DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : CHEMISTRY
DPP No. : 9

Topic :- THERMODYNAMICS

1 **(c)**
E and $G(H - TS)$ are state functions. Also, $\Delta E = q + w$ is state function. But q and w are path dependent and not state functions.

2 **(c)**
An isolated system neither shows exchange of heat nor matter with surroundings.

4 **(b)**
No doubt (a) and (b) both represent heat of formations but standard heat of formation ($\Delta H^\circ f$) for CO_2 will be from $C_{(graphite)} + O_2 \rightarrow CO_2$ as $C_{(graphite)}$ is most stable form of carbon.

5 **(a)**
For an isothermal process, $\Delta E = 0$
As the process is taking place at constant T and p hence, from equation,
$$\Delta H = \Delta E + \Delta p.V$$
We have, $\Delta H = 0 + 0 \times V = 0$
Hence, for the process, $\Delta H = \Delta E = 0$

6 **(b)**
At isothermal condition $T =$ constant.

7 **(a)**
The heat of formation of CO is calculated by using Hess's law. According to it, the total heat changes occurring during a chemical reaction are independent of path.
$2CO(g) + O_2(g) \rightarrow 2CO_2(g);$ $\quad \Delta H = -135.2$ kcal
$(I) CO_2(g) \rightarrow CO(g) + \frac{1}{2}O_2(g);$ $\quad \Delta H = \frac{135.2}{2}$ kcal
$(II)\ C(s) + O_2(g) \rightarrow CO_2(g);$ $\quad \Delta H = -94$ kcal
Required equation
$C(s) + \frac{1}{2}O_2(g) \rightarrow CO(g);$ $\quad \Delta H = ?$
Add Eqs. (I) and (II)
$C(s) + \frac{1}{2}O_2(g) \rightarrow CO(g);$ $\quad \Delta H = -26.4$ kcal

8 **(d)**
Graphite possesses lesser energy than diamond.

10 **(a)**

Under adiabatic conditions work is done on the cost of internal energy of system.

11 **(b)**

$\Delta G = \Delta H - T\Delta S$

$\therefore \Delta G = -11700 - 298 \times (-105)$

$= +19590 \, J = +19.59 \, kJ$

Thus, reaction is non-spontaneous.

12 **(c)**

Internal energy, enthalpy and entropy are state functions but work and heat are path functions.

13 **(a)**

$q = \Delta U - W; \; -W$ is work done by the system

$\Delta U = 40 - 8 = 32 \, J \quad (\because -W = 8)$

14 **(a)**

At constant volume, heat of reaction is ΔU.

15 **(c)**

$2.303 \log \dfrac{P_2}{P_1} = \dfrac{\Delta H}{R} \dfrac{[T_2 - T_1]}{T_1 T_2}$

$\therefore 2.303 \log \dfrac{10}{1} = \dfrac{460.6}{2} \times \dfrac{[T_2 - 50]}{50 \times T_2}$

$\therefore T_2 = 100 \, K$
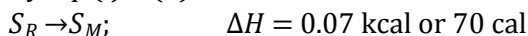
16 **(b)**

Heat of neutralization is defined as the energy released during neutralization of 1 eq. of an acid by 1 eq. of base.

17 **(d)**

$S_R + O_2 \rightarrow SO_2; \quad \Delta H = -70.96 \ldots\ldots(i)$

$S_M + O_2 \rightarrow SO_2; \quad \Delta H = -71.03 \ldots\ldots(ii)$

By eq. (i) – (ii) ,

$S_R \rightarrow S_M; \qquad \Delta H = 0.07 \, kcal \, or \, 70 \, cal$

19 **(d)**

It does not violate the first law of thermodynamics but violates the II law of thermodynamics

20 **(c)**

If $\Delta H = +$ ve and $\Delta S = -$ ve then the reaction is spontaneous

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	C	B	B	A	B	A	D	C	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	C	A	A	C	B	D	D	D	C