# DPP

DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

**Solutions**

SUBJECT : CHEMISTRY
DPP No. : 5

## Topic :- THERMODYNAMICS

1. **(a)**
Ice takes up heat to melt and thus, enthalpy change is +ve.

3 **(a)**
When $\Delta H = -$ ve, $\Delta S = +$ ve and $\Delta G = -$ ve than reaction is spontaneous

4 **(d)**
$\mathrm{KE} = (3/2)RT$

5 **(b)**
$\mathrm{C}(s) + \mathrm{O_2(g)} \rightarrow \mathrm{CO_2(g)}; \Delta H = r$
...(i)
$\mathrm{CO(g)} + \frac{1}{2}\mathrm{O_2(g)} \rightarrow \mathrm{CO_2(g)};\ \Delta H = s$
...(ii)
$\mathrm{C}(s) + \frac{1}{2}\mathrm{O_2(g)} \rightarrow \mathrm{CO(g)};\ \Delta H = ?$
Subtract Eq. (ii) from Eq. (i)
$\mathrm{C}(s) + \mathrm{O_2(g)} \rightarrow \mathrm{CO_2(g)}; \Delta H = r$
$\mathrm{CO(g)} + \frac{1}{2}\mathrm{O_2} \rightarrow \mathrm{CO_2(g)};\ \Delta H = s$
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$\mathrm{C}(s) + \frac{1}{2}\mathrm{O_2(g)} \rightarrow \mathrm{CO(g)};\ \Delta H = r - s$

6 **(d)**
$\mathrm{Cu(g)} \rightarrow \mathrm{Cu^+(g)} + \mathrm{e}, \qquad \Delta H = 745\ \mathrm{kJ\ mol^{-1}}$
$\mathrm{I(g)} + \mathrm{e} \rightarrow \mathrm{I^-(g)}; \qquad \Delta H = -295\ \mathrm{kJ\ mol^{-1}}$
Adding $\mathrm{Cu^+(g)} + \mathrm{I^-(g)} \rightarrow \mathrm{CuI(g)};\ \Delta H^\circ = -446\ \mathrm{kJ\ mo}$

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$\mathrm{Cu(g)} + \mathrm{I(g)} \rightarrow \mathrm{CuI(g)}; \qquad \Delta H^\circ = 4\ \mathrm{kJ\ mol^{-1}}$

7 **(a)**

Entropy of universe is tending towards maximum.

9 **(a)**

$\Delta H_{(\text{reaction})} = \Delta H_{f(\text{diamond})} - \Delta H_{f(\text{graphite})}$

$= 1.896 - 0.23 = 1.666$ kJ/ mol

10 **(b)**

$p$=1 atm

$$\Delta V = (50 - 15) = 35 \text{ L}$$

$$\therefore \quad W = -p.\Delta V = -1 \times 35$$

$$= -35 \text{ Latm}$$

Hence, work done by the system on the surroundings is equal to 35 L-atm.

11 **(d)**

The product possesses maximum energy and thus, least stable.

12 **(d)**

By eq. [(i) + 2 × (ii)] – (iii),

$$\text{C} + 2\text{H}_2 \longrightarrow \text{CH}_4; \Delta H = 74.1\ kJ$$

13 **(a)**

For the equation,

$\text{H}_2 + \text{S} + 2\text{O}_2 \rightarrow \text{H}_2\text{SO}_4$

Eqs. (i) +(ii)+(iii)+(iv)

$\Delta H = -287.3 + (298.2) + (-98.7) + (-130.2)$

$= 814.4$ kJ

14 **(d)**

(a) For isochoric process, $\Delta V = 0$

$$W = p\Delta V = 0$$

$$\therefore \quad \Delta E = Q$$

(b) For adiabatic process, $Q = 0$

$$\Delta E = W$$

(c) For isothermal process, $\Delta T = 0$

and $\Delta E = 0$

$$Q = -W$$

(d) For cyclic process, state functions like

$$\Delta E = 0$$

$$Q = -W$$

16 **(a)**

$\Delta G = \Delta H - T\Delta S = -\text{ve} - \text{ve} = -\text{ve}$

17 **(a)**

$F_2 + \frac{1}{2}O_2 \longrightarrow F_2O;\ \ \Delta H = +\text{ve}.$

18 **(c)**

Two equivalent of each are used.

19 **(a)**

Isothermally (at constant temperature) and reversible work.

$$W = 2.303\, nRT \log \frac{p_2}{p_1}$$
$$= 2.303 \times 1 \times 2 \times 300 \log \frac{10}{2}$$
$$= 2.303 \times 600 \times \log 5 = 965.84$$

At constant temperature, $\Delta E = 0$

$$\Delta E = q + W,\ q = -W = -965.84 \text{ cal}$$

20 **(d)**

The gaseous phase have more entropy and thus, $\Delta S$ is +ve in (a) and (b). Also decrease in pressure increases disorder and thus, $\Delta S$ is +ve in (c). In (d) the disorder decreases in liquid state due to decrease in temperature. Thus, $\Delta S = -$ ve.

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