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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 12**  Name of Teacher**:** Shanavas K.E Standard: XI Science  Subject: Chemistry Strength: 59  Topic: Fourth Thermodynamic function Gibb’s free energy G Time: 6 minutes Chapter: Chemical Bonding and Molecular structure | | | |
| 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 based on CDM-12  Today I focus up on fourth Thermodynamic function, Gibb’s free energy and spontaneity.  Can all the energy contained in a system be converted into useful work?  No  Could you define Gibb’s free energy of system ?  It is defined as maximum amount of energy available to the system that can be converted in to useful work.  It is the capacity of a system to do useful work.  Give mathematical representation of Gibb’s free energy G  G = H - TS Where H = Enthalpy of the system S = entropy of system and T =Temperature  What is Gibb’s free energy?  It is a measure of a system’s ability to work. In system, quantity of heat absorbed or evolved by the system denotes Enthalpy H.  Some heat or energy can be used for temperature (T) and randomness or disorder (S) in a system cannot be used for useful work. That is free energy  G = H – TS 🡪 1  Since H = U + PV  Substitute for H in equation  G = U + PV – TS 🡪 2  Change in Gibbs for energy  ∆G = ∆U + ∆(PV) - ∆(TS)  ∆GT.P = ∆U + P∆V - T∆S   |  | | --- | | ∆G = ∆H - T∆S |   Gibbs Helmholtz equation    Can you explain the physical significant of Gibb’s free energy?  Give 1st law of T.D  ∆U = q + w 🡪1  Here work include expansion work (pv) and non-expansion work  ∆U = q + W**exp** + W**nonexp** 🡪 2  At constant pressure  ∆U = q – P∆V + W**nonexp**  q = ∆U + P∆V - W**nonexp**  q = ∆H - W **non exp 🡪 3**  Since ∆U + P∆V = ∆H  For a reversible process at const T  ∆S = q **rev** / T **🡪 4**  Substitute for q**rev** in equation 3  T∆S = ∆H - W**non exp**  ∆H - T∆S = W**non exp**  ∆G = W**useful** = W**max**  The Gibb’s free energy decreases in a system for a spontaneous process  ∆G = -ve process is spontaneous  ∆G = +ve process is non spontaneous  ∆G = 0 the process is equilibrium.  **Time gap online assignment**  Give relation between ∆G and ∆H?  Hint: Gibbs Helmholtz equation  Solution:   |  | | --- | | ∆G = ∆H-T∆S |   Give relation between ∆H and equilibrium constant, K   |  | | --- | | ∆G = -2.303R T log K |   Give relation between ∆H and electrical work done in a cell.     |  | | --- | | ∆G= - nFE0 cell |   Give equation of standard Gibbs free energy change(∆G0r)  ∆G0r = Sum of standard Gibb’s free energy of formation of Products sum of standard Gibb’s free energy of formation of Reactants  ∆G0r = ∑∆G0 **f (P)** -∑∆G0**f (R)** | Teacher presents  Slide  Thermodynamic function Gibbs free energy G and spontaneity  Slide  Question  Slide  Definition of Gibb’s free energy of system  Slide  G=H-TS  Where  H = Enthalpy of the system  S = Entropy of the system  T = Temperature  Slide  Statement related to Gibbs free energy G  Slide  Derivation of Gibbs free energy change ∆G  Slide  ∆G = ∆H - T∆S  Slide  Question  Slide  Physical significan of Gibbs free energy  Slide  ∆H-T∆S=W**non exp**  ∆G = W**useful**  ∆G = W**max**  Slide  ∆G = -ve Sp  ∆G = +ve Non-Sp  ∆G = 0 Equilibrium  Slide  Assignment  Slide  ∆G = ∆H-T∆S  Slide  ∆G = -2.303R T log K  Slide  ∆G= - nFE0 cell  Slide  ∆G0r =∑∆G0 **f (P)** -∑∆G0**f (R)**    Slide  Thank you. Learn well Learn chemistry in a simple way. Enjoy chemistry. | Gaining the attention to the objectives  Presentation of slides  Audio video input  Developing the content Free energy G and its equation.  Audio video input  Developing the content the Free energy G and its relation.  Asking question  Audio-video input giving more applications and problems  Audio video input  Audio video input  Evaluate and assess the content  Audio video input giving more equations on Gibb’s free energy and their relations.  Audio video input giving equations on standard Gibb’s free energy. | **Phase 1**  Establishes rapports with the students.  Confrontation with stage relevant task  Present a puzzling problem  Insisting to think  **Phase 2**  Inquiry  Probes reasoning  Offer counter suggestions  Elicits students’ responses  **Phase 3**  Transfer  Seeks  justification results in assimilation  Giving perceptual  Cues or hints  Insist to think  Probes reasoning  Accommodation of new learning experience leading to ability to apply in different learning situations. |