DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : CHEMISTRY
DPP No. : 3

Topic :- THERMODYNAMICS

1 **(d)**

$\Delta n = 0$

$\therefore \quad \Delta H = \Delta U$

2 **(a)**

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O(g);\ \Delta H = -57.0$ kcal.....(i)

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O(l);\ \Delta H = -68.3$ kcal.....(ii)

By eq. (i) and (ii),

$H_2O(l) \rightarrow H_2O(g); \quad \Delta H = +11.3$ kcal

3 **(b)**

$\Delta H = \Delta U + \Delta nRT$

$\therefore \ \Delta U = 176 - 1 \times 8.314 \times 1240 \times 10^{-3}$

$= 165.6\ kJ$

4 **(a)**

$TV^{\gamma-1} =$ constant

$$\frac{T}{T_{\text{final}}} = \left(\frac{V_2}{V_1}\right)^{\gamma-1}$$

$$\frac{T}{T_{\text{final}}} = \left(\frac{2}{1}\right)^{(5/3-1)} = 2^{(2/3)}$$

$$\frac{T}{T_{\text{final}}} = \frac{T}{2^{(2/3)}}$$

6 **(b)**

$\Delta n = -2$

$\therefore \quad \Delta H = \Delta U + \Delta nRT$

$= -1415 + (-2) \times 0.0083 \times 300$

$= -1420$ kJ

7 **(c)**

Experimental determination of heats of reaction by bomb calorimeter represents its value at constant volume, i.e., ΔU.

8 **(b)**

Graphite possesses sp^2-hybridisation and has flat layer structure whereas diamond possesses sp^3-hybridisation and has rigid tetrahedral nature.

9 **(c)**

$n_{\text{efficiency}} = \dfrac{T_2 - T_1}{T_2}$

or $0.25 = \dfrac{T - 400}{T}$

$\therefore T = 533.3$ K

10 **(a)**

Lower is energy level of a system, more is its stability.

11 **(b)**

$\Delta H = \Delta U + \Delta nRT$

Since, $\Delta n = -2$

Thus, $\Delta H < \Delta U$

12 **(b)**

$K + \frac{1}{2}O_2 + \frac{1}{2}H_2 \rightarrow KOH;\ \Delta H = ?$

Find ΔH by Eq. [(i) + (ii)] – (iii).

14 **(c)**

The fact for a quantity referred as state function.

15 **(c)**

Bond formation is always exothermic.

16 **(d)**

$N_2 + \frac{1}{2}O_2 \longrightarrow N_2O;\ \ \Delta H = 28$ kJ

$\frac{1}{2}N_2 + \frac{1}{2}O_2 \rightarrow NO;\ \ \Delta H = 90$ kJ

By eq. $[4 \times (ii)] - [2 \times (i)]$,

$2N_2O + O_2 \rightarrow 4NO;\ \Delta H = 304$ kJ

17 **(b)**

Calorific value = Heat of combustion per g of fuel, i.e., for C_2H_4, it is $\frac{-1411}{28}$, the lowest value.

18 **(b)**

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

$= -54.07 - 298 \times 10 \times 10^{-3}$

$= -57.05$ kJ

Also, $\Delta G^\circ = 2.303\ RT \log_{10} K$

$\log_{10} K = \dfrac{-57.05 \times 10^3}{2.303 \times 8.314 \times 298}$

19 **(b)**

Hess's law is based upon law of conservation of energy *i.e.*, first law of thermodynamics.

20 **(d)**

$\Delta S_f = \dfrac{\Delta H_f}{T} = \dfrac{6 \times 10^3}{273} = 21.98$ J

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