DPP SOLUTION

- **Subject – Physical Chemistry**

- **Chapter – Chemical Equilibrium**

DPP No.- 03

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In equilibrium $CH_3COOH + H_2O \rightleftharpoons CH_3COO^- + H^+$. The equilibrium constant may change when

(1) $^\times CH_3COO^-$ are added

(2) $^\times CH_3COOH$ is added

(3) $^\times$ Catalyst is added

(4) Mixture is heated

K_p or K_c Change when T is change

Ans. (4)

In the reaction, $A_2(g) + 4B_2(g) \rightleftharpoons 2AB_4(g)$, $\Delta H < 0$ **the formation of** AB_4 **will be favoured at**

forward or shift.

$n_{gr}(g) = 5$ $n_{pc}(g) = 2$ $\Delta H = (-)ve \Rightarrow$ forward or shift

Temp less

$P \uparrow$

1. Low temperature, high pressure

2. High temperature, low pressure

3. Low temperature, low pressure

4. High temperature, high pressure

Ans. (1)

$+q \Rightarrow \Delta H = (-) ve$

$-q \Rightarrow \Delta H = (+) ve$ ✓

$N_2^{(g)} + O_2^{(g)} \rightleftharpoons 2NO, -Q$ cals. **In the above reaction which is the essential condition for the higher production of NO**

1) High temperature
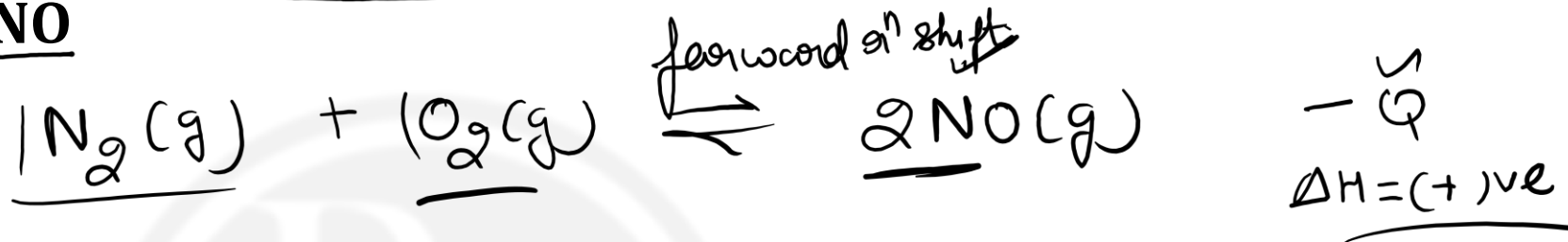
2) High pressure

3) Low temperature

4) Low pressure

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ $-Q$

forward $\overset{n}{\text{shift}}$

$\Delta H = (+) ve$

endo

endo $T \uparrow$ eq. forward $\overset{n}{\text{shift}}$.

Ans. (1)

Which of the following reactions proceed at low pressure

more
gaseous moles in Product

$n_r(g)$ $n_P(g)$ $P \downarrow$

(1) $N_2^{(g)} + 3H_2^{(g)} \rightleftharpoons 2NH_3(g)$ 4   2

(2) $H_2 + I_2 \rightleftharpoons 2HI$ 2   2

(3) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ 1   2

(4) $N_2 + O_2 \rightleftharpoons 2NO$ 2   2

Ans. (3)

The reaction A + B ⇌ C + D heat has reached equilibrium. The reaction may be made to proceed forward by

forward or shift

$$A + B \rightleftharpoons C + D \quad +q \Rightarrow \Delta H = (-)ve \text{ or}$$

exothermic

$T\downarrow$ or forward shift
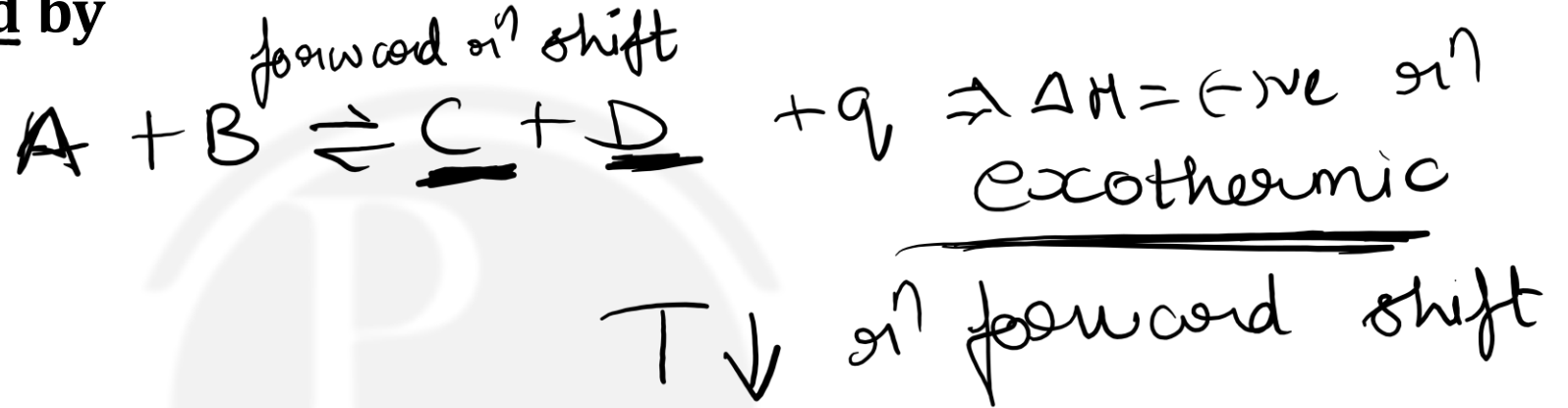
1. Adding more C

2. Adding more D

3. Decreasing the temperature

4. Increasing the temperature

Ans. (3)

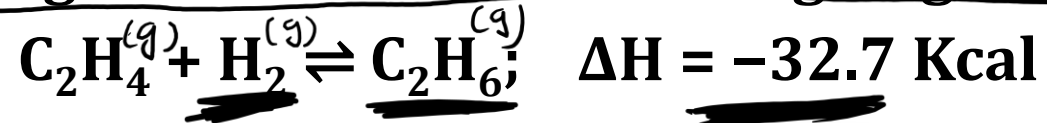**According to Le-chatelier principle, if heat is given to solid-liquid system, then**

1. Quantity of solid will reduce

solid ⇌ liquid

2. ✗ Quantity of liquid will reduce

3. ✗ Increase in temperature

4. ✗ Decrease in temperature

Ans. (1)

Following the gaseous reaction is undergoing in a vessel,

$$C_2H_4^{(g)} + H_2^{(g)} \rightleftharpoons C_2H_6^{(g)}; \quad \Delta H = -32.7 \text{ Kcal}$$

Which will increase the equilibrium concentration of C_2H_6

$[C_2H_6] \uparrow$

1. $\wedge$ Increase in temperature

2. By reducing the temperature

3. $\times$ By removing some hydrogen

4. $\times$ By adding some C_2H_6
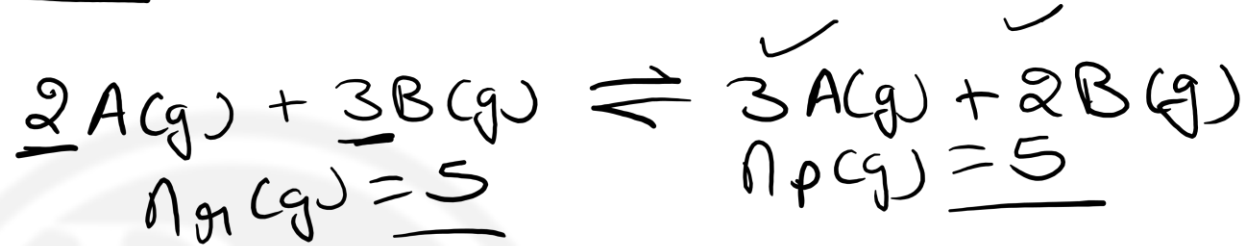
exo T↓ eq. forward shift

$[C_2H_6] \uparrow$

Ans. (2)

The effect of increasing the pressure on the equilibrium $2A + 3B \rightleftharpoons 3A + 2B$ is

1. Forward reaction is favored

2. Backward reaction is favored

3. No effect

4. None of the above

$$2A(g) + 3B(g) \rightleftharpoons 3A(g) + 2B(g)$$

$$n_r(g) = 5 \qquad n_p(g) = 5$$
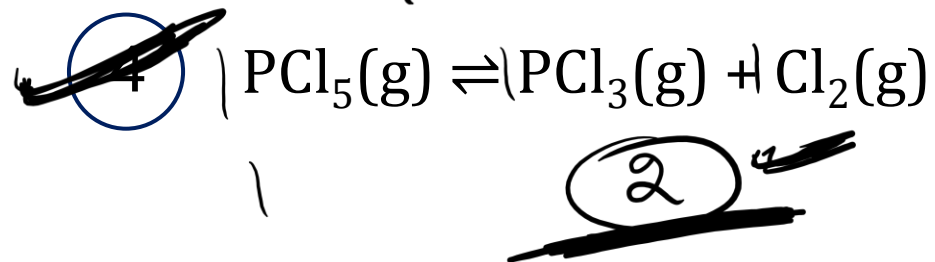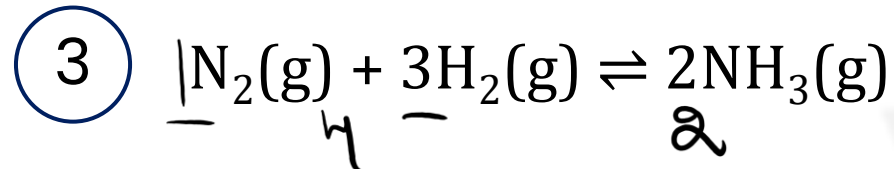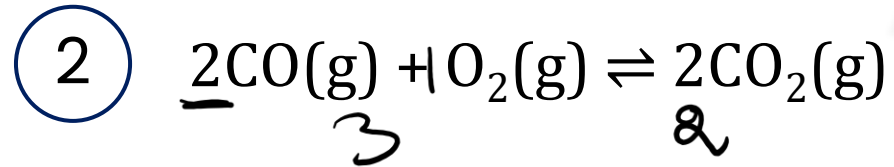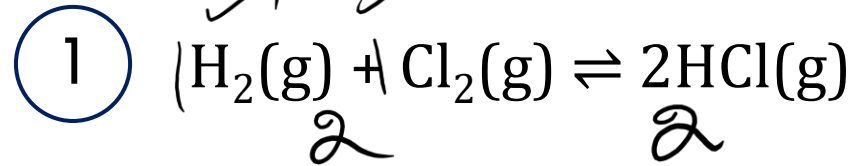
$P\uparrow$ eq. shift lesser no. of gaseous moles

$\Delta n_g = 0 \Rightarrow P$ has no effect

Ans. (3)

In which of the following system, doubling the volume of the container causes a shift to the right $\Rightarrow$ forward shift $V \uparrow P \downarrow \Rightarrow$ eq. shift more no. of gaseous moles.

(1) $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$
        2   2   2

(2) $2CO(g) + O_2(g) \rightleftharpoons 2CO_2(g)$
        3   2

(3) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
        4   2

(4) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$
        1   ②

Ans. (4)

The equilibrium $SO_2Cl_2(g) \rightleftharpoons SO_2(g) + Cl_2(g)$ is attained 25°C at in a closed container and an inert gas helium is introduced which of the following statement is correct

at Const. Volume ⇒ No effect on eq.

1. More chlorine is formed

2. Concentration of SO_2 is reduced

3. The concentration of all remains unaffected

4. More SO_2Cl_2 is formed

Ans. (3)

$H_2(g) + I_2(g) \rightleftharpoons 2HI(g); \Delta H = +q$ cal, then formation of HI
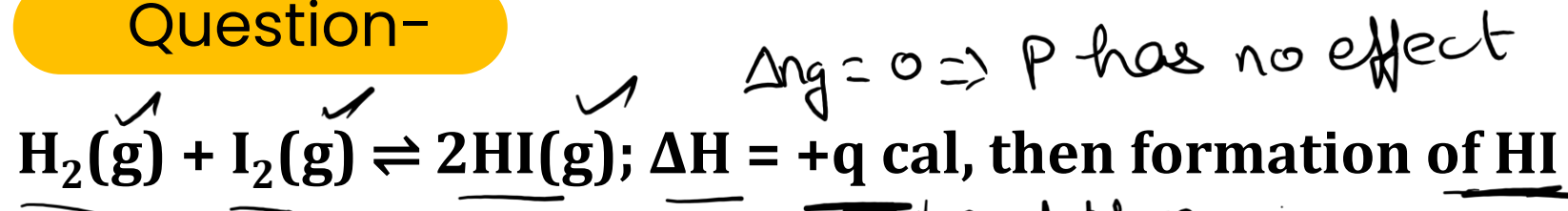
$\Delta n_g = 0 \Rightarrow$ P has no effect

↓endothermic → T↑ forward shift

T↓ backward shift

1) ✗ Is favoured by lowering the temperature

2) ✗ Is favoured by increasing the pressure

3) Is unaffected by change in pressure

4) ✗ Is unaffected by the change in temperature

Ans. (3)

NO (g)

$n_{sl}(g) = 2$ $n_p(g) = 0$

The formation of nitric oxide by the contact process $N_2^{(g)} + O_2^{(g)} \rightleftharpoons 2NO$, $\Delta H = \underline{43}, 200$

kcal is favoured by   → forward 2^n shift

endo

$\Uparrow$ forward shift

$T \Downarrow$ backward ⟩

(1) ✗ Low temperature and low pressure

(2) ✗ Low temperature and high pressure

$\Delta n_g = 0$ ∴ P has no effect.

(3) ✗ High temperature and high pressure

(4) High temperature and excess reactants concentration

[reactant] ↑ eq. shift forward shift.

Ans. (4)

The yield of product in the reaction, $A_2(g) + 2B(g) \rightleftharpoons C(g) + Q \text{ kJ}$ **would be high at**

$n_r(g) = 3 \qquad n_p(g) = 1$

1 High temperature and high pressure

2 High temperature and low pressure

3 Low temperature and high pressure

4 Low temperature and low pressure

$\Delta H = (-)ve$

yield high $\Rightarrow$ eq. forward shift

exo. $T\uparrow$ eq. backward
$T\downarrow$ eq. forward

$\Delta n_g = 1 - 3 = -2$

$\Delta n_g = (-)ve$ or^n

$P\uparrow$ eq lesser no. of gaseous moles.

Ans. (3)

Some inert gas is added at constant volume to the following reaction at equilibrium, $NH_4HS(s) \rightleftharpoons NH_3(g) + H_2S(g)$. Predict the effect of adding the inert gas:

1. The equilibrium shifts in the forward direction

2. The equilibrium shifts in the backward direction

3. The equilibrium remains unaffected

4. The value of K_p is increased

Ans. (3)

Le-Chatelier principle is not applicable to

1. $H_2(g) + I_2(g) \leftrightarrows 2HI(g)$

2. $Fe(s) + S(s) \leftrightarrows FeS(s)$

3. $N_2(g) + 3H_2(g) \leftrightarrows 2NH_3(g)$

4. $N_2(g) + O_2(g) \leftrightarrows 2NO(g)$

Ans. (2)