# Radioactive Decay - Physics.

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## Alpha Decay:-

- Alpha particle = 2 protons + 2 neutrons
- When an atom emits an alpha particle
  - Atomic number goes down by 2
  - Atomic mass goes down by 4.
- Example :-

Uranium-238 = Thorium-234 + He

Mass = 238 → 234 + 4

Atomic number → 92 : 90+2

- Some times gamma rays are also released.

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## (2) Beta Decay

- In Beta decay, a neutron changes into proton.
- A fast electron (beta particle) is released.
- Mass number doesnot change.
- Beta particle = $e^-$

Exp:-

Carbon 14 → Nitrogen-14 + $e^-$

Mass 14 → 14 + 0

Atomic number: 6 → 7 + (-1).

- New element formed

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## Gamma Rays

- Gamma rays carry away extra energy.

- They donot change mass or atomic number.
- Symbol = $\gamma$

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## Half life :-

- Half life = time for half the radioactive nuclei to decay.
- Radioactive decay is Random.
- Activity (Rate of decay) is measured in Bq (Becquerels).
- 1Bq = 1 decay per second.
- Each time a nucleus decay, activity decreases.

Half life can be short or very long.

Example :-

Neodymium-144 = 2 million billion years.

Helium-5 = $7.6 \times 10^{-21}$ second.

- Using Half life.
- To find remaing activity after half lives :-
  1. Start with initial ~~Activity~~.
  2. Divide by 2 for each half life.
  3. To get percentage (final ÷ initial) x 100
- Example :- Initial = 640Bq , 2 half lives.
  - 1st Half life = 640 ÷ 2 ⇒ 320
  - 2nd Half life = 320 ÷ 2 ⇒ 160.
  - Percentage = (160 ÷ 640) x100 ⇒ 25%.

From a graph :-

1) Find initial activity

2) Divide by 2.

3) Read time on x-axis. for this value → one half life.

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Initial :- 720Bq and . 3 half lives :-