

Date Planned : __ / __ / __	Daily Tutorial Sheet-1	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Advanced (Archive)	Exact Duration : _____

- First law of thermodynamics is not adequate in predicting the direction of a process. (1982)
- $C_p - C_v$ for an ideal gas is (1984)
- The total energy of one mole of an ideal monatomic gas at 27°C is cal. (1984)
- Heat capacity of a diatomic gas is higher than that of mono atomic gas. (1985)
- A system is said to beif it can neither exchange matter nor energy with the surroundings. (1993)
- Enthalpy is an property. (1997)
- When Fe(s) is dissolved in aqueous hydrochloric acid in a closed vessel, the work done is (1997)
- A sample of argon gas at 1 atm pressure and 27°C expands reversibly and adiabatically from 1.25dm^3 to 2.50dm^3 . Calculate the enthalpy change in this process. $C_{v,m}$ for argon is $12.48\text{JK}^{-1}\text{mol}^{-1}$. (2000)
- Assertion :** The heat absorbed during the isothermal expansion of an ideal gas against vacuum is zero.

Reason : The volume occupied by the molecules of an ideal gas is zero. (2000)

(A) Statement-I is True, Statement-II is True and Statement-II is a correct explanation for Statement-I

(B) Statement-I is True, Statement-II is True and Statement-II is NOT a correct explanation for Statement-I

(C) Statement-I is True, Statement-II is False

(D) Statement-I is False, Statement-II is True
- Show that the reaction $\text{CO(g)} + \frac{1}{2}\text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)}$ at 300 K, is spontaneous and exothermic, when the standard entropy change is $-0.094\text{kJ mol}^{-1}\text{K}^{-1}$. The standard Gibbs free energies of formation for CO_2 and CO are -394.4 and -137.2kJ mol^{-1} , respectively. (2000)
- When 1-pentyne (A) is treated with 4N alcoholic KOH at 175°C , it is converted slowly into an equilibrium mixture of 1.3% 1-pentyne (A), 95.2% 2-pentyne (B) and 3.5% of 1, 2-pentadiene (C). The equilibrium was maintained at 175°C . Calculate ΔG° for the following equilibria : (2001)



$$\text{B} \rightleftharpoons \text{A} \quad \Delta G_1^\circ = ?$$

$$\text{B} \rightleftharpoons \text{C} \quad \Delta G_2^\circ = ?$$

From the calculated value of ΔG_1° and ΔG_2° indicate the order of stability of (A), (B) and (C). Write a reasonable reaction mechanism showing all intermediates leading to (A), (B) and (C).
- One mole of a non-ideal gas undergoes a change of state $(2.0\text{atm}, 3.0\text{L}, 95\text{K}) \rightarrow (4.0\text{atm}, 5.0\text{L}, 245\text{K})$ with a change in internal energy, $\Delta U = 30.0\text{L atm}$. The change in enthalpy (ΔH) of the process in L atm is: (2002)

(A) 40.0 (B) 42.3

(C) 44.0 (D) not defined, because pressure is not constant

- 13.** Two moles of a perfect gas undergo the following processes : **(2002)**
- (a)** a reversible isobaric expansion from (1.0 atm, 20.0 L) to (1.0 atm, 40.0 L)
 - (b)** a reversible isochoric change of state from (1.0 atm, 40.0 L) to (0.5 atm, 40.0 L)
 - (c)** a reversible isothermal compression from (0.5 atm 40.0 L) to (1.0 atm, 20.0 L)
 - (i)** Sketch with labels each of the processes on the same $p - V$ diagram.
 - (ii)** Calculate the total work (W) and the total heat change (Q) involved in the above processes.
 - (iii)** What will be the values of ΔU , ΔH and ΔS for the overall process?
- 14.** C_v value of He is always $3R/2$ but C_v value of H_2 is $3R/2$ at low temperature and $5R/2$ at moderate temperature and more than $5R/2$ at higher temperature. Explain in two or three lines.  **(2003)**
- 15.** The enthalpy of vapourization of a liquid is 30 kJ mol^{-1} and entropy of vapourization is $75 \text{ J mol}^{-1} \text{ K}^{-1}$. The boiling point of the liquid at 1 atm is :  **(2004)**
- (A)** 250 K **(B)** 400 K **(C)** 450 K **(D)** 600 K