MINISTRY OF EDUCATION
SECONDARY ENGAGEMENT PROGRAMME
CHEMISTRY
GRADE 10

WEEK 7       LESSON 2

Topic: Structure and Bonding
Sub-topic: Metallic Bonds
Objectives: After reading and looking at related diagrams students will explain metallic bonding as it relates to the arrangement of cations and mobile electrons.

Content:
Metallic bonding is another type of chemical bond, where bonding electrons are delocalized across a lattice of atoms. A metallic bond is similar to an ionic bond, however, the location of a bonding electron is static. Within these bonds, there is little to no electronegative difference between atoms. Atoms in metals and alloys are examples of such bonding.

The outermost electron shell of each of the metal atoms overlaps with a large number of neighboring atoms. As a consequence, the valence electrons continually move from one atom to another and are not associated with any specific pair of atoms. This makes the metal positively charged.

The valence electrons in metals, unlike those in covalently bonded substances, are delocalized and are capable of wandering relatively free. The atoms that the electrons leave behind become positive ions, and the interaction between such ions and valence electrons gives rise to the cohesive or
binding force that holds the metallic crystal together. The attraction of a positive metallic ion for delocalized (mobile) electrons is called a **metallic bond**.

### Metallic Bond

The electron sea model proposes that all metal atoms contribute their valence electrons. This results in the stationary metal cation being surrounded by a “sea” of mobile valence electrons that are not associated with any one cation.

### Properties of Metal

Metals owe their physical properties to their delocalized electrons. All metals show the following characteristics.

1. Malleable - they can be hammered into sheets.
2. Ductile - can be drawn into wires
3. Metallic luster - are shiny
4. High melting and boiling point
5. High electrical and thermal conductivity

### References:

- [https://byjus.com/chemistry/metallic-bonds/](https://byjus.com/chemistry/metallic-bonds/)
- [https://sciencenotes.org/ionic-vs-covalent-bonds/#:~:text=The%20key%20difference%20between%20an%20metal%20and%20non-metal](https://sciencenotes.org/ionic-vs-covalent-bonds/#:~:text=The%20key%20difference%20between%20an%20metal%20and%20non-metal)