
KNOWLEDGE PROBE
Introduction to Semiconductor Materials

Student Learning Outcomes:

1. Define conductor, insulator and semiconductor and state the resistance or conductance of each.
2. Name at least three semiconductor materials and state the most widely used.
3. Name the basic structure of material and explain how it is formed with atoms.
4. Define doping and name the two types of semiconductor material formed with doping.
5. Name the current carriers in N and P-type material.
6. Explain how current flows in semiconductor material.

Directions: Circle the best answer for each question.

1. A good conductor has:
 - a. Low resistance
 - b. High resistance
 - c. Medium resistance
 - d. Any desired resistance

2. A good insulator has:
 - a. Low resistance
 - b. High resistance
 - c. Medium resistance
 - d. Any desired resistance

3. A semiconductor has:
 - a. Low resistance
 - b. High resistance
 - c. Medium resistance
 - d. Any desired resistance

4. A typical semiconductor material has how many valence electrons?
 - a. 1
 - b. 2
 - c. 3
 - d. 4

5. The most commonly used semiconductor material is:
 - a. Silicon
 - b. Germanium
 - c. Copper
 - d. Boron

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6. Which of the following is NOT a semiconductor?
 - a. Silicon
 - b. Germanium
 - c. Silver
 - d. Carbon

 7. The basic atomic structure formed by the atoms in a semiconductor is called a:
 - a. Collection of atoms
 - b. Crystal lattice
 - c. Network of atoms
 - d. Bonded chains

 8. An intrinsic semiconductor is a:
 - a. Good conductor
 - b. Good insulator
 - c. Either a good conductor or insulator depending upon doping.
 - d. Mythical material

 9. The process of making a semiconductor conduct is called:
 - a. Polluting
 - b. Blending
 - c. Doping
 - d. Vaccinating

 10. To create a semiconductor with extra electrons for conduction a new element is added that has how many electrons?
 - a. 1
 - b. 2
 - c. 3
 - d. 5

 11. The conduction carrier created when an element with 3 valence electrons is added to a semiconductor is called a(n):
 - a. Hole
 - b. Electron
 - c. Particle
 - d. Ion

 12. Adding a large amount of doping material to silicon will cause the resistance of the material to be:
 - a. High
 - b. Low
 - c. Medium
 - d. Whatever

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13. Doped semiconductor material with extra electrons for current flow is called:
- a. N-type
 - b. P-type
 - c. Intrinsic
14. Inside semiconductor material, holes flow:
- a. From negative to positive
 - b. From positive to negative
 - c. In either direction depending upon the polarity of the external voltage