**🔬 Why Graphite is a Good Conductor of Electricity**

1. **Atomic Structure of Graphite**
   * Graphite is made of **carbon atoms** arranged in **flat layers** (called graphene sheets).
   * Each carbon atom is bonded to **only 3 other carbon atoms** in a hexagonal pattern.
2. **Delocalized Electron**
   * Carbon has **4 valence electrons**. In graphite:
     + **3 electrons** form strong covalent bonds with neighboring atoms.
     + The **4th electron is free** — it does **not** bond.
   * This **free electron is delocalized**, meaning it can **move freely across the layer**.
3. **Electron Mobility = Conductivity**
   * These **mobile electrons** act like a "sea of charge" — similar to metals.
   * They can carry electric current when a voltage is applied.
4. **Layer Structure Helps**
   * The layers are held together by **weak forces** (van der Waals), so electrons can move **easily within layers** but **not between them**.
   * That's why graphite conducts **in the plane of the layers**, but not vertically.

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**🧠 Explanation of Each Row**

**1. Quantized orbits (n=1,2,…)(n = 1, 2, \ldots)(n=1,2,…) → Continuous energy bands**

* **Bohr Atom**:  
  In the hydrogen atom, electrons can only occupy discrete orbits (or energy levels), labeled by an integer quantum number nnn. Each level corresponds to a specific energy WnW\_nWn​.
* **Solid Material**:  
  In a solid, atoms are packed closely together. Their overlapping orbitals cause these discrete levels to **broaden into continuous energy bands**, because electrons can occupy a range of closely spaced energy states.

**2. Negative WnW\_nWn​ = bound → Valence band (bound states)**

* **Bohr Atom**:  
  The negative energy Wn<0W\_n < 0Wn​<0 indicates that the electron is **bound to the nucleus**. The more negative it is, the more tightly the electron is held.
* **Solid Material**:  
  Electrons in the **valence band** are also in bound states — they are still associated with specific atoms and cannot move freely through the material without additional energy.

**3. Ionization limit W=0W = 0W=0 → Bottom of conduction band**

* **Bohr Atom**:  
  When W=0W = 0W=0, the electron is **no longer bound** to the atom — it has enough energy to escape (i.e., it’s ionized).
* **Solid Material**:  
  The **bottom of the conduction band** is the lowest energy an electron can have while being "free" to move through the material. It's like the “ionized” state in an atom, but in a crystal lattice.

**🧩 Why this table matters:**

It shows that:

* Atomic **discrete energy levels** evolve into **energy bands** in solids.
* The **bound vs. free** nature of electrons in atoms carries over to the **valence vs. conduction band** picture.
* Bohr’s quantum model forms a foundation for understanding **electrical behavior in materials** — especially in **semiconductors** and **insulators**.

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**Acceptor and donor:**

If a small percentage of trivalent or pentavalent atoms are added to intrinsic silicon or germanium, a *doped, impure,* or *extrinsic* semiconductor is formed.

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Hall effect:  
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