Date Planned : __ / __ / __	Daily Tutorial Sheet-5	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level-1	Exact Duration :_____

***61.** Which of the following process is (are) expected to be spontaneous at higher temperature but non-spontaneous at lower temperature ?

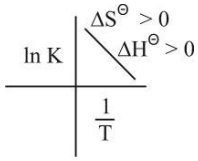
(A) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(B) $H_2(g) \rightleftharpoons 2H(g)$

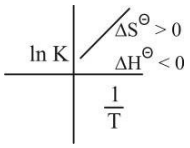
(C) $CO_2(s) + C(s) \rightleftharpoons 2CO(g)$ $[\Delta H^{\ominus}_{f,\,m} : CO_2 = -394\,kJ/mol,\ CO = -212\,kJ/mol]$

(D) $Na(s) \longrightarrow Na^+(g) + e^-$

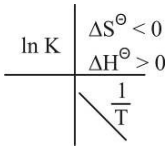
***62.** Which of the plots of ln K vs $\left(\frac{1}{T}\right)$ is/are correct ?



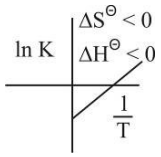
(A)



(B)



(C)



(D)

***63.** The value of $\Delta H_{transition}$ of C (graphite) $\rightarrow$ C (diamond) is $1.9\,kJ/mol$ at 25°C entropy of graphite is higher than entropy of diamond. This implies that :

(A) C (diamond) is more thermodynamically stable than C (graphite) at 25°C

(B) C (graphite) is more thermodynamically stable than C (diamond) at 25°C

(C) Diamond will provide more heat on complete combustion at 25°C

(D) $\Delta G_{transition}$ of C (diamond) $\rightarrow$ C (graphite) is $-ve$

64. Among the following, the state function(s) is (are) :

(A) Internal energy **(B)** Molar enthalpy

(C) Reversible expansion work **(D)** Irreversible expansion work

65. For an endothermic reaction, where ΔH represents the enthalpy of the reaction in kJ/mol, the minimum value for the energy of a activation will be :

(A) less than ΔH **(B)** zero **(C)** more than ΔH **(D)** equal to ΔH

66. Match the following :

Column I		Column II	
(A)	$CO_2(g) + C(s) \longrightarrow 2CO(g)$ $[\Delta_f H^o : CO_2 = -394$ and $CO = -220\,kJ/mol]$	**(1)**	$\Delta_r S > 0$
(B)	$SO_2Cl_2(g) \longrightarrow SO_2(g) + Cl_2(g)$	**(2)**	$\Delta_r H > \Delta_r U$
(C)	$CO(g) + Cl_2(g) \longrightarrow COCl_2(g)$	**(3)**	$\Delta_r H < \Delta_r U$
(D)	$Cl_2(g) \longrightarrow 2Cl(g)$	**(4)**	$\Delta_r G > 0$

67. Match the Column :

Column I		Column II	
(A)	$H^+(aq)$	**(1)**	$\Delta_f H° = 0$
(B)	$H(g)$	**(2)**	$\Delta_f H° \neq 0$
(C)	$H_2(g)$	**(3)**	$\Delta_f G° = 0$
(D)	C(s, diamond)	**(4)**	$\Delta_f S° < 0$

68. For the gas phase reaction, $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$
Which of the following conditions are correct :

(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 $\Delta S > 0$

69. The Haber's process for production of ammonia involves the equilibrium :

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

Assuming $\Delta H°$ and $\Delta S°$ for the reaction do not change with temperature, which of the statements is true? ($\Delta H° = -95\,kJ$ and $\Delta S° = -190\,JK^{-1}$)

(A) Ammonia dissociates spontaneously below 500 K

(B) Ammonia dissociates spontaneously above 500 K

(C) Ammonia dissociates at all temperatures

(D) Ammonia does not dissociates at any temperature

70. If gas, at constant temperature and pressure expands then it.

(A) Entropy increases and then decreases **(B)** Internal energy increases

(C) Internal energy remains the same **(D)** Internal energy decreases

71. Considering the reaction,

$$C(s) + O_2(g) \longrightarrow CO_2(g) + 393.5\ kJ$$

the signs of ΔH, ΔS and ΔG respectively are :

(A) +, –, – **(B)** –, +, + **(C)** –, –, – **(D)** –, +, –

72. Considering entropy(s) as a thermodynamic parameter, the criterion for the spontaneity of any process is:

(A) $\Delta S_{system} + \Delta S_{surroundings} > 0$ **(B)** $\Delta S_{system} - \Delta S_{surroundings} > 0$

(C) $\Delta S_{system} > 0$ only **(D)** $\Delta S_{surroundings} > 0$ only

73. Assuming $\Delta H°$ and $S°$ do not change with temperature. Calculate, the boiling point of liquid A using the thermodynamic data given below :

Thermodynamic data	A(ℓ)	A(g)
$\Delta_f H°(kJ/mol)$	–130	–100
$S°(J\,K^{-1}\,mol^{-1})$	100	200

(A) 300 K **(B)** 130 K **(C)** 150 K **(D)** 50 K

74. For a phase change : $H_2O(\ell) \underset{0°C,\,1\text{ bar}}{\rightleftharpoons} H_2O(g)$

(A) $\Delta G = 0$ **(B)** $\Delta S = 0$ **(C)** $\Delta H = 0$ **(D)** $\Delta U = 0$

75. For the process,

$H_2O(\ell)(1\,\text{bar}, 373\,K) \longrightarrow H_2O(g)(1\,\text{bar}, 373\,K)$

The correct set of thermodynamic parameters is :

(A) $\Delta G = 0, \Delta S = +ve$ **(B)** $\Delta G = 0, \Delta S = -ve$

(C) $\Delta G = +ve, \Delta S = 0$ **(D)** $\Delta G = -ve, \Delta S = +ve$