

UG. Part II

Subsidiary.

Group - B

(Inorganic)

UNIT - IV - Radioactivity

Topic - 2

Binding forces at the nucleus.

Topic-2

Q Binding forces at the nucleus.

Binding forces at the nucleus are called nuclear forces.

Q What is a nuclear force?

Ans Nuclear force is one of the four fundamental forces of nature, the others being gravitational and electromagnetic force.

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- In fact nuclear forces are 10 million times stronger than the chemical binding forces.
- They are also known as the strong forces.
- Definition :- The nuclear force is a force that acts between the protons and neutrons of atoms.
- This force can exist between
 - 1) protons and protons
 - 2) neutrons and protons
 - and 3) neutrons and neutrons
- This force is that force which holds the nucleus together.
- The charge of protons (+ve) tends to push them away from each other with a strong electric field repulsive force a/c to collomb's law.
- But nuclear force is strong enough to keep them together and to overcome that resistance at short range.

Properties of Nuclear Force

- It is attractive in nature but with a repulsive core. That is the reason that the nucleus is held together without collapsing in itself.
- The range of a nucleus force is very short.
- The nuclear force is identical for all nucleons.
- At a distance of less than 0.7 Fermi, this force becomes repulsive.

- The repulsive component of nuclear force decides the size of the nucleus.

Example of nuclear force

- The most common example of nuclear force is the binding force of protons which are repulsive in nature because of their positive charge.

Field strength of nuclear force

- The nuclear force has a spin-dependent component.
- The force is stronger for particles with their spins aligned than for those with their spins anti-aligned.
- The nuclear force also has a tensor component which depends on the interaction between the nucleon spins and the angular momentum of the nucleons, leading to deformation from a simple spherical shape.
- The nuclear forces arising between nucleons are analogous to the forces in chemistry between neutral atoms or molecules called London forces.

Date

In short properties of nuclear forces

- 1) Nuclear forces are attractive.
- 2) Nuclear forces are charge independent
- 3) These are short range forces
- 4) Nuclear forces decreases very quickly with distance between two nucleus.
- 5) Nuclear forces are spin dependent
- 6) Nuclear forces are much stronger than electromagnetic force or gravitational attractive forces.
- 7) The force should probably affect all subatomic particles and also cause electrons to cling together.