ENTRI

Soddy Fajan Laws (Group-Displacement Laws)

- When a nuclide emits one a-particle (He^4), its mass number (A) decreases by 4 units and atomic number (Z) decreases by 2 units.

z XA --5 z 2YA 4 +2He4 + Energy

- When a nuclide emits a ß-particle, its mass number remains unchanged but atomic number increases by one unit. z XA z +1YA + + Energy

where antineutrino.

- In the nucleus, due to conversion of neutron into proton, antineutrino is produced. It has no charge or mass, but has momentum. When a proton is converted to a neutron, a neutron and a +ve ß-particle is produced, which is called as positron. ß rays are electrons and ß are the antielectrons or positrons. on + A e + U (antineutrino)

1 p +0 n ++1 e (positron) + D(neutrino)

- Antineutrino and neutrino share the energy of electrons and positrons. That is the reason why the energy ofß is continuous and ß rays has a energy maximum.

When a y particle is produced, both atomic and mass number remain constant.

ACTIVITY OF A RADIOACTIVE ISOTOPE

- The activity ofa radioactive substance (or radioisotope) means the rate of decay per second or the number of nuclei disintegrating per second. It is generally denoted by A.

dt

- If at time t = 0, the activity of a radioactive substance be A and after time t — — t s, activity be At then

$$A_0 = \left[\frac{dN}{dt}\right]_{t=0} = -\lambda N_0$$

$$A_t = \left[\frac{dN}{dt}\right]_{t=t} = -\lambda N_t$$

$$A_t = A_0 e^{-\lambda t}$$

Unit of Activity

- The activity is measured in terms of Curie (Ci). I curie is the activity of 1 g of a freshly prepared sample of radium Ra^{226}

(TIE = 1602 years.)

1 curie = 1 Ci = 3.7 >< 10 [10] dps (disintegration per second) 1 dps 'is also known as 1 Bq (becquerel).

1 3.7 x Bq