

Que 3 :→ How does the conductivity of Semiconductors increase?

Ans → Semiconductors conduct electricity to a very lower extent. Their conductivity is between of conductors and insulators. A absolute or they have 0 electrical conductivity. So temperature is increases to the conductivity and other way to increase the conductivity is doping.

Semiconductor are of two types.

(i) Intrinsic S/c.

(ii) Extrinsic S/c.

(i) Intrinsic S/c :→

They are pure S/c. Their conductivity is function of temp. only. No impurities are added to it.

They have very low conductivity than Extrinsic semiconductor. On (↑) temp. they show conductivity but less than Extrinsic S/c. Because their Fermi level is about half way in forbidden gap.

(ii) Extrinsic S/c :→

They are impure S/c. To increase the conductivity some impurities are added in it. On the basis of doping they are of two types:→ (1) n-type

(2) p-type.

In extrinsic S/c, as the temp. increases conductivity also increases. More e^- jump from v.B to c.B. They are free to conduct electricity. Their conductivity is very high.

(i) n-type :→ Pentavalent impurities are added with them.

e.g. group no. 15 As, P. They creates an extra free e^- 's which are free to move.

⑥ p-type \rightarrow

Trivalent impurities are doped with semi-conductor. e.g. group 13 elements Al, Ga. They create a +ve holes which accept an e^- .

As we know as number of holes and e^- increase conductivity increase.

Que-4 Compare Intrinsic and Extrinsic S/c.

<u>ANS</u> \rightarrow INTRINSIC S/c	EXTRINSIC S/c.
(1) These are pure semiconductors	(1) These are impure semiconductors.
(2) In these no material and no impurities are added to increase the conductivity.	(2) In these pentavalent and trivalent impurities are added to increase conductivity.
(3) Their electrical conductivity is low.	(3) Their electrical conductivity is high.
(4) The no. of free electrons in conduction band and no. of holes in valence band are exactly equal and very small indeed.	(4) The no. of free electrons and holes are never equal. There is excess of e^- 's in n-type S/c and excess of holes in p-type S/c.
(5) Their electrical conductivity is function of temp. only.	(5) Their electrical conductivity depends upon the temp. as well as on the quantity of impurity atom doped in structure.
(6) Example of crystalline form of pure Silicon and Germanium.	(6) Examples are Si and Ge crystal with impurity atoms of As, P, Sb, Al, B etc.
(7) At room temp. Fermi level is about half way in forbidden gap.	(7) Fermi level in forbidden gap shifts very close to conduction band.

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