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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 T 11**  Name of Teacher**:** Shanavas K.E Standard: XI Science  Subject: Chemistry Strength: 59  Topic: Entropy S, IInd law of T.D and Entropy and spontaneity Time: 6 minutes Chapter: Thermodynamics | | | |
| Audio | Video | Tg-lg activities | Phases of CDM |
| Hello Plus One Students, Welcome to the world of plus one chemistry. chapter 6 T.D This is E content Lesson -11  Today focus up on third Thermodynamic function- Entropy S, IInd Law of T D, Entropy and spontaneity, criteria for spontaneity.  First, I pose a problem?  What is the randomness or measure of disorder in the case of solid, liquid and gas?  Disorder increases.  solid < liquid < gas  Can you define entropy S?  Entropy is defined as the measure of disorder or randomness in a system  The 2nd law of T. D introduces the concept of Entropy. It explains the spontaneity or feasibility of process.  Can you define IInd law of T.D?  This law states that the entropy of the universe always increases in the course of every spontaneous process.  Can you give equations for 2nd law of T.D?  For physical process ∆S =S **final** –S **inital**  For chemical process  ∆S = S **product** –S **reactant**  For reversible and iso-thermal process  ∆S = q rev / T = ∆H / T  For a spontaneous process  ∆S**total** = ∆S **system** + ∆S**surrounding**  > 0  ∆S **total** =∆S **universe** > 0  ∆S= +ve for spontaneous process  Can you define spontaneous process?  It is a process take place either of its own or no initiation or need slight initiation.  What are the criteria for spontaneity in chemical reactions?  a) Energy factor and spontaneity (enthalpy factor)  ½ N2 (g)+3/2 H2(g) → NH3(g) ∆Hf = -46.1 KJmol-1  Identify this reaction  Exothermic reaction (Evolution of heat) ∆H= -ve spontaneous It is accompanied by energy. The products NH3 have less energy and more stability compared to the reactants.    From this can you give first criteria of spontaneity?  Tendency to acquire minimum energy or maximum stability is the one of the criteria of spontaneity.    ½ N2 (g)+O2 (g) → 2NO(g) ∆Hf = + 33.2 KJmol-1  Identify this reaction?  Endothermic reaction. Absorption of heat or increase in energy.  ∆H = +ve Spontaneous process.   |  | | --- | | Exothermic ∆H = -ve Spontaneous process.  Endothermic ∆H = +ve Spontaneous process. |   b) Randomness or disorder or entropy factor and spontaneity.  Tendency to have maximum Randomness or disorder. ∆S = +ve is the criterion for Spontaneous process.  SO3 (g) → SO2(g) + ½ O2 (g)  ∆S = +ve product contain more gases are more random in gaseous state than reactants.    H2O (g) → H2O (s)  Disorder decreases ∆S = -ve Non spontaneous process.  But enthalpy factor and entropy factor alone cannot be criterion for spontaneous process.  Can you predict spontaneity in Isolated system?  In isolated system there is no exchange of energy or matter between system and surroundings. but increase in disorder there is increase in entropy. ∆S=+ve spontaneous process in isolated system  Can you predict spontaneous in non-isolated system?  In non-isolated system, we have to take into account entropy changes in system  and the surroundings for a spontaneous process  ∆S total (universe) must be +ve.  ∆S total =∆S system+∆S surrounding > 0    Freezing of water.  H2O (l) → H2O (s) ∆S = -ve  Indicating the process is non spontaneous.  But we observe the freezing of water is spontaneous at 272K and 1 atm.  That is, increase of entropy of surrounding is more than decrease of entropy of the system. such that total entropy  change is +ve. Spontaneous at 272 K  **Time gap online assignment**  Give equation of 2nd law of T.D for non-isolated system. | Teacher presents  Slide  Third thermodynamic function -Entropy S, IInd law of T.D, Entropy and spontaneity, criteria for spontaneity.  Slide  Problem or question  Slide  Definition of entropy S  Slide  Statement related to 2nd law of T.D  Slide  Definition of IInd law of T.D  Slide  Equation for IInd law of T.D  Slide  Equation for entropy in physical process, chemical process, reversible iso-thermal process and spontaneous process  Slide  Definition of spontaneous process  Slide  Criteria for spontaneity  Slide  Enthalpy factor and its statement related to spontaneity  Slide  Exothermic ∆H=-ve spontaneous process.  Endothermic reaction. ∆H = +ve spontaneous  Slide  Slide  Entropy factor and spontaneity.  Slide  Equation  Slide  ∆S =+ve for Spontaneous process.  Slide  Equation  Slide  ∆S =-ve for Non spontaneous process.  Slide  Prediction of spontaneity in isolated system  Slide  Prediction of spontaneity in non-isolated system  Slide  Freezing of water  ∆S=-ve Non spontaneous process. but spontaneous at 272K and 1atm  Slide  ∆S **Total** = ∆S **System** +  ∆S **Surrounding**  ∆S = +ve spontaneous process  Slide  Thank you. Learn well. Revise E-content lesson. Enjoy chemistry. | Gaining the Attention to the objectives  Presentation of slides  Developing the content  Asking question  Audio video input giving equations  Audio-video input giving statement  Audio video input giving content- enthalpy factor and spontaneity  Audio video input give content entropy factor and spontaneous    Presentation of slides    Asking question  Audio video input  Audio video input giving examples  Evaluate and assess the content. | **Phase 1**  Establishes rapport with the students.  Confrontation with stage relevant task  Present a puzzling problem  Insisting to think  Elicits students’ responses  Probes reasoning  Seeks justification results in assimilation  Elicits students’ responses  Probes reasoning  Elicits student’s responses  Elicits students’ responses  Seeks justification result in assimilation  Probes reasoning  Insisting to think  Offer counter suggestion  Seeks reasoning  Accommodation of new learning experience leading to ability to apply in different learning situations |