VSA TYPE QUESTIONS

Q1. A thermodynamic state function is a quantity

   (i) used to determine heat changes

   (ii) whose value is independent of path

   (iii) used to determine pressure- volume work

   (iv) whose value depends on temperature only

Q2. The enthalpy of all elements in their standard state is :

   (i) unity

   (ii) zero

   (iii) less than zero

   (iv) different for each element

Q3. For the process to occur under adiabatic conditions, the correct condition is :

   (i) change in temperature is zero

   (ii) change in pressure is zero

   (iii) q= 0

   (iv) w=0

Q4. A reaction is found to have a positive entropy change. The reaction will be

   (i) possible at high temperature

   (ii) possible only at low temperature

   (iii) not possible at any temperature

   (iv) possible at any temperature

Q5. For a spontaneous process free energy change:

(i) is equal to zero

(ii) less than zero

(iii) greater than zero

(iv) none of these

Q6. Dissolution of ammonium chloride in water is endothermic yet it is a spontaneous process. Explain

Q7. When will heat change at constant volume and heat change at constant pressure be equal?

Q8. Discuss the role of temperature in determining the spontaneity of a process

Q9. Predict the change in internal energy for an isolated system at constant volume.

Q10. Give two examples of state functions.

SA TYPE QUESTIONS :

Q11. State

i.   Hess's law of constant heat summation

ii.   Second law of thermodynamics

(Q12)a) In an isolated system, two identical gases are allowed to mix under identical conditions.

(b) $I_2(g)$ à $I_2(s)$

(c) $H_2(g) + I_2(g)$ à $2HI(g)$

d) Dissolution of sugar in water contained in a thermos flask . What will be the sign of entropy change in each of these?

Q13. Derive the relation $DH = D U + Dn_gRT$

Q14. DH and DS for the reaction $Ag_2O \rightleftharpoons 2Ag + \frac{1}{2} O_2$ are 30.56 KJ/mole and 60 J/K

respectively. Calculate the temperature at which the free energy change for this reaction will be zero. Predict whether the forward reaction will be favoured above/below this T

Q15.Differentiate between :

a) heat of formation and heat of reaction

b) heat of hydration and heat of solution

Q16.Calculate heat change at constant pressure if heat change at constant volume for the reaction $NH_2CN(g) + 3/2 O_2(g)$ à $N_2(g) + CO_2(g) + H_2O(l)$ at 298K is -742 kJ/mole

Q16. Define : (i) Molar heat capacity   (ii) Enthalpy of a reaction   (iii) Residual entropy

Q17. Calculate the DH^0_f of benzene if DH_{comb} of benzene, carbon and hydrogen are 3267, 393 and 286 kJ/mole respectively.

Q18. Comment on the following statements:

(i)   An exothermic reaction is always thermodynamically spontaneous.
(ii)   The entropy of a substance increases when going from liquid state to vapour
        state at any temperature.

Q19. bond enthalpies of N≡N and H-H are 946 and 436 kJ/mole respectively. If heat of formation of ammonia is -46kJ/mole, calculate the mean BE of N-H bonds in ammonia.

Q20(I). Calculate the entropy change in surroundings when 36 g of water is formed under standard conditions. DH^0_f of water = -286kJ/mole

(II) Calculate the work done when 2.5 moles of an ideal gas at 300K is isothermally and reversibly compressed from a volume of $5m^3$ to a volume of $2 m^3$