DAILY PRACTICE PROBLEM OF PHYSICAL CHEMISTRY FOR NEET

BY

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THERMODYNAMICS

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DPP-1

1. Tea placed in thermos flask is an example of

(1) Open system (2) Close system (3) Isolated system (4) It can't act as system

Ans. **(3)**

2. Gaseous system is placed with pressure P_1, volume V_1 and temperature T_1, it has undergone thermodynamic changes where temperature is remaining constant, it is

(1) Adiabatic process (2) Isothermal process

(3) Isobaric process (4) Isochoric process

Ans. **(2)**

3. The respective examples of extensive and intensive properties are

(1) Enthalpy, Entropy (2) Entropy, Enthalpy

(3) Entropy, Temperature (4) Temperature, Entropy

Ans. **(3)**

4. A thermally isolated gaseous system can exchange energy with the surroundings. The mode of energy may be

(1) Heat (2) Work

(3) Heat and radiation (4) Internal energy

Ans. **(2)**

5. A system absorbs 10kJ of heat and does 4 kJ of work. The internal energy of the system

(1) Decreases by 6 kJ (2) Increases by 6 kJ

(3) Decreases by 14kJ (4) Increase by 14 kJ

Ans. **(2)**

6. In a reaction, all reactant and products are liquid, then

(1) $\Delta H > \Delta E$ (2) $\Delta H < \Delta E$ (3) $\Delta H = \Delta E$ (4) Can't predicted

Ans. **(3)**

7. Regarding the internal energy of the molecule, which of the following statement is correct ?

(1) Its absolute value can be successfully calculated

(2) Its absolute value cannot be determined

(3) It is the sum of vibrational and rotational energies

(4) Both (1) & (2)

Ans. **(2)**

8. The specific heat of a gas is found to be 0.075 calories at constant volume and its formula wt. is 40. The atomicity of the gas would be

(1) One (2) two (3) Three (4) Four

Ans. **(1)**

9. In a flask colourless N_2O_4 is in equilibrium with brown coloured NO_2. At equilibrium when the flask is heated at 100°C, the brown colour deepens and on cooling it becomes less coloured. The change in enthalpy, ΔH for formation of NO_2 is

(1) negative (2) Positive (3) Zero (4) Undefined

Ans. **(2)**

10. For the system $S(s) + O_2(g) \rightarrow SO_2(g)$:–

(1) $\Delta H = \Delta E$ (2) $\Delta H > \Delta E$ (3) $\Delta E > \Delta H$ (4) $\Delta H = 0$

Ans. **(1)**

11. For the reaction $CO(g) + \frac{1}{2} O_2(g) \rightarrow CO_2(g)$

Which one of the statement is correct at constant T and P ?

(1) $\Delta H = \Delta E$ (2) $\Delta H < \Delta E$

(3) $\Delta H > \Delta E$ (4) ΔH is Independent of physical state of reactants

Ans. **(2)**

12. For which change $\Delta H \neq \Delta E$:-

(1) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ (2) $HCl(\ell) + NaOH(\ell) \rightarrow NaCl(s) + H_2O(\ell)$

(3) $C(s) + O_2(g) \rightarrow CO_2(g)$ (4) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

Ans. **(4)**

13. For the reaction $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$

(1) $\Delta H = \Delta E$ (2) $\Delta H > \Delta E$ (3) $\Delta H < \Delta E$ (4) Can't predicted

Ans. **(2)**

14. If 'r' is the work done on the system and 's' is heat evolved by the system then,

(1) $\Delta E = r + s$ (2) $\Delta E = r - s$ (3) $\Delta E = r$ (4) $\Delta E = s$

Ans. **(2)**

15. For the reaction

$aA(s) + bB(g) \longrightarrow dD(s) + cC(g)$. Then

(1) $\Delta H - \Delta E = (b - d)\,RT$ (2) $\Delta H - \Delta E = (c - b)\,RT$

(3) $\Delta H - \Delta E = (a + b) - (c + d)\,RT$ (4) $\Delta H - \Delta E = (a - d)\,RT$

Ans. **(2)**

16. For the given reaction, $A \longrightarrow D$; $\Delta H = x$. Steps involved are

$A \longrightarrow B$; $\Delta H_1 = x_1$

$B \longrightarrow C$; $\Delta H_2 = ?$

$C \longrightarrow D$; $\Delta H_3 = x_3$

(1) $\Delta H_2 = x - (x_1 + x_3)$ (2) $\Delta H_2 = x + x_1 + x_3$ (3) $\Delta H_2 = x_1 - x_3 - x$ (4) $\Delta H_2 = (x_1 + x) - x_3$

Ans. **(1)**

DPP - 2

1. The volume of a gas expands by 0.25 m^3 at a constant pressure of $10^3 N\ m^{-2}$. The work done is equal to

(1) 2.5 erg (2) 250 J (3) 250 watt (4) 250 newton

Ans. **(1)**

2. A cylinder contains either ethylene or propylene. 12 ml of gas required 54 ml of oxygen for complete combustion. The gas is

(1) Ethylene (2) Propylene

(3) 1 : 1 mixture of two gases (4) 1 : 2 mixture

Ans. **(2)**

3. An athlete takes 100 g of glucose of energy equivalent to 1560 kJ. How much amount of energy is uptaken by 1 g molecule of glucose ?

(1) 15.6 kJ (2) 2808 kJ (3) 1560 kJ (4) 28.08 kJ

Ans. **(2)**

4. $C_6H_{12}(l) + 9O_2(g) \rightarrow 6H_2O(l) + 6CO_2(g)$;

$\Delta H_{298} = -936.9$ kcal. Thus

(1) $-936.9 = \Delta E - (2 \times 10^{-3} \times 298 \times 3)$ kcal (2) $+936.9 = \Delta E + (2 \times 10^{-3} \times 298 \times 3)$ kcal

(3) $-936.9 = \Delta E - (2 \times 10^{-3} \times 298 \times 2)$ kcal (4) $-936.9 = \Delta E + (2 \times 10^{-3} \times 298 \times 2)$ kcal

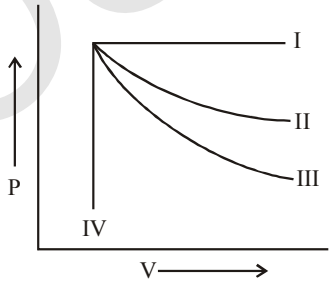
Ans. **(1)**

5. The heat change during the reaction 24g C and 128g S following the change $C+S_2 \rightarrow CS_2$; ΔH=22K cal

(1) 22 K cal (2) 11 K cal (3) 44 K cal (4) 32 K cal

Ans. **(3)**

6.



The plots between P and V which represent adiabatic and isothermal process respectively :

(1) I, IV **(2)** II, III **(3)** III, II **(4)** IV, I

Ans. **(3)**

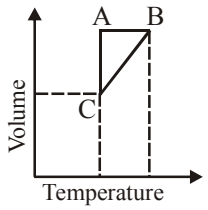
7. Five moles of a gas is put through a series of changes as shown graphicallay in a cyclic process the A $\rightarrow$ B, B $\rightarrow$ C and C $\rightarrow$ A respectively are

(1) Isochoric, Isobaric, Isothermal

(2) Isobaric, Isochoric, Isothermal

(3) Isothermal, Isobaric, Isochoric

(4) Isochoric, Isothermal, Isobaric



Ans. **(1)**

8. An electric heater of resistance 6 ohm is run for 10 minutes on a 120 volt line. The work done in this period of time is

(1) 7.2×10^3J **(2)** 14.4×10^5J **(3)** 43.2×10^4J **(4)** 28.8×10^4J

Ans. **(2)**

9. In a closed insulated container, a liquid is stirred with a paddle to increase its temperature. In this process, which of the following is true

(1) $\Delta E = W = Q = 0$ **(2)** $\Delta E \neq 0, Q = W = 0$ **(3)** $\Delta E = W \neq 0, Q = 0$ **(4)** $\Delta E = Q \neq 0, W = 0$

Ans. **(3)**

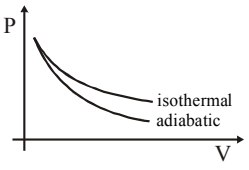
10. A vessel contains 100 litres of a liquid X. Heat is supplied to the liquid in such a fashion that, Heat given = change in enthalpy. The volume of the liquid increases by 2 litres. If the external pressure is one atm, and 202.6 Joules of heat were supplied then, [U - total internal energy]

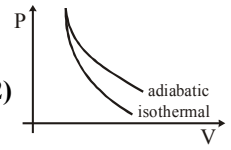
(1) $\Delta U = 0\ ,\ \Delta H = 0$ **(2)** $\Delta U = +202.6\ J\ ,\ \Delta H = +202.6\ J$

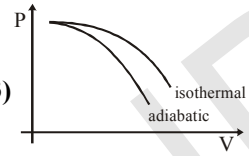
(3) $\Delta U = -202.6J, \Delta H = -202.6J$ **(4)** $\Delta U = 0,\ \Delta H = +202.6J$

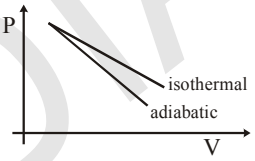
Ans. **(4)**

11. The correct figure representing isothermal and adiabatic expansions of an ideal gas from a particular initial state is

(1) 

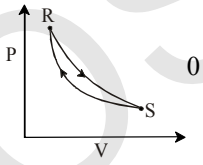
(2) 

(3) 

(4) 

Ans. **(1)**

12. Consider the cyclic process R $\rightarrow$ S $\rightarrow$ R as shown in the Fig. You are told that one of the path is adiabatic and the other one isothermal. Which one of the following is(are) true?



(1) Process R $\rightarrow$ S is isothermal **(2)** Process S $\rightarrow$ R is adiabatic

(3) Process R $\rightarrow$ S is adiabatic **(4)** Such a graph is not possible

Ans. **(4)**

13. 50 L of a certain liquid is confined in a piston system at the external pressure 100 atm. This pressure is suddenly released and liquid is expanded against the constant atmospheric pressure, volume of the liquid increases by 1 L and the final pressure on the liquid is 10 atm. Find the workdone.

(1) 1L.atm **(2)** 5 L.atm **(3)** 500 L.atm **(4)** 50 L.atm

Ans. **(1)**

14. Select the correct set of statement/s :

I. Work done by the surrounding in case of infinite stage expansion is more than single stage expansion

II. Irreversible work is always greater than reversible work. (with sign)

III. On an ideal gas in case of single stage expansion and compression system as well as surrounding are restored back to their original states

IV. If gas is in thermodynamic equilibrium is taken from state A to state B, by four successive single stage expansions. Then we can plot 4 points on the P-V indicator diagram.

(1) II **(2)** I, II, III, IV **(3)** II, IV **(4)** I, II, IV

Ans. **(1)**

15. A sample of liquid in a thermally insulated container (a calorimeter) is stirred for 2 hr. by a mechanical linkage to a motor in the surrounding, for this process :

(1) $w < 0; q = 0; \Delta U = 0$ **(2)** $w > 0; q > 0; \Delta U > 0$ **(3)** $w < 0; q > 0; \Delta U = 0$ **(4)** $w > 0; q = 0; \Delta U > 0$

Ans. **(4)**

16. Match the entries of column I with appropriate entries of column II and choose the correct option out of the four options **(1)**, **(2)**, **(3)** and **(4)**.

Column I	**Column II**
(X) Isothermal	(p) $\Delta T = 0$
(Y) Isobaric	(q) $\Delta V = 0$
(Z) Adiabatic	(r) $\Delta P = 0$
(W) Isochoric	(s) $q = 0$

(1) X–p, Y–q, Z-r, W-x **(2)** X–p, Y–r, Z-s, W-q **(3)** X–s, Y–p, Z-r, W-q **(4)** X–s, Y–p, Z-q, W-r

Ans. **(2)**

DPP - 3

1. For stretched rubber, Entropy

(1) Increases (2) First increases then decreases

(3) Decreases (4) First decreases then increases

Ans. **(3)**

2. The least random state of H_2O is

(1) Ice (2) Liquid water

(3) Steam (4) Randomness is same in all

Ans. **(1)**

3. What is the increase in entropy when 11.2 L of O_2 are mixed with 11.2 L of H_2 at STP ?

(1) 0.576 J/K (2) 5.76 J/K (3) 7.56 J/K (4) 2.76 J/K

Ans. **(2)**

4. The standard free energy change ΔG° is related to K (equilibrium constant) as

(1) $\Delta G^\circ = -2.303\ RT \log K$ (2) $\Delta G^\circ = 2.303\ RT \log K$

(3) $\Delta G^\circ = RT \log K$ (4) $\Delta G^\circ = -RT \log K$

Ans. **(1)**

5. When two gases are mixed the entropy :–

(1) Remains constant (2) Decreases (3) Increases (4) Becomes zero

Ans. **(3)**

6. The enthalpy of vaporization for water is 186.5 KJ mol^{-1}, the entropy of its vaporization will be-

(1) 0.5 $KJK^{-1}\ mol^{-1}$ (2) 1.0 $KJK^{-1}\ mole^{-1}$ (3) 1.5 $KJ\ K^{-1}\ mole^{-1}$ (4) 2.0 $KJK^{-1}\ mole^{-1}$

Ans. **(1)**

7. In a spontaneous irreversible process the total entropy of the system and surroundings

(1) Remains constant (2) Increases (3) Decreases (4) Zero

Ans. **(2)**

8. What is the sign of ΔG for the process of ice melting at 283 K ?

(1) $\Delta G > 0$ (2) $\Delta G = 0$ (3) $\Delta G < 0$ (4) None of these

Ans. **(3)**

9. For an endothermic reaction to be spontaneous

(1) $\Delta G = 0$ (2) $\Delta G > 0$ (3) $\Delta G < 0$ (4) ΔG may be +ve or -ve

Ans. **(3)**

10. At 27°C the reaction,

$C_6H_{6(l)} + 15/2\ O_{2(g)} \rightarrow 6CO_{2(g)} + 3H_2O_{(l)}$

Proceeds spontaneously because the magnitude of

(1) $\Delta H = T\Delta S$ (2) $\Delta H > T\Delta S$ (3) $\Delta H < T\Delta S$ (4) $\Delta H > 0$ and $T\Delta S < 0$

Ans. **(2)**

11. Mixing of non-reacting gases is generally accompanied by

(1) Decrease in entropy **(2)** Increase in entropy

(3) Change in enthalpy **(4)** Change in free energy

Ans. **(2)**

12. Two mole of an ideal gas is expanded irreversibly and isothermally at 37ºC until its volume is doubled and 3.41 kJ heat is absorbed from surrounding. ΔS_{total} (system + surrounding) is :

(1) –0.52 J/K **(2)** 0.52 J/K **(3)** 22.52 J/K **(4)** 0

Ans. **(2)**

13. If $\Delta G = -177$ K cal for (1) $2\,Fe(s) + \frac{3}{2}O_2(g) \longrightarrow Fe_2O_3(s)$

and $\Delta G = -19$ K cal for (2) $4\,Fe_2O_3(s) + Fe(s) \longrightarrow 3\,Fe_3O_4(s)$

What is the Gibbs free energy of formation of $Fe_3O_4(s)$?

(1) + 229.6 kcal/mol **(2)** – 242.3 kcal/mol **(3)** – 727 kcal/mol **(4)** – 229.6 kcal/mol

Ans. **(2)**

14. Which one of the following has ΔS^0 greater than zero

(1) $CaO(s) + CO_2(g) \rightleftharpoons CaCO_3(s)$ **(2)** $NaCl(aq) \rightleftharpoons NaCl(s)$

(3) $NaNO_3(s) \rightleftharpoons Na^+(aq) + NO_3^-(aq)$ **(4)** $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

Ans. **(3)**

15. What is the change in entropy when 2.5 mole of water is heated from 27ºC to 87ºC ? Assume that the heat capacity is constant. ($C_{p,m}(H_2O) = 4.2$ J/g-K ln (1.2) = 0.18)

(1) 16.6 J/K **(2)** 9 J/K **(3)** 34.02 J/K **(4)** 1.89 J/K

Ans. **(3)**

16. Consider the ΔG°_f and ΔH°_f (kJ/mol) for the following oxides. Which oxide can be most easily decomposed to form the metal and oxygen gas ?

(1) ZnO ($\Delta G^\circ = -318.4$, $\Delta H^\circ = -348.3$) **(2)** Cu_2O ($\Delta G^\circ = -146.0$, $\Delta H^\circ = -168.8$)

(3) HgO ($\Delta G^\circ = -58.5$, $\Delta H^\circ = -90.8$) **(4)** PbO ($\Delta G^\circ = -187.9$, $\Delta H^\circ = -217.3$)

Ans. **(3)**