**ACTIVITY ORIENTED LESSON PLAN - 1**

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| **I Preliminary Details**  Name of the Teacher : SHANAVAS K E Standard : XI Science Name of the Institution : JHSS Thandekkad Time : 45 Minutes Subject : Chemistry Unit : IV Chapter : Chemical Bonding & Molecular Structure Topic : Octet rule and its limitations, Lewis symbols and structures, Formation of ionic bond and covalent bonds. |

**II Types of Knowledge**

(i) **Factual Knowledge:**

**Terms:** Lewis symbols and structures, Octet rule, Ionic bond and Covalent bonds.

**Facts:**

(1) The outer shell that could accommodate a maximum of eight electrons.

(2) Lewis postulated that atoms achieve the stable octet when they are linked by chemical

bonds.

(3) The bond is formed by the sharing of a pair of electrons between the atoms.

**(ii) Conceptual Knowledge:**

**Concepts:** Lewis symbols, Octet rule, Ionic bond and Covalent bonds.

**Definitions**:

(1) Lewis introduced simple notations to represent valence electrons in an atom These notations are called Lewis symbols.

(2) The atom can combine either by transfer of valence electrons from one atom to another or gaining or losing electrons by ionic bond or by mutual sharing of valence electrons in order to have an octet in their valence shell by covalent bond. This is known as octet rule.

(3) The complete transference of one or more valence electrons from one atom to the valence shell of the other atom is called Ionic bond

(4) The combination of 2 or more atoms involving mutual sharing of electrons is called covalent bond.

**(iii) Procedural Knowledge:**

(1) Lewis symbols and its significance

**Steps**

1. Write the valence electron of an atom.
2. The valence electrons are shown by electron dots or cross around the symbol.

(2) Formation of Ionic bond

**Steps**

1. Write symbol of given elements
2. Write its valence electrons
3. The valence electrons are shown by electron dots and cross around the symbols.
4. The complete transference of one or more valence electrons from one atom to the valence shell of the other atom is called Ionic bond

(3) Formation of Covalent bond

(a) Write symbol of given elements

(b) Write its valence electrons.

(c) The valence electrons are shown by electron dots and cross around the symbols.

(d) The combination of 2 or more atoms involving mutual sharing of electrons is called

Covalent bond.

**(iv) Meta Cognitive Knowledge**

The students can acquire the awareness of knowledge, thinking and learning strategies in

octet rule and its limitations, Lewis symbols and structures, formation of ionic bond and

covalent bonds.

**III Instructional objectives and Learning Outcomes**

1. Define the above-mentioned facts and concepts.
2. Explains, describes, summarises the above-mentioned facts and concepts.
3. Draws Lewis symbols of various elements and compounds.
4. Differentiating and analysing the Lewis structure of elements and compounds.
5. Predict the formation and structure of ionic and covalent compounds.

**IV Previous knowledge and lattice enthalpy**

The students have the knowledge about the valence electrons in molecules or compounds.

**V Learning aids**

1. Chart showing definition of Octet rule and its limitations, Lewis symbols and structures, Formation of ionic bond and covalent bonds.
2. Print page of Chapter 4 chemical bonding and molecular structure in Xl chemistry NCERT text.

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| **Constructivist Learning Design** | |
| Activity | Student response with Assessment |
| **Phase I Situation**  How outer shell attains stability?  What are Lewis symbols?  **Phase II Grouping**  Who introduced the atomic symbol?  The students are grouped into two. The first group is Lewis group and second group is Dalton.  **Phase III Bridging**  What is significance of Lewis symbol?  Write the Lewis symbols of first, second and third period elements? | Student share their experiences.  The outer shell that could accommodate a maximum of eight electrons.  Lewis introduced simple notations to represent valence electrons in an atom These notations are called Lewis symbols.      John Dalton      The Lewis symbol stands as a fundamental tool in understanding chemical bonding and electron distribution within atoms. The valence electrons are shown by electron dots and cross around the symbols.  Lewis Structures - Course Hero |
| **Factual Knowledge**  The students recognise the Lewis symbol and its significance. | |
| **Phase IV Question**  How NaCl formed from Na and Cl ?  What is the Lewis structure of NaCl ?  Can you define ionic bond?  What is Electrovalency of an atom?  What is the Electrovalency of Na and Cl in NaCl? | Dalton group define ionic bond.  An ionic bond is formed by the complete transfer of one or more valence electrons of one atom to another atom.  The number of electrons lost or gained by an atom represent the electrovalency of the atom.  The Electrovalency of Na is +1 and Cl is -1 |
| **Conceptual knowledge**  Students define the ionic bond. | |
| How many valence electron in oxygen  Give the Lewis structure of O2  Shows print page of NCERT text containing  the Lewis structure of O2  How many double bonds in oxygen molecule?  Can you define covalent bond?  Can you define octet rule? | Six      One double bond.  The mutual sharing of electrons between two atoms is called Covalent bond.  The atom can combine either by transfer of valence electrons from one atom to another or gaining or losing electrons by ionic bond or by mutual sharing of valence electrons in order to have an octet in their valence shell by covalent bond. This is known as octet rule. |
| **Procedural knowledge** Students draws and analyses the Lewis structures of simple molecules and compounds. Students predict the formation and structure of ionic and covalent compounds. | |
| **Phase V Exhibit**  Can you give the Lewis representation of simple molecules Cl2, N2 and exhibit for others.  How many bond pair of electrons in Cl2 molecule?  Can you define bond pair?  Can you define lone pair?  What is Covalency?  What is Covalency of Chlorine?  **Phase VI Reflection**  Give the Lewis representation of N2  How many Triple bonds in nitrogen molecule?  What is Covalency of Nitrogen? | Lewis group hang the chart of the Lewis representation of simple molecules Cl2, N2 and exhibit for others.    One bond pair.  The shared pair of electrons which is responsible for bond formation is called bond pair of electrons.  The valence electrons not involved in sharing are known as lone pair of electrons.  Covalency is defined as the number of electrons its atom contributes for sharing while forming a covalent bond.  Covalency of Chlorine is 1    One triple bond.  Covalency of Nitrogen is Three |
| **Meta cognitive knowledge** The students can acquire the awareness of knowledge, thinking and learning strategies in Octet rule and its limitations, Lewis symbols and structures, Formation of ionic bond and covalent bonds. | |
| **Follow up Activities**  Can you give the Limitations of octet rule and its examples | Incomplete octet of the central atom.  Example: LiCl, BeH2, BCl3  Odd electron molecules of central atom.  Example: Nitric oxide, NO  Expanded octet  Example: PCl5, SF6  Octet rule is based on the chemical inertness of noble gases but some noble gases: xenon, krypton combine with oxygen and fluorine to form XeF2, XeF4, XeF6, XeOF2, KrF2 |