}^{0}_{-1}\mathrm{e}$$

$$^{111}_{49}\mathrm{In} \longrightarrow {}^{107}_{47}\mathrm{Ag} + {}^{4}_{2}\mathrm{He}$$

$$^{30}_{15}\mathrm{P} + {}^{0}_{-1}\mathrm{e} \longrightarrow {}^{30}_{14}\mathrm{Si}$$

Question 14
Identify the type of decay - alpha decay, beta decay, or electron capture - represented by each of the following processes:

$$^{111}_{49}\mathrm{In} \longrightarrow {}^{107}_{47}\mathrm{Ag} + {}^{4}_{2}\mathrm{He}$$

$$^{30}_{15}\mathrm{P} + {}^{0}_{-1}\mathrm{e} \longrightarrow {}^{30}_{14}\mathrm{Si}$$

$$^{131}_{53}\mathrm{I} \longrightarrow {}^{131}_{54}\mathrm{Xe} + {}^{0}_{-1}\mathrm{e}$$

Question 15
Identify the type of decay - alpha decay, beta decay, or electron capture - represented by each of the following processes:

$$^{30}_{15}\mathrm{P} + {}^{0}_{-1}\mathrm{e} \longrightarrow {}^{30}_{14}\mathrm{Si}$$

$$^{131}_{53}\mathrm{I} \longrightarrow {}^{131}_{54}\mathrm{Xe} + {}^{0}_{-1}\mathrm{e}$$

$$^{111}_{49}\mathrm{In} \longrightarrow {}^{107}_{47}\mathrm{Ag} + {}^{4}_{2}\mathrm{He}$$

Question Group 6
Question 16
Identify the type of decay - alpha decay, beta decay, or electron capture - represented by each of the following processes:

$$^{12}_{5}\mathrm{B} \longrightarrow {}^{12}_{6}\mathrm{C} + {}^{0}_{-1}\mathrm{e}$$

$$^{222}_{86}\mathrm{Rn} \longrightarrow {}^{218}_{84}\mathrm{Po} + {}^{4}_{2}\mathrm{He}$$

$$^{57}_{27}\mathrm{Co} + {}^{0}_{-1}\mathrm{e} \longrightarrow {}^{57}_{26}\mathrm{Fe}$$

Question 17
Identify the type of decay - alpha decay, beta decay, or electron capture - represented by each of the following processes:

$$^{222}_{86}\mathrm{Rn} \longrightarrow {}^{218}_{84}\mathrm{Po} + {}^{4}_{2}\mathrm{He}$$

$$^{57}_{27}\mathrm{Co} + {}^{0}_{-1}\mathrm{e} \longrightarrow {}^{57}_{26}\mathrm{Fe}$$

$$^{12}_{5}\mathrm{B} \longrightarrow {}^{12}_{6}\mathrm{C} + {}^{0}_{-1}\mathrm{e}$$

Question 18

Identify the type of decay - alpha decay, beta decay, or electron capture - represented by each of the following processes:

$$^{57}_{27}\mathrm{Co} + {}^{0}_{-1}\mathrm{e} \longrightarrow {}^{57}_{26}\mathrm{Fe}$$

$$^{12}_{5}\mathrm{B} \longrightarrow {}^{12}_{6}\mathrm{C} + {}^{0}_{-1}\mathrm{e}$$

$$^{222}_{86}\mathrm{Rn} \longrightarrow {}^{218}_{84}\mathrm{Po} + {}^{4}_{2}\mathrm{He}$$

Activity 2: Decay Type
Question Group 7
Question 19
Identify the type of decay represented by the following process:

$$^{234}_{91}\mathrm{Pa} \longrightarrow {}^{234}_{92}\mathrm{U}$$

Question 20
Identify the type of decay represented by the following processes:

$$^{137}_{55}\mathrm{Cs} \longrightarrow {}^{137}_{56}\mathrm{Ba}$$

Question 21
Identify the type of decay represented by the following processes:

$$^{234}_{90}\mathrm{Th} \longrightarrow {}^{234}_{91}\mathrm{Pa}$$

Question Group 8
Question 22
Identify the type of decay represented by the following processes:

$$^{214}_{83}\mathrm{Bi} \longrightarrow {}^{214}_{84}\mathrm{Po}$$

Question 23
Identify the type of decay represented by the following processes:

$$^{206}_{80}\mathrm{Hg} \longrightarrow {}^{206}_{81}\mathrm{Tl}$$

Question 24
Identify the type of decay represented by the following processes:

$$^{210}_{83}\mathrm{Bi} \longrightarrow {}^{210}_{84}\mathrm{Po}$$

Question Group 9
Question 25
Identify the type of decay represented by the following processes:

$$^{226}_{88}\mathrm{Ra} \longrightarrow {}^{222}_{86}\mathrm{Rn}$$

Question 26
Identify the type of decay represented by the following processes:

$$^{210}_{84}\mathrm{Po} \longrightarrow {}^{206}_{82}\mathrm{Pb}$$

Question 27
Identify the type of decay represented by the following processes:

$$^{214}_{84}\mathrm{Po} \longrightarrow {}^{210}_{82}\mathrm{Pb}$$

Question Group 10
Question 28
Identify the type of decay represented by the following processes:

$$^{210}_{82}\mathrm{Pb} \longrightarrow {}^{206}_{80}\mathrm{Hg}$$

Question 29
Identify the type of decay represented by the following processes:

$$^{230}_{90}\mathrm{Th} \longrightarrow {}^{226}_{88}\mathrm{Ra}$$

Question 30
Identify the type of decay represented by the following processes:

$$^{241}_{95}\mathrm{Am} \longrightarrow {}^{237}_{93}\mathrm{Np}$$

Question Group 11
Question 31
Identify the type of decay represented by the following processes:

$$^{22}_{11}\mathrm{Na} \longrightarrow {}^{22}_{10}\mathrm{Ne}$$

Question 32
Identify the type of decay represented by the following processes:

$$^{10}_{6}\mathrm{C} \longrightarrow {}^{10}_{5}\mathrm{B}$$

Question 33
Identify the type of decay represented by the following processes:

$$^{23}_{12}\mathrm{Mg} \longrightarrow {}^{23}_{11}\mathrm{Na}$$

Question Group 12
Question 34
Identify the type of decay represented by the following processes:

$$^{22}_{11}\mathrm{Na} \longrightarrow {}^{22}_{10}\mathrm{Ne}$$

Question 35
Identify the type of decay represented by the following processes:

$$^{59}_{28}\mathrm{Ni} \longrightarrow {}^{59}_{27}\mathrm{Co}$$

Question 36
Identify the type of decay represented by the following processes:

$$^{26}_{13}\mathrm{Al} \longrightarrow {}^{26}_{12}\mathrm{Mg}$$

Activity 3: Name That Isotope
Question Group 13
Question 37
Plutonium-234 undergoes alpha decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 38
Americium-239 undergoes alpha decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 39
Neptunium-235 undergoes alpha decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question Group 14
Question 40
Radium-210 undergoes alpha decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 41
Radon-200 undergoes alpha decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 42
Polonium-195 undergoes alpha decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question Group 15
Question 43
Potassium-42 undergoes beta decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 44
Manganese-56 undergoes beta decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 45
Silver-108 undergoes beta decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question Group 16
Question 46
Tin-121 undergoes beta decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 47
Xenon-133 undergoes beta decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 48
Cesium-132 undergoes beta decay. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question Group 17
Question 49
Cesium-119 undergoes positron emission. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 50
Phosphorus-28 undergoes positron emission. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 51
Sulfur-29 undergoes positron emission. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question Group 18
Question 52
Sodium-21 undergoes electron capture. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 53
Oxygen-13 undergoes electron capture. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.

Question 54
Chlorine-31 undergoes electron capture. Identify the atomic and mass number of the product isotope by tapping on the appropriate cell of the table.