

Topic :- THERMODYNAMICS

- 1 (c)
 $\Delta H = nC_p\Delta T$
The process is isothermal therefore,
 $\Delta G = 0$
 $\therefore \Delta H = 0$
- 2 (b)
The system returns to its original state, *i.e.*, cyclic process.
- 3 (b)
 $\Delta G = \Delta H - T\Delta S$; at equilibrium,
 $\Delta G = 0, \therefore \Delta H = T\Delta S$
or $\Delta H = 273 \times (60.01 - 38.20) = 5954.13 \text{ J mol}^{-1}$
- 4 (a)
 $EN_F \sim EN_{Cl} = 0.2028 \sqrt{\Delta}$
and $\Delta = [e_{F-Cl} - (e_{F-F} \times e_{Cl-Cl})^{1/2}]$
 $\therefore EN_F \sim EN_{Cl} = 0.2028 [e_{F-Cl} - (e_{F-F} \times e_{Cl-Cl})^{1/2}]^{1/2}$
Or $1 = 0.2028 [e_{F-Cl} - (38 \times 58)^{1/2}]^{1/2}$
 $\therefore e_{F-Cl} = 71.26 \text{ kcal mol}^{-1}$.
- 6 (b)
0.2 mole will neutralize 0.2 mole of HNO_3 heat evolved = $51 \times 0.2 = 11.4 \text{ kJ}$
- 7 (b)
Kirchhoff's equation is : $\Delta H_2 - \Delta H_1 = \Delta C_p (T_2 - T_1)$
- 8 (d)
 Δn depends on stoichiometry of reaction.
- 9 (a)
 $e_{A-A} = a$ Also, $\frac{1}{2}A_2 + \frac{1}{2}B_2 \rightarrow AB$;
 $e_{A-B} = a \Delta H = -100 \text{ kJ mol}^{-1}$
 $e_{B-B} = 0.5a$
 $\therefore \Delta H = -[e_{A-B}] + \frac{1}{2}[e_{A-A} + e_{B-B}]$
 $= a + \frac{1}{2}[a + 0.5a]$

$$-100 = -0.25 a$$

$$\therefore a = 400 \text{ kJ mol}^{-1}$$

10 (d)

The properties of the system whose value is independent of the amount of substance present in the system are called intensive properties *e.g.*, viscosity, surface tension, temperature, pressure etc.

11 (d)

When a real gas is forced through a porous plug into a region of low pressure, it is found that due to expansion, the gas on the side of low pressure gets cooled

12 (b)

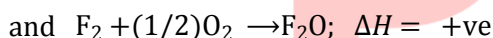
The room got heated because heat is lost to surroundings.

13 (b)

$$T_b = \frac{\Delta H}{\Delta S} = \frac{30 \times 10^3}{75} = 400 \text{ K}$$

14 (d)

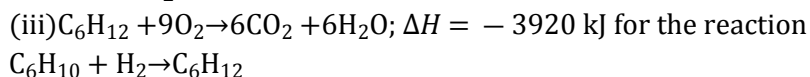
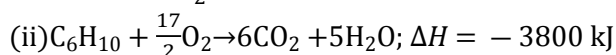
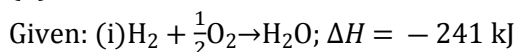
Heat of combustion is always exothermic; Few combustion reactions such as F_2 to F_2O , N_2 to N_2O and NO are endothermic but these reactions do not give heat of combustion because the substance should be completely oxidized. In F_2O , F_2 is reduced and N_2O and NO are not completely oxidized state of N_2 . However, three reactions are exceptions but these do not represent heat of combustion. These are,



15 (b)

For an isothermal process $\Delta T = 0$ and $\Delta E = 0$ and $q \neq 0$.

16 (b)



[It is infact Eq.(i)+Eq.(ii) - Eq.(iii)]

$$\text{Thus, } \Delta H = -241 - 3800 - (-3920) = -121 \text{ kJ}$$

17 (d)

In isothermal reversible process, ideal gas has constant volume and so, $\Delta E = 0$ and

$$\Delta H = \Delta E = 0$$

18 (a)

$$\Delta H = -2 \times e_{H-Cl} + e_{H-H} + e_{Cl-Cl}$$

$$\therefore n182 = -2 \times a + 430 + 242$$

$$\therefore a = 245 \text{ kJ mol}^{-1}$$

19 (d)

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

$$\Delta n = + 1/2$$

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Thus, $\Delta H > \Delta U$

(c)

Cylinder contains 11.2 kg or 193.10 mole butane. (\because molecular mass of butane =58)

\therefore Energy released by 1 mole of butane = -2658

\therefore Energy released by 193.10 mole of butane

$$= -2658 \times 193.10$$

$$= 5.13 \times 10^5 \text{ kJ}$$

$$\therefore \frac{5.13 \times 10^5}{20000} = 25.66 \text{ or } 26 \text{ days}$$

PE

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

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