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| **School of Pedagogical Sciences (SPS)**  **M.G University Kottayam as a part of Ph. D Programme**  Research Scholar  **: Shanavas K.E**  Supervising Teacher **: Dr Sajna Jaleel Professor SPS** | | | |
| **Action Script : E-content Lesson based on CDM 6**  Name of Teacher**:** Shanavas K.E Standard: X1 Science  Subject: Chemistry Strength: 59  Topic: Bond parameters, Lattice enthalpy and Resonance Time: 6 minutes Chapter: Chemical Bonding and Molecular structure | | | |
| Audio | Video | Tg-lg activities | Phases of CDM |
| Dear Students,  Welcome to the world of chemistry chapter 4 chemical bonding and molecular structure. This is the E-content lesson based on CDM 6.  Students, we can study about the Bond Parameters, Lattice Enthalpy and Resonance.  What are Bond parameters?  What is Bond length?  What is the Bond angle of methane .CH4  Is it 90o or 109o 281?  Can you define Bond angle ?  What is bond Enthalpy ?  Can you give Bond Enthalpy of H2 molecule ?  What is Bond order ?  What is the bond order of H2, O2 and N2  Can you give the equation for bond order  What is meant by bond order ?  Give the significance of bond order  Students, what are the factors depend on bond length.  What is the bond length in C-C single bond, C = C double bond and C ≡ C triple bond. In ethane, ethane and ethyne  What are the factors depending on bond length ?  What is lattice Enthalpy ?  Give the equation of Lattice Enthalpy  Students, what is resonance ?  Can you give an example of Resonance  Students, can you give the character is of resonance.  **Time gap online Assignment**  Calculate bond length of HCl. Given data.  r H-H = 74pm r Cl-Cl = 198pm | Teacher presents  Slide  definition  Bond parameters refer to the characterization of covalent bond on the basis of various parameters like bond length, bond order, bond angle and bond enthalpy.  Slide  Definition  Bond length is defined as the equilibrium distance. between the center of nuclei of 2 bonded atoms in a molecule. It is expressed in angstrom, A0 or picometer, pm  Slide  Bond angle of methane is 1090 281. In this geometry the four bond pairs of methane are in minimum repulsion.    Slide  Definition  Bond angle is defined as the average angle between the lines representing the orbitals containing bonding electrons.  Slide  Bond Enthalpy is defined as the average energy required to break one mole of a particular kind of bond in a molecule.  The bond enthalpy of H2 molecule is 435.8KJmol-1  H2(g) → H(g) + H(g) ∆H = 435.8KJmol-1  Slide (Definition)  Bond order gives the number of covalent bonds in a molecule.  The bond order of H2 molecule is1. It contains one covalent bond or single bond.  B.O of O2 is 2. It contains two covalent bonds or dongle bond.  B.O of N2 is 3. It contains three covalent bonds or Triple bonds.  Slide  B.O = ½ (Nb – Na)  = ½ (BMO - AMO)  Nb represent number of electrons in BMO.  Na represents number of electrons in AMO.  Bond order is defined as the half of the difference between number of electrons in BMO and number of electrons in AMO.  Slide  The positive value of B.O indicate a stable molecule and negative or zero value of B.O indicates an unstable molecule.  B.O ᶑ Bond Enthalpy or BDE.  B.O ᶑ 1/ B. L  B.O increases, B.L decreases  If B.O is fractional, the molecule is paramagnetic it contains unpaired electron  B.O values 1,2,3 corresponds to single bond, double bond and triple bond  Slide  Bond length depend on the nature of atoms and types of bonds between them.  Slide  C-C bond length is 154 pm in ethane, CH3 – CH3 single bond.  C=C bond length is 134 pm in ethene, CH2= CH2 double bond.  C ≡ C bond length is 120pm in ethyne  CH ≡ CH triple bond  Slide  B.L decrease with increase in multiplicity (double or triple bonds  B.L is found to increase in size of atom in a molecule.  Slide  Lattice Enthalpy is defined as the amount of energy released when one mole of ionic solid is formed by the close packing of gaseous ions  Slide Na +(g) +Cl-(g) → NaCl (s) + U  Where U is the lattice enthalpy  Slide  Definition  When a molecule cannot be represented by a single structure but its characteristics properties can be described by 2 or more structures, then actual molecule is said to be a resonance hybrid of these structures.  Ozone molecule.    Slide  Resonance will shorten bond length.  It stabilizes a molecule.  The number of paired and unpaired electrons remains unchanged.  The energy of the actual molecule will be less than the energy of the stablest of the contributing structures. The difference is called resonance energy.  Slide  B.L of H-Cl = ½ [r H-H + r Cl-Cl] = ½ [74+ 198] = 136pm  Slide  Thank you, students.  Learn well. | Gaining the attention to the objectives  Presentation of slides  Audio-video input entering into the content  Audio-video input.  Developing  the content.  Asking Questions  Presentation of slides  Audio-video input giving more examples  Audio-video input giving equations.  Audio-video input giving definitions.  Presentation of slides  Audio-video Input giving more explanations.  Asking questions  Audio-video input giving more applications and problems  Asking  Questions  Audio-video input giving more examples  Audio–video input giving equations  Asking questions  Auto–video input giving more explanations.  Audio-video input giving structures of compounds.  Presentation of slides  Evaluate and assess the content.  Audio-video input giving equations. | **Phase 1**  Confrontation with stage relevant task  Establishes rapport with the students.  Presents a puzzling problem?  Insisting to think  Elicits students’ responses  Giving Cues  Offer counter suggestions  Elicits students’ responses  **Phase II**  Inquiry  Seeks reasoning  Probes reasoning  Seeks justification results in Assimilation  Elicit student’s responses.  **Phase III**  Transfer  Probes  Reasoning  Giving perceptual cues or hints  Offer counter suggestions  Elicits students’ responses  Seeks justification  Accommodation  of new experience leading to ability to apply in different learning situation.  Seeks reasoning  Offers counter suggestions  Probes reasoning  Elicits students’ responses  Insisting to think  Seeks  Justification  Seeks justification results in assimilation  Elicits students’ responses  Accommodation of new experience leading to ability to apply in different learning situations. |