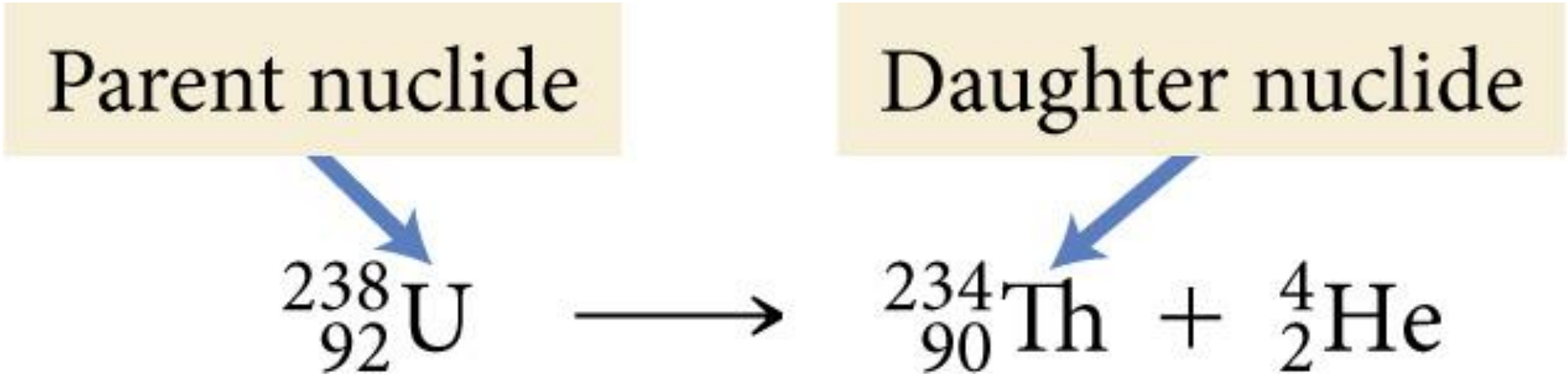
N7 - Nuclear Equations

Target: I can write nuclear equations to show how the decay reactions take place.

Link to YouTube Presentation: https://youtu.be/LrCO_eciSLQ

Nuclear Equations

- Mass numbers and atomic numbers are **conserved**.
- We can use this fact to determine the identity of a daughter nuclide if we know the parent and type of decay.



Example 1: Write the nuclear equation for the radioactive decay of polonium – 210 by alpha emission.

Step 1: Write the element that you are starting with.

Mass #

$^{210}_{84}Po$

Atomic #

Example 1: Write the nuclear equation for the radioactive decay of polonium – 210 by alpha emission.

Step 2: Draw the arrow.

Mass #

$$^{210}_{84}Po \longrightarrow$$

Atomic #

Example 1: Write the nuclear equation for the radioactive decay of polonium – 210 by alpha emission.

Step 3: Write the alpha particle.

Mass #

$$^{210}_{84}Po \longrightarrow {}^{4}_{2}He$$

Atomic #

Example 1: Write the nuclear equation for the radioactive decay of polonium – 210 by alpha emission.

Step 4: Determine other product (ensuring everything is balanced).

Mass #

$$^{210}_{84}Po \longrightarrow {}^{4}_{2}He + {}^{206}_{82}Pb$$

Atomic #

Example 2: Write the nuclear equation for the radioactive decay of radium – 226 by alpha emission.

Step 1: Write the element that you are starting with.

Mass #

$^{226}_{88}Ra$

Atomic #

Example 2: Write the nuclear equation for the radioactive decay of radium – 226 by alpha emission.

Step 2: Draw the arrow.

Mass #

$$^{226}_{88}Ra \longrightarrow$$

Atomic #

Example 2: Write the nuclear equation for the radioactive decay of radium – 226 by alpha emission.

Step 3: Write the alpha particle.

Mass #

$$^{226}_{88}Ra \longrightarrow {}^{4}_{2}He$$

Atomic #

Example 2: Write the nuclear equation for the radioactive decay of radium – 226 by alpha emission.

Step 4: Determine other product (ensuring everything is balanced).

Mass #

$$^{226}_{88}Ra \longrightarrow {}^{4}_{2}He + {}^{222}_{86}Rn$$

Atomic #

Example 3: Write the nuclear equation for the radioactive decay of zirconium – 97 by beta decay.

Step 1: Write the element that you are starting with.

Mass #

$^{97}_{40}Zr$

Atomic #

Example 3: Write the nuclear equation for the radioactive decay of zirconium – 97 by beta decay.

Step 2: Draw the arrow.

Mass #

$$^{97}_{40}Zr \longrightarrow$$

Atomic #

Example 3: Write the nuclear equation for the radioactive decay of zirconium – 97 by beta decay.

Step 3: Write the beta particle.

Mass #

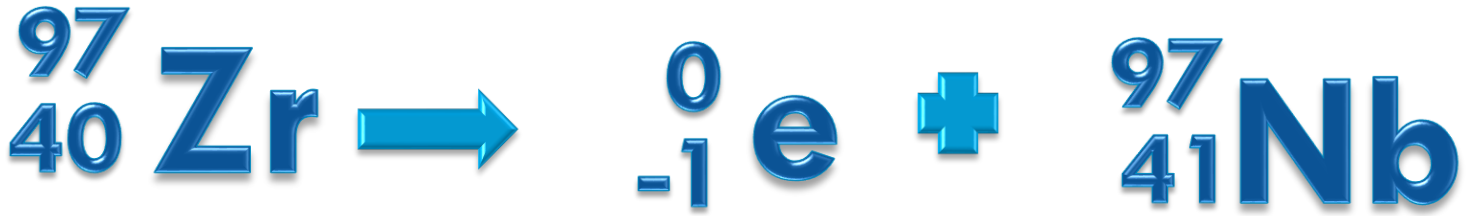
$$^{97}_{40}Zr \longrightarrow {}^{0}_{-1}e$$

Atomic #

Example 3: Write the nuclear equation for the radioactive decay of zirconium – 97 by beta decay.

Step 4: Determine other product (ensuring everything is balanced).

Mass #



Atomic #

Example 4: What type of decay is it when carbon – 14 turns into nitrogen – 14 ?

Step 1: Write the element that you are starting with.

Mass #

$^{14}_{6}C$

Atomic #

Example 4: What type of decay is it when carbon – 14 turns into nitrogen – 14 ?

-

Step 2: Draw the arrow.

Mass #

$$^{14}_{6}C \longrightarrow$$

Atomic #

Example 4: What type of decay is it when carbon – 14 turns into nitrogen – 14 ?

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Step 3: Write the daughter product this time!

Mass #

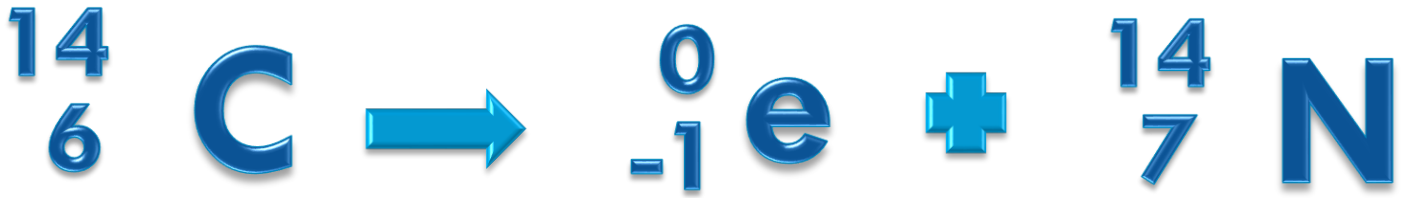
$$^{14}_{6}C \longrightarrow {}^{14}_{7}N$$

Atomic #

Example 4: What type of decay is it when carbon – 14 turns into nitrogen – 14 ?

Step 4: Determine other product (ensuring everything is balanced).

Mass #



Atomic #

Sometimes lots of parts! Still just adding/subtracting!

(2 x 1) + 235 = **237**

(3 x 0) + 237 = **237**

$$2\,{}^{1}_{0}n + {}^{235}_{92}U \rightarrow 3\,{}^{0}_{-1}e + {}^{237}_{95}Am$$

(2 x 0) + 92= **92**

(3 x -1) + 95 = **92**

By the way…This is called “neutron bombardment”

Sometimes lots of parts! Still just adding/subtracting!

0 + 218 = **218**

218 + 0 = **218**

$$_{-1}^{0}e + {}_{85}^{218}At \rightarrow {}_{84}^{218}Po + \gamma_{0}^{0}$$

(-1) + 85= **84**

84 + 0 = **84**

By the way…This is called “electron capture”

YouTube Link to Presentation

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