

Chapter -13

Nuclei

- Q.1 what is atom?
- Q.2. Define a.m.u. and write it's value.
- Q.3. write the formula of relation b/w radius of atom with mass no.
- Q.4. what is nucleon?
- Q.5. Write any one example of isotopes.
- Q.6. what is mass defect?
- Q.7. what do you understand by the binding energy per ~~nucle~~ nucleon?
- Q.8. draw the graph b/w binding energy per nucleon and mass no.
- Q.9. what is radio Active element?
- Q.10. what is radio active decay law?
- Q.11. write the unit of activity of radio active element.
- Q.12. what is the meaning of half life and mean life.
- Q.13. write the meaning of nuclear fussion and nuclear fission, write one example.

Nuclei :- The centre part of the atom in which all the protons are present is known as nucleus or nuclei. The radius of nuclei is 10^{-15} and radius of atom is 10^{-10} .

$$R_n \quad r_n = 10^{-15} \text{ m}$$
$$r_a = 10^{-10} \text{ m}$$

proton and neutron is known as nucleon. And the sum of proton and neutron is known as Atomic mass, represented by A.

$$A = (\text{no. of proton}) + (\text{no. of neutron}),$$

no. of proton is called Atomic no., this is represented by Z

$$Z = \text{no. of proton}$$

$$\text{No. of neutron} = A - Z.$$

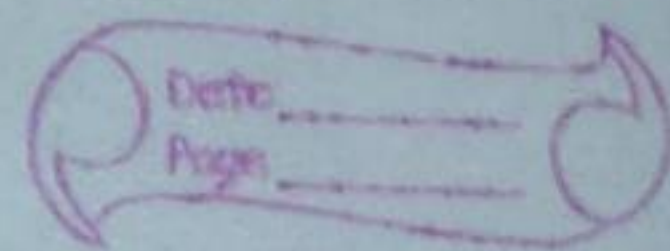
a.m.u. :- atomic mass unit :-

~~one~~ by two $\frac{1}{12}$ of the mass of ~~carbon~~ C_{12} (carbon 12) atom is known as the a.m.u. its value is $1 \text{ a.m.u.} = 1.66 \times 10^{-27} \text{ kg}$.

a

$$1 \text{ a.m.u.} = 1.66 \times 10^{-27} \text{ kg}.$$

Mass Spectroscope :- This is device by which we measure weight of electron, proton or neutron.



Mass defect :- The difference b/w calculated mass and standard mass is called mass defect.

$$\text{mass defect } (\Delta m) = [Zm_p + (A-Z)m_n] - M$$

where m_p = mass of proton = 1.67×10^{-27} kg
 m_n = mass of neutron = 1.67×10^{-27} kg
 m_e = mass of electron = 9.11×10^{-31} kg

$$m_p \text{ in a.m.u} = 1.00726 \text{ a.m.u.}$$

$$m_n \text{ in a.m.u} = 1.00866 \text{ a.m.u}$$

$$m_e \text{ in a.m.u} = 0.00055 \text{ a.m.u}$$

The required energy to bind the nucleon is known as binding energy.

(or)

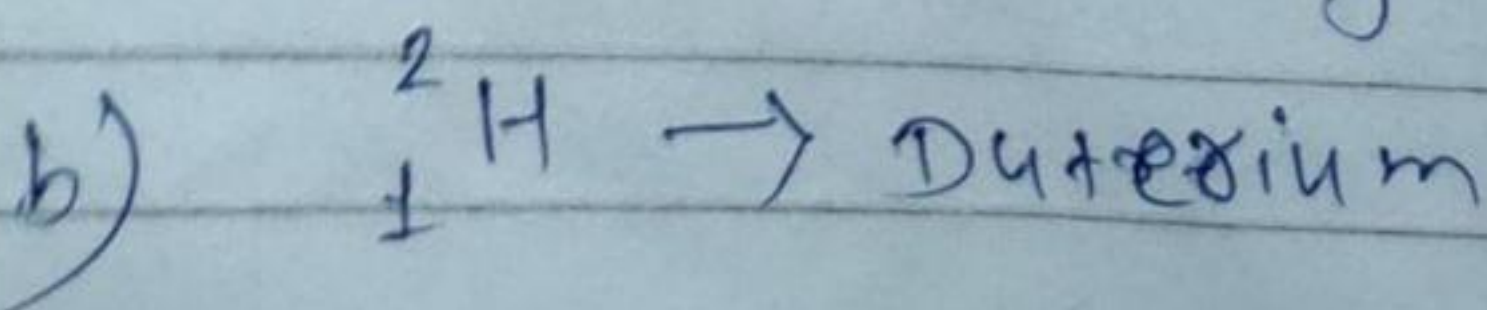
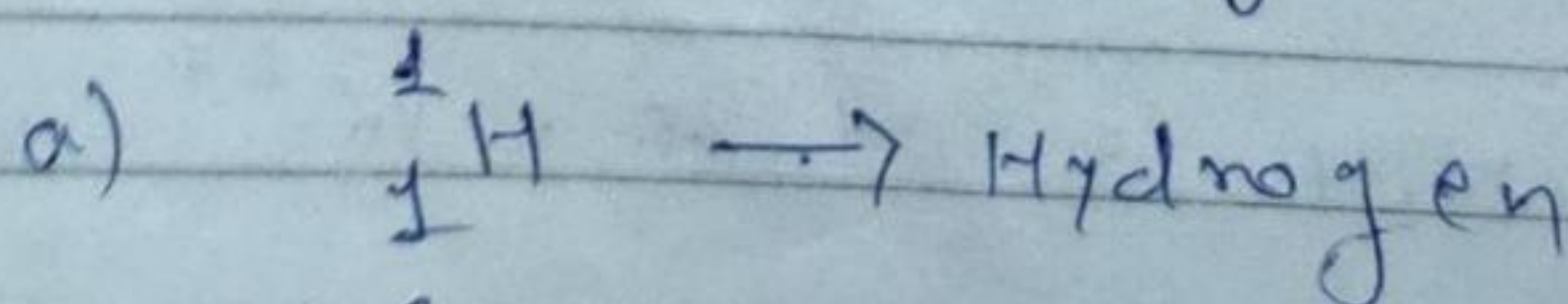
The required energy to separate the two nucleon is called binding energy.

Binding Energy per nucleon :-

$$\Rightarrow \frac{\text{Binding Energy}}{n} :-$$

The required energy to separate the nucleon.

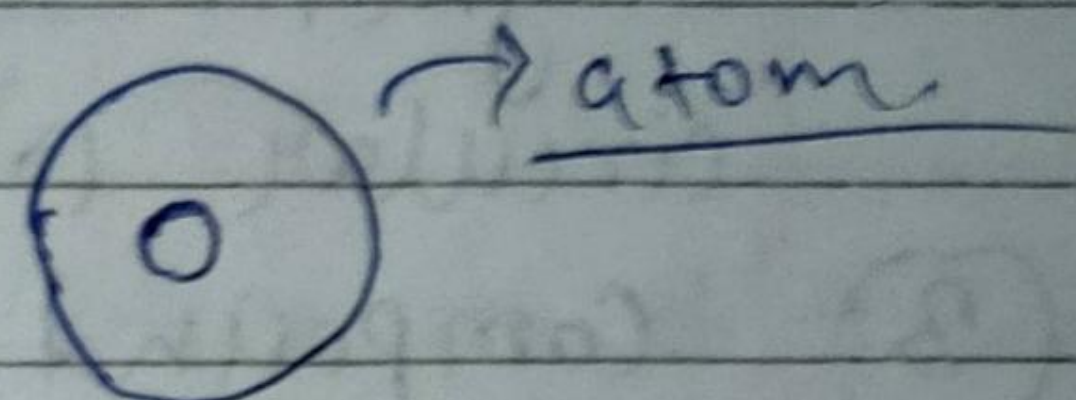
Ans. 5)



c) ${}^3_1\text{H} \rightarrow \text{Tritium}$

Ans. 3

$V_{\text{atom}} = V_{\text{nucleus}} \times A$



$$\Rightarrow \frac{4}{3} \pi R^3 = \frac{4}{3} \pi R_0^3 \times A$$

$$\Rightarrow R^3 = R_0^3 A$$

$$\Rightarrow R = R_0 (A)^{\frac{1}{3}} \quad , \quad R_0 =$$