## ...nction Diode as a Rectifier ⇒

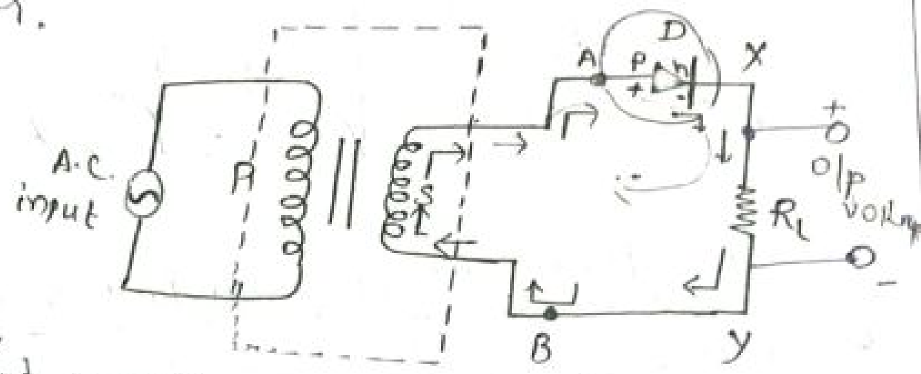
Rectifier ⇒ The process of converting alternating current into direct current is called retification and device used for this process is called rectifier.

The p-n junction can be used as:

(i) a Half-wave rectifier

(ii) a full-wave rectifier.

A Half-wave rectifier




...consists of a transformer, ...unction, diode D and a load resistance $R_L$. The primary coil ...transformer is connected to the a.c. mains and the secondary ...is connected in series with junction diode D. and load ...sistance $R_L$.

Working :→ when ac is supplied to the primary coil, the ...condary of the transformer supplies desired alternating voltage ...ross A & B. "During positive half cycle of a.c the end A is posi... ...d B is negative. the Diode D is forward biased and a current ...flows through $R_L$, i.e. I/p voltage ↑↓ then I ↑↓. and o/p = $IR_L$ ac...

...uring negative half cycle ⇒ the end A becomes negative and B posi... ...diode is reveaed biased and no current flows. No voltage ...ppears across $R_L$. In next cycle we get again o/p voltage. ...o/p voltage is unidirectional but pulsating.

...the voltage across the load appears only during the positive ...cycle of the input a.c. this process is called half wave ...ctification and this arrangement is called half wave rectifier.

## Distance of closest approach ⇒

Charge on α-particle $q_1 = +2e$

Charge on scattering nucleus $= +Ze = q_2$

where Z = atomic no. of foil atoms

$Z_{Au} = 79$

Initially K.E. of α-particle $K_\alpha = \frac{1}{2}mv^2$

Electrostatic P.E. of α-particle

$$U = K\frac{q_1 q_2}{r_0} = K\frac{2eZe}{r_0}$$

As by conservation of energy :-

$$U = K_\alpha \Rightarrow K_\alpha = U$$

$$\frac{1}{2}mv^2 = K\frac{2eZe}{r_0}$$

$$r_0 = \frac{2\times 2KZe^2}{mv^2}$$

$$\boxed{r_0 = \frac{4KZe^2}{mv^2}}$$ where $K = \frac{1}{4\pi\epsilon_0} = 9\times10^9$ Nm²

⇒ **Bohr's Quantization Condition** ⇒ Consider the motion of an electron in a circular orbit of radius $r$ around the nucleus of atom. According to de Broglie hypothesis :

$$2\pi r = n\lambda$$

or $\lambda = \frac{h}{mv}$

$$2\pi r = \frac{nh}{mv}$$

... α-particles

**Half - Life** ⇒ The time interval in which ... the radioactive nuclei originally present in the radioactive sample disintegrate is called half-life of the radioactive substance.

**Relation b/w Half-life and Decay constant** ⇒

At $t = T_{1/2}$, $N = \frac{N_0}{2}$

$\because N = N_0 e^{-\lambda t}$

$\frac{N_0}{2} = N_0 e^{-\lambda t} = N_0 e^{-\lambda . T_{1/2}}$

$\frac{1}{2} = e^{-\lambda T_{1/2}}$

$e^{\lambda T_{1/2}} = 2$

by taking long

$\lambda T_{1/2} \log_e e = \log_e 2$

$T_{1/2} = \frac{2.303 \log 2}{\lambda}$

$T_{1/2} = \frac{2.303 \times 0.3010}{\lambda}$

$$\boxed{T_{1/2} = \frac{0.693}{\lambda}}$$

**Mean life** (Avg life) :- It is the ratio of the combined age of all nuclei to the total No of nuclei present the given sample. It is denoted by $\tau$.

$$\boxed{\tau = \frac{\text{sum of the lives of all nuclei}}{\text{Total no of nuclei}}}$$

$\tau = \frac{T_{1/2}}{0.693} = 1.44\, T_{1/2}$

$$\boxed{\tau = 1.44\, T_{1/2}}$$