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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 6**  Name of Teacher**:** Shanavas K.E Standard: XI Science  Subject: Chemistry Strength: 59  Topic: Work done in reversible expansion and compression of a gas. Time : 6 minutes Chapter: Thermodynamics | | | |
| Audio | video | Tg-lg activities | Phases of CDM |
| Hello plus one students,  Welcome to world of plus one Chemistry: Chapter 6 T.D. This is the E Content Lesson based on CDM 6  Today I focus upon the common forms of work that we come across in the study of the T.D are   * 1. Pressure –volume work   2. Electrical work   First, I pose a puzzling problem. What is Expansion work?  Let us see when gas enclosed in a cylinder, what type of work take place?  The gas involves changes in volume against the external pressure.  This type of work is also called expansion work. (pressure-volume work)  Give expression for PV work?  W = P∆V  Can you expression for work done during irreversible free expansion of gas in vaccum?  The volume change from v1 to v2 irreversibly.  work done =-Pex (v2 - v1)  In vaccum no external pressure on the gas. W = 0  The work done during irreversible expansion of gas  W=-Pex ∆V  Here –ve sign indicate work done by gas Pex < Pin  The work done in reversible isothermal expansion of a gas  Consider a cylinder which contains one mole of an ideal gas fitted with a frictionless piston. The external pressure of gas inside Pin the cylinder. Pex = Pin for reversible process. If the external pressure is lowered by an infinitesimal amount dp.  It falls from Pin to Pin – dp. Also, the gas will expand by an infinitesimal volume, dv. volume changes from v to v + dv  V2  Wrev = - ∫ Pex dv  V1  V2 = - ∫ (Pin – dp) dv  V1  V2  = - ∫ Pin dv  V1  since dp. dv is very small.  For 1mole of an ideal gas  Pin = RT  V  V2  Wrev = - RT ∫ dV / V  V1  = -RT ln V2 / V1  Wrev = - 2.303RT log V2 / V1  Wrev = - 2.303RT log P1 / P2  Also, P1V1 = P2V2  V2 / V1 = P2 / P1  from Boyle’s law.  In the case of expansion of a gas, the work is done by the system on the surroundings and w has a –ve sign.  Work done in reversible compression of a gas. Here Pex is infinitesimally higher than Pin. Hence Pex = Pin + dp  Wrev = 2.303RT log V2 / V1  Wrev = 2.303RT log P1 / P2  In the case of compression of a gas, the work is done by the surroundings on the system and w has a positive sign.  **Time gap online assignment**  Remember the formulae  Wirrev during irreversible expansion.  Wirrev = -Pex ∆V  Wirrev in vaccum.  Wirrev = 0  Wrev during reversible expansion  Wrev = -2.303RT log V2  V1  = -2.303RT log P1  P2  Wrev during reversible compression.  Wrev= +22.3.3RT by V2  V1  =+2.303RT log P1  P2  Electrical work in electrochemical cells in redox reaction.  Welec = EQ where E is the potential difference across the conductor and Q is the charge following through conductor. It is also known as non-PV work or non-expansion work.  Problem  Calculate the work done when a gas is compressed by an average pressure of 0.50 atm so as to decrease its volume from 400 cm3 to 200 cm3  Solution: here ∆V = 200 - 400  = - 200 cm3  = - 0.2 L  External pressure Pex = 0.5 atm  W=-P ∆V  W=-0.5 (-0.2) L atom  W= 0.1L atom  Since 1L atom= 101.3J  Therefore W = 0.1 x 101.3J = 10.13J | Teacher presents  Slide      Pex **<<** Pin  Slide  W = P∆V  Slide  W= Pex (v2-v1)    Slide  W=-Pex ∆V  Slide    Pex = Pin  Neither expansion or compression of gas reversible process.    Slide    Pex = Pin – dp  Expansion of gas infinitesimally slowly reversible process.  Slide  Derivation of work done reversible in the case of a gas  Slide  Wrev =-2.303RT log V2  V1  Wrev =-2.3.3RTlog P1 / P2  Slide  Work done in reversible compression of a gas.  Slide  Wrev =2.303RTlogV2 /V1  Wrev =2.303RT log P1 / P2  Slide  Wirrev during irreversible expansion.  Wirrev = -Pex ∆V  Slide  Wirrev in vaccum.  Wirrev = 0  Slide  Wrev during reversible expansion  Wrev = -2.303RT log V2  V1  = -2.303RT log P1  P2  Slide  Wrev during reversible compression.  Wrev= +22.3.3RTlog V2  V1  =+2.303RT log P1  P2  Slide  Electrical work  Welec = EQ  Slide  Problem  Slide  Thank you  Learn well  Revise E content Lesson  Enjoy Chemistry in a simple way | Gaining the attention to objectives  Presentation of slides  Audio-Video input  Developing the content  Asking questions  Audio-Video input entering into the content.  Audio-Video input giving more diagrams and equations.  Audio-Video input giving more applications and problems  Developing the content.  Audio-video input giving equations and explanations.  Evaluate and assess the content    Evaluate and assess the problems | **Phase 1**  Confrontation with stage relevant task  Establishes rapport with the students.  Insisting to think  Elicits students’ responses  Seeks probing  **Phase 2**  inquiry  seeks reasoning  Giving perceptual cues or hints.  Offer counter suggestion  Seeks justification  Insisting to think  **Phase 3**  Transfer  Offer counter suggestion  Seeks justification results in assimilation    Insisting to think  Seeks reasoning  Seeks probing  Accommodation of new learning experience leading to ability to apply in different learning situations.  Insisting to think  Seeks reasoning results in  Assimilation and accommodation |