

(Lecture
6)

Extrinsic Semi-Conductors

Question- What are drawbacks of ^{Pure} Semi-conductors?

Ans:-

- i) Pure Semi-conductors behave as insulator at lower temperature.
- ii) They are temperature independent.

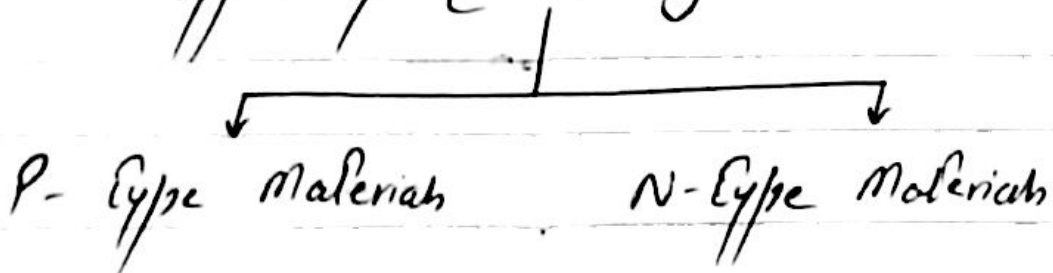
Doping:-

Process of adding impurity to pure semi-conductor is called Doping.

Doping Level

The amount of impurity added to semi-conductor is called Doping Level.

Types of Extrinsic Semi-Conductors



P-type Materials

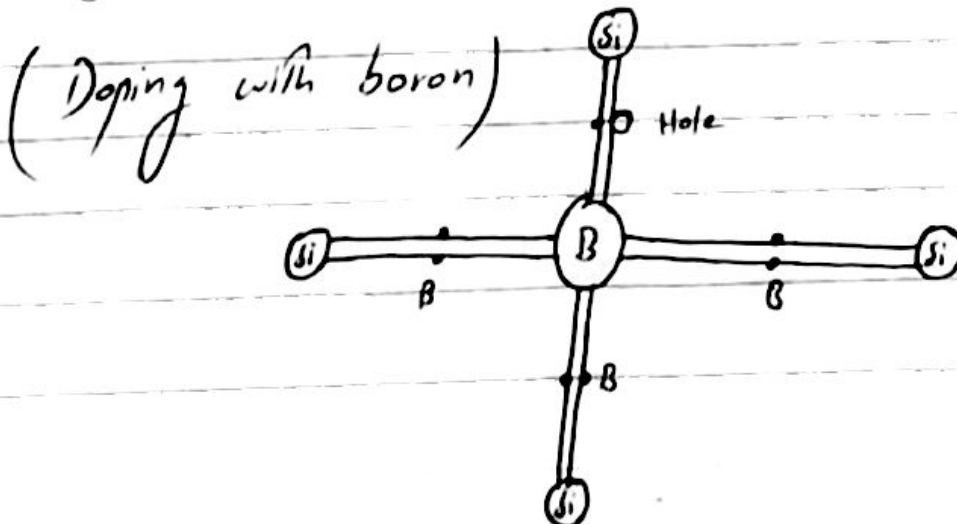
In formation of p-type materials, we use atoms of Group III materials in periodic table.

Group III elements have 3 e^- in outermost shell so they called Tri-valent elements.

- Positive holes will produced by adding Tri-valent element.
- Majority charge carriers are holes.
- Minority charge carriers are electrons. They are temperature dependent.

Doping Level:-

1 impurity atom is added to every 10^4 and 10^6 atoms of Silicon.



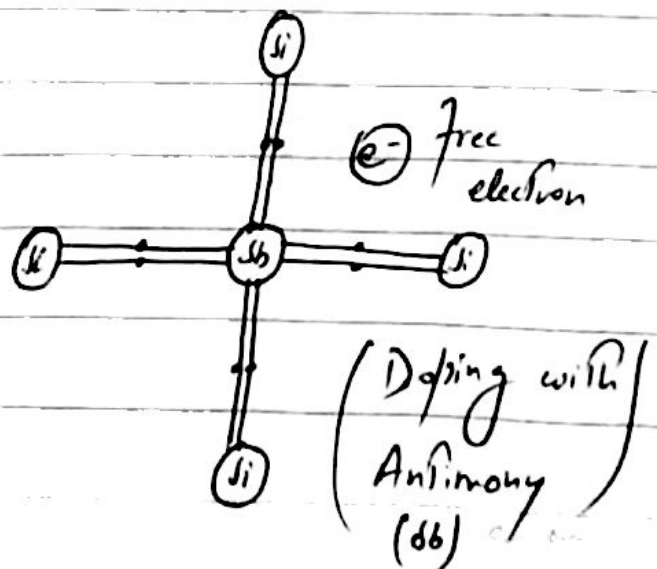
N-Type Materials

In formation of N-Type Materials, we use atoms of Group V materials in periodic table.

Group V elements have $5e^-$ in outermost shell so they are called Penta-valent elements.

- Electrons will produced by adding Penta-valent elements.
- Majority charge carriers are electrons.
- Minority charge carriers are holes. They are temperature dependent.
- Doping Level: 1 impurity atom to every 10^4 and 10^6 atoms of Silicon.

→ These free electrons are superfluous. They are loosely bonded with atom.

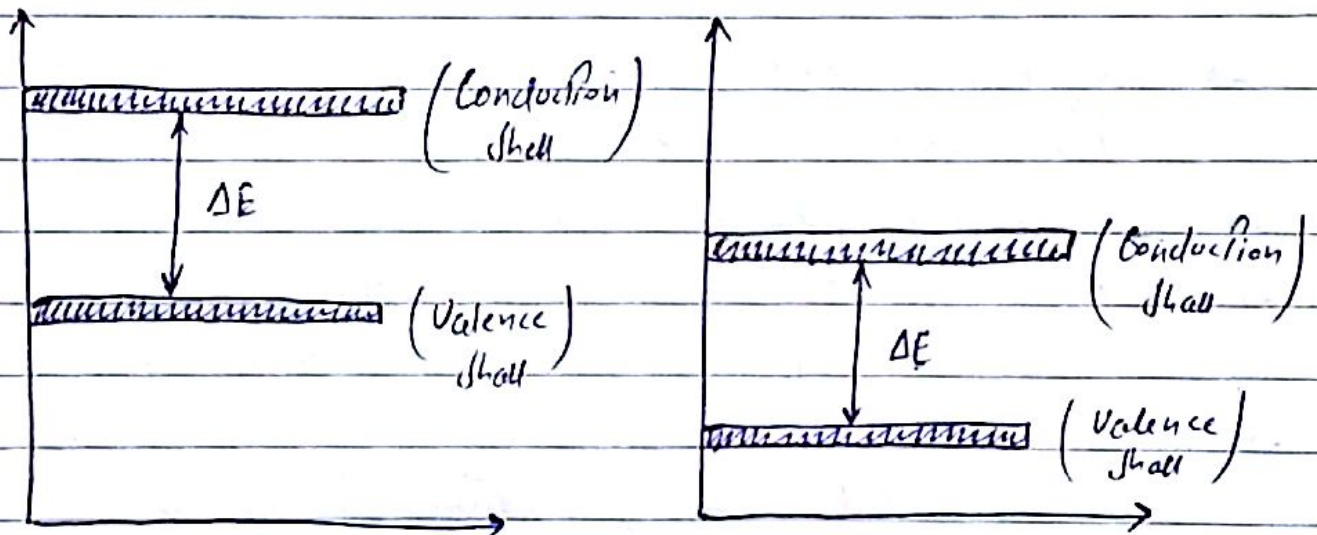


Question:-

Differentiate between Energy Level diagrams of p-type or n-type Semiconductors?

P-type

N-type



→ In N-type materials, the core attraction is higher than P-type materials.