Date Planned : __ / __ / __	Daily Tutorial Sheet-3	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level-1	Exact Duration :_____

31. From the given table answer the following question:

	CO (g)	CO_2(g)	H_2O(g)	H_2(g)
$\Delta_f H^o_{298}$ (kcal/mole)	– 26.42	– 94.05	– 57.8	0
$\Delta_f G^o_{298}$ (kcal/mole)	– 32.79	– 94.24	– 54.64	0
$\Delta_f S^o_{298}$ (Cal/K mol)	47.3	51.1	?	31.2

Reaction : $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$. Calculate $S^o_{298}[H_2O(g)]$

(A) – 119.47 Cal/K mole **(B)** + 119.47 Cal/K mole
(C) – 45.13 Cal/K mole **(D)** + 45.13 Cal/K mole

32. Calculate the free energy change at 298 K for the reaction; $Br_2(\ell) + Cl_2(g) \longrightarrow 2BrCl(g)$. For the reaction $\Delta H^o = 29.3$ kJ and the entropies of $Br_2(\ell), Cl_2(g)$ & $BrCl(g)$ at the 298 K are 152.3, 223.0, 239.7 J mol^{-1} K^{-1} respectively.

(A) –1721.8 J **(B)** –60321.8 J **(C)** +60321.8 J **(D)** –+1721.8 J

33. A mole of an ideal gas is expanded from an initial pressure of 1 bar to final pressure of 0.1 bar at constant temperature of 273 K. Predict which of the following is not **CORRECT**?

(A) $\Delta E = 0$ **(B)** $\Delta H = 0$ **(C)** PV is constant **(D)** $\Delta S < 0$

34. For the reaction $2HgO(s) \longrightarrow 2Hg(\ell) + O_2(g)$

(A) $\Delta H > 0$ and $\Delta S < 0$ **(B)** $\Delta H > 0$ and $\Delta S > 0$
(C) $\Delta H < 0$ and $\Delta S < 0$ **(D)** $\Delta H < 0$ and $\Delta S > 0$

35. Predict which of the following reaction(s) has a positive entropy change?

I. $Ag^+(aq) + Cl^-(aq) \longrightarrow AgCl(s)$ II. $NH_4Cl(s) \longrightarrow NH_3(g) + HCl(g)$

III. $2NH_3(g) \longrightarrow N_2(g) + 3H_2(g)$

(A) I and II **(B)** III **(C)** II and III **(D)** II

***36.** Which of the following is/are state function?

(A) Enthalpy **(B)** Heat **(C)** Entropy **(D)** Gibb's free energy (G)

37. The enthalpy of vaporization of a liquid is 30 kJ/mol and entropy of vaporization is 75 J mol^{-1} K^{-1}. The boiling point of the liquid at 1 atm is :

(A) 250 K **(B)** 400 K **(C)** 450 K **(D)** 600 K

***38.** When the gas is an ideal gas and process is isothermal then the **CORRECT** relation is:

(A) $P_1V_1 = P_2V_2$ **(B)** $\Delta U = 0$ **(C)** $\Delta W = 0$ **(D)** $\Delta H_1 = \Delta H_2$

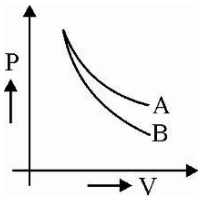
39. A system absorbs 300 cal of heat, its volume doubles and temperature rises from 273 to 298 k, the work done on the surrounding is 200 cal. ΔE for the above reaction is:

(A) 100 cal **(B)** 500 cal **(C)** –500 cal **(D)** –100 cal

40. Temperature of one mole of a gas is increased by $1°C$ at constant pressure. The work done on the system is :

(A) R **(B)** 2R **(C)** R/2 **(D)** –R

41. P – V plot for two gases (assuming ideal) during adiabatic processes are given in the figure. Plot A and plot B should correspond respectively to :



(A) He and H_2 **(B)** H_2 and He

(C) He and Ne **(D)** H_2 and Cl_2

42. Calculate the final temperature of a monoatomic ideal gas that is compressed reversible and adiabatically from 16 L to 2 L at 300 K :

(A) 600 K **(B)** 1044.6 K **(C)** 1200 K **(D)** 2400 K

43. The adsorption of vapours on a clean surface is a spontaneous process because

(A) change in the entropy of the process is highly positive

(B) enthalpy change is highly positive

(C) change in entropy is zero

(D) change in enthalpy is highly negative

44. Column-I and Column-II contains four entries each. Entries of Column-I are to be matched with some entries of Column-II.

One or more than one entries of Column-I may have the matching with the same entries of Column-II and select the correct answer using the code given below the Columns:

Column-I		**Column-II**	
(A)	Reversible cooling of an ideal gas at constant volume	**(p)**	$w = 0; q < 0; \Delta U < 0$
(B)	Reversible isothermal expansion of an ideal gas	**(q)**	$w < 0; q > 0; \Delta U > 0$
(C)	Adiabatic expansion of non-ideal gas into vaccum	**(r)**	$w = 0; q = 0; \Delta U = 0$
(D)	Reversible melting of sulphur at normal melting point	**(s)**	$w < 0; q > 0; \Delta U = 0$

Code:

	(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
(A)	p	s	r	q	**(B)**	p	s	s	q
(C)	s	p	r	q	**(D)**	p	r	r	q

45. Match Column-I with Column-II and select the correct answer using the code given below the Columns:

Column-I		**Column-II**	
(A)	Adiabatic process	**(p)**	$q = 0$
(B)	Isothermal process	**(q)**	$\Delta H = 0$
(C)	Isoenthalpic process	**(r)**	$\Delta T = 0$
(D)	Isoentropic process	**(s)**	$\Delta S = 0$

Code:

	(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
(A)	r	r	q	s	**(B)**	p	r	q	q
(C)	p	r	q	s	**(D)**	p	r	s	s