Lesson Plan 7

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| **Title**: **Chapter 19: The kinetic theory of gases** | | **Ref. No**: Week 4,  Day 1 | | |
| **Target Group/Population**: B. Sc students (CS, EEE and IPE) | | **Duration**: 90 min | | |
| **Aims/Rationale**: To give the students basic concepts of molar specific heats at constant volume and constant pressure of an ideal gas and relation between them. Calculate the molar specific heats for monatomic, diatomic and polyatomic ideal gases. | | | | |
| **Learning Outcomes**: At the end of the session, the students will be able to understand and analyze above topics and apply those to solve related problems. | | | | |
| **Contents:** 19-7: The molar specific heats of an ideal gas (internal energy, molar specific heat at constant volume, molar specific heat at constant pressure), 19-8: Degrees of freedom and molar specific heats | Method or  Technique | | Resource  or Aid | Time |
| **Introduction**:   * Welcome address * Rapport building * Review the main topics of last lecture * Importance/bridging the topic * Pre-assessment of student’s knowledge | Lecture  QA | | WB  MMP | 15 min |
| **Development**:  1. Drive an expression for the internal energy of an ideal gas as a function of the gas temperature only.  2. If *Cv*  and *Cp* are molar specific heats at constant volume and constant pressure respectively of an ideal gas, then show that *Cp - Cv = R*, where *R* is the gas constant. Why is *Cp* greater than *Cv* ?  3. Show that *Cv* =R. Calculate the molar specific heats for monatomic, diatomic and polyatomic ideal gases in a constant-volume process and a constant-pressure process. | Lecture Discussion  QA  Problem  Solving | | WB  MMP | 60 min |
| **Conclusion**:   * Quick recap/summary * Feedback from the students * References * Forward planning |  | | WB  MMP | 15 min |
| Problems:  47. The temperature of 2.00 mol of an ideal monatomic gas is raised 15.0 K at constant volume. What are (a) the work *W* done by the gas, (b) the energy transferred as heat *Q*, (c) the change ΔEint in the internal energy of the gas, and (d) the change ΔK in the average kinetic energy per atom?  48. When 20.9 J was added as heat to a particular ideal gas, the volume of the gas changed from 50.0 cm3 to 100 cm3 while the pressure remained at 1.00 atm. (a) By how much did the internal energy of the gas change? If the quantity of gas present was 2.00x10-3 mol, find (b) *Cp* and (c) *CV*. | | | | |