**Activity Oriented Lesson Plan 8 C**

**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 and Molecular structure

Topic : H bonding

**II Types of Knowledge**

**i) Factual Knowledge**

Terms: Electronegativity, H-bonding, Inter molecular H-bonding, Intra molecular H-bonding.

Facts 1) Hydrogen bond is represented by a dotted line while a solid line represents the

covalent bond.

2) Fluorine, oxygen and Nitrogen are the highly electro negative elements.

**ii) Conceptual knowledge**

Concepts: H-bonding, Inter and Intra molecular H-bonding

Definitions

1) The partially positively charged H atom form a bond with other more electronegative atoms F, O, N is known as H-bonding

2) Inter molecular H-bonding is formed between H atom and highly electronegative atom F, O, N with different molecules of same or different compounds.

3)Intra molecular H-bonding is formed between H atom and highly electronegative atom F, O, N within the same molecule.

**iii) Procedural Knowledge**

1) Formation of inter and Intra molecular H-bonding.

**Steps**

1. Write the group which show most electronegativity.
2. Write the decreasing order of electronegativity in the periodic table F > O > C1 > Br > I > At
3. Write the first, second, third and fourth element which show highest electronegativity in the periodic table. F > O > C1 > N
4. Definition of H-bonding.
5. Categories Inter and Intra molecular H-bonding.

**iv) Meta Cognitive Knowledge**

The students can acquire the awareness of knowledge, thinking and learning strategies in Inter and Intra molecular H-bonding.

**III Instructional objectives and learning outcomes**

Defines, explains, draws, categorizes, analyzing, predict and create the different inter and intra molecular H-bonding.

**IV Previous knowledge**

The students have the knowledge about the Electronegativity in the elements

**V Learning Aids**

Electronegativity chart of the periodic table, Diagrams of Inter and Intra molecular H-bonding with examples.

**Constructivist learning design**

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| **Activity** | **Student response with Assessment** | |
| **Phase I situation**  Which is the most electronegative element in the periodic table  Can you give example of Polar and non-polar bond  **Phase II grouping**  Students are grouped on the basis of the scientist who discovered H bonding  **Group III Bridging**  Which groups are having highest electronegativity in the periodic table.  **Phase IV questions**  When H forms a partial bond with electronegative atoms F, O, N, the type of bond formed is \_\_\_\_\_ | Student share their experiences  Flourine F is the most electronegative element in the periodic table  Polar bond. Hydrogen forms a partial bond with electronegative atom. Eg. **H∂+ \_ F ∂-**  Non polar bond. Eg. **H - H** bond.  T.S. Moore and T.F. Winwill first mentioned the H-bond in 1912  Students are grouped into two groups as Moore group and Winwill group.  Halogens F > C1 > Br > I > At  Halogens electronegativity values are above 2.2  The most electronegative atoms in the periodic table are F, O, N  H – bond  H bond by dotted lines.  Is HF (Hydrogen Fluoride) Ionic or Covalent? - Techiescientist**…..**Is HF (Hydrogen Fluoride) Ionic or Covalent? - Techiescientist**…..**Is HF (Hydrogen Fluoride) Ionic or Covalent? - Techiescientist | |
| **Factual knowledge**  Student recognizes the electronegative elements and representation of H bond | | |
| How will you represent H bonding  Can you define H bonding.  Then can you define inter and intra molecular H- bonding with examples. | Moore group hang the chart of definition of H bonding with examples.  The partially positively charged **H∂+** atom form a bond with other more electronegative atoms F, O, N is known as H-bonding  Winwill group hang the chart of definition of inter and intra molecular H-bonding with examples.  In intermolecular H bonding, formed between two different molecules of same or different compounds.  Eg. H2O, NH3, H-F  Intra molecular H-bonding is formed between H atom and highly electronegative atom F, O, N within the same molecule  Eg. O-nitrophenol    What is hydrogen bond? How does an intermolecular hydrogen bond differ from  intramolecular hydrogen bond ? – The Unconditional Guru | |
| **Conceptual knowledge**  The students define H-bonding and the types of H bonding. | | |
| **Phase V exhibit**  What are the causes of H bonding?  What type of H-bond present in ortho nitrobenzoic acid? | | Student group share their experiences after learning H-bonding (BB)  a) Strong electronegative element F, O, N  b) Polarity of bonds.  c) Influence of physical state  d) High m.p and b.p  Moore group draw the intra molecular H-bond in the chart and exhibit for others.  O-nitro benzoic acid, intra molecular H-bonding within the same molecule. |
| **Procedural Knowledge**  The students identify the different steps in H-bonding. | | |
| **Phase VI reflections**    H2O is a liquid while H2S is a gas. Explain | | Winwill group draws the H-bond in H2O.    In H2O, there is intermolecular H-bonding through association. Hence it is liquid. In H2S, there is no H bonding. Hence it is a gas. |
| **Meta cognitive knowledge**  The students can acquire the awareness of knowledge, thinking and learning strategies in H bonding and its types with examples. | | |
| **Follow up Activities**   1. Draw the H bonding in NH3. 2. HCl does not form H-bonding. Explain | | Assign to two groups   1. Moore and Winwill groups present their findings.   Is $ N{H_3} $ a hydrogen bond?  2) Despite its electronegativity, size of C1 atom is larger and hence electron density is low. So HC1 does not form H bonding. |