NEET REVISION SERIES

EQUILIBRIUM



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Q-1 - 11037496

100*mL* of a buffer solution contains 0.1*M* each of weak acid *HA* and salt *NaA*. How many gram of *NaOH* should be added to the buffer so that it *pH* will be 6? ( $K_a$  of  $HA = 10^{-5}$ ).

(A) 0.328

(B) 0458

(C) 4.19





#### **CORRECT ANSWER: A**

#### SOLUTION:

For acidic buffer,  $pH = pK_a + \log rac{0.1}{0.1}$  $pH = pK_a = -\log \left( 10^{-5} 
ight) = 5$ 

Rule: ABC (In acidic buffer (A), on addition of  $S_B(B)$ , the concentration of  $W_A(A)$  decreases and that of salt increases.

Let xM of NaOH is added. $pH_{
eq w}=5$   $+\logiggl(rac{0.1+x}{0.1-x}iggr)$ 

 $egin{array}{l} 6-5 \ = \logigg(rac{0.1+x}{0.1-x}igg) \end{array}$ 

$$\left(rac{0.1+x}{0.1-x}
ight)$$

 $= Anti \log(1) = 10$ 

Solve for x:

$$x = 0.082 M = rac{0.082}{1000} imes 100$$

```
= 0.0082 mol(100 mL)
)^{-1}
```

```
= 0.0082
	imes 40 g (100 mL)^{-1}
```

```
= 0.328g
```

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Q-2 - 11037499

The  $pK_b$  of  $CN^{\Theta}$  is 4.7. The pH is solution prepared by mixing

#### 2.5mol of 2.5mol of KCN of 2.5mol of HCN in water and

#### making the total volume upto 500mL is



(B) 9.3

(C) 8.3

(D) 4.7

#### **CORRECT ANSWER: B**

SOLUTION:

It forms basic buffer  $pOH = pK_b$  $+\log\!\left(rac{2.5/500}{2.5/500}
ight)$ = 4.7

pH = 14 - 4.7 = 9.3.



#### Q-3 - 11037503

#### An aqueous solution of metal chloride $MCI_2(0.05M)$ is saturated

with  $H_2S(0.1M)$ . The minimum pH at which metal sulphide will

be precipiated is

$$egin{aligned} & \left[K_{sp}MS = 5 imes 10^{-21}, \ & K_1(H_2S) = 10^{-7}, K_2(H_2S) \ & = 10^{-14} \end{aligned} 
ight.$$

(A) 3.25

(B) 2.50

(C) 1.50

(D) 1.25

#### CORRECT ANSWER: C

SOLUTION:

 $K_{sp}MS$ 

#### $=ig[M^{2\,+}ig]ig[S^{2\,-}ig]$

$$egin{array}{l} 5 imes 10^{-21} \ = (0.05)ig[S^{2-}ig] \end{array}$$

For precipitation  $Q_{sp} = K_{sp}$ 

For  $H_2S$ :  $H_2S \Leftrightarrow H^{\oplus}$  $+ HS^{\Theta}(K_1)$ 

 $HS^{\,\Theta} \Leftrightarrow H^{\,\oplus}$  $+ S^{2-}(K_2)$ 

 $K_1 imes K_2$  $=rac{[H^\oplus]^2ig[S^{2-}ig]}{H_2S}$ 

$$egin{aligned} 10^{-7} imes 10^{-14} \ &= rac{[H^{\oplus}]^2 ig[ 10^{-19} ig]}{0.1} \end{aligned}$$

$$\left[ H^{\,\oplus} 
ight]^2 = 10^{-3}, \, \Rightarrow \,$$
 [Taking negative logaritham both sides]

$$egin{aligned} -2\logig[H^\oplusig]&=3\ pH&=rac{3}{2}=1.5 \end{aligned}$$

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Q-4 - 11037508

Phenolphalein does not act as an indicator for the titration between

(A) HCI and  $NH_4OH$ 

#### (B) $Ca(OH)_2$ and HCI

#### (C) NaOH and $H_2SO_4$

#### (D) KOH and $CH_3COOH$

With weal base and stronf acid, phenolhthalein does not

act an indicator.

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Q-5 - 11037513

A solution containing  $NH_4CI$  and  $NH_4OH$  has

 $\begin{vmatrix} \Theta \\ OH \end{vmatrix} = 10^{-6} mol L^{-1}$ , which of the following hydroxides would be precipitated when this solution in added in equal volume to a

solution containing 0.1M of metal ions?



#### $Mg(OH)_2, (K_{sp}=3)$ $\times 10^{-11}$ )

(B)  

$$Fe(OH)_2(K_{sp} = 8$$
  
 $imes 10^{-16})$   
(C)  
 $Cd(OH)_2(K_{sp} = 8$   
 $imes 10^{-6})$ 

(D)
$$AgOHig(K_{sp}=5
ight. imes 10^{-3}ig)$$

CORRECT ANSWER: B

SOLUTION:

When equal volumes of  $(NH_4CI+NH_4OH)$  and

metal ions are mixed (volume becomes double and

#### concentration is halved)



 $Q_{sp}(\ {
m or}\ IP)$  of metal hydroxides of  $M(OH)_2$ type

$$= \begin{bmatrix} M^{+n} \end{bmatrix} \begin{bmatrix} \Theta \\ OH \end{bmatrix}^2$$
$$= \left(\frac{0.1}{2}\right) \left(\frac{10^{-6}}{2}\right)^2$$
$$= \frac{1}{8} \times 10^{-13}$$

$$= 0.125 imes 10^{-13} \ = 12.5 imes 10^{-11}$$

$$egin{aligned} &\therefore Q_{sp} \ &> K_{sp} of Mg(OH)_2 \ &ig(12.5 imes10^{-11}>3 \ & imes10^{-11}ig) \ & ext{and}\ Q_{sp}>K_{sp} ext{ of} \end{aligned}$$

 $Fe(OH)_2(12.5$ 

 $imes \, 10^{\,-\,11} > \, 8$ 

 $\times 10^{-16}$ 

So both can be precipitated. Since the  $k_{sp}$  of  $Fe(OH)_2$ is less than Ksp of  $Mg(OH)_2$ , so  $Fe(OH)_2$  will be precipiated first.

Similarly,  $Q_{sp}$  (or IP) of metal hydroxides of M(OH)

type

$$egin{aligned} &= egin{bmatrix} M^{+1} \end{bmatrix} egin{bmatrix} \Theta \ OH \end{bmatrix} \ &= egin{pmatrix} 0.1 \ 2 \end{pmatrix} egin{pmatrix} 10^{-6} \ 2 \end{pmatrix} \end{pmatrix} \end{aligned}$$

$$= 0.25 imes 10^{-7}$$

$$\therefore Q_{sp}$$

 $< K_{sp} of AgOH ig( 0.25 \ imes 10^{-7} < 5 imes 10^{-3} ig)$ 

#### IT can not be precipitated out. Hence $Fe(OH)_2$ will be

precipitated.



Three sparigly soluble salts  $M_2X$ , MX, and  $MX_3$  have the same solubility product. Their solubilities will be in the order

(A) 
$$MX_3 > MX > M_2X$$

(B)  $MX_3 > M_2X > MX$ 

(C)  $MX > MX_3 > M_2X$ 

(D)  $MX > M_2X > MX_3$ 

CORRECT ANSWER: B

SOLUTION:

$$M_2X$$
: Solubility of  $M_2X = 3\sqrt{rac{K_{sp(M_2X)}}{4}}$   
 $MX$ : Solubility of  $MX = \sqrt{K_{sp(MX)}}$   
 $MX_3$ : Solubility of  $MX_3 = 4\sqrt{rac{K_{sp(MX_3)}}{27}}$ 

Clearly, solubility is maximum for  $MX_3$  and then  $M_2X$ .



Q-7 - 11037536

The pH value of 0.001M aqueous solution of NaCI is

(A) 7

(B) 4

(C) 11

(D) Unpredictable

CORRECT ANSWER: A

#### SOLUTION:

#### NaCI is salt of $S_A/S_B$ . So it is neutral and pH = 7.

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Q-8 - 11037537

Which of the following will supress the ionisation of acetic acid in aquoeus solution ?

(A) NaCI

(B) HCI

(C) KCI

(D) Unpredictable

CORRECT ANSWER: B

SOLUTION:

 $CH_3COOH$ 

 $ightarrow CH_3COO^{\,\Theta} + H^{\,\oplus}$ 

#### Only the HCI provides common ion $H^{\oplus}$ and so it will

#### supress the ionisation of acetic acid.



Q-9 - 11037538

#### An aqueous solution of $HCIis10^{-9}MHCI$ . The pH of the

solution should be

(A) 9

(B) Between  $6 \mbox{ and } 7$ 

(C) 7

(D) Unpredictable

CORRECT ANSWER: B

#### SOLUTION:

#### $H_3 O^{\oplus} = 10^{-9} M.$

#### Since the concentration of $H_3 O^{\oplus} is < 10^{-6} M$ . So

#### concentration fo $H_3O^{\oplus}$ is calculated from ionisation of

water and its common effect, so the value will lie

between 6 and 7.

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Q-10 - 11037544

Let the solubilities of AgCI in  $H_2O$ , and in

 $0.01MCaCI_2, 0.01MNaCI, and 0.05MAgNO_3$  be

 $S_1, S_2, S_3, S_4$ , respectively. What is the correct relationship

between these quantites.

(A) 
$$S_1 > S_2 > S_3 > S_4$$
  
(B)  $S_1 > S_2 = S_3 > S_4$ 

(C)  $S_1 > S_3 > S_2 > S_4$ 

#### (D) $S_4 > S_2 > S_3 > S_1$

#### CORRECT ANSWER: C

i. $AgCI + H_2O$  $\Rightarrow Ag^{\oplus}(aq)$  $+ CI^{\Theta}(aq)...S_1$ 

ii. AgCI in  $0.01MCaCI_2, S_2$  Concentration of  $CI^{\,\Theta} = 2 imes 0.01$ = 0.002M

iii. $AgCI \in 0.01MNaCI,$  $.S_3$ Concentration of  $CI^{\,\Theta} = 0.01M$ 

iv.

AgCI is 0.05M

$$AgNO_3, ..., S_4$$

#### Concentration of $Ag^{\oplus} = 0.05$ .

#### Since both $CI^{\,\Theta}$ ions and $Ag^{\,\oplus}$ ions acts as common

ion. So larger the concentration of  $Ag^{\oplus}$  or  $CI^{\Theta}$  ions,

more is the supression of ionisation of AgCI and hence

less will be solubility of AgCI.

- . Solubility order
- $S_1 > S_3 > S_2 > S_4$

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Q-11 - 11037545

Which of the following salts will not undergo hydrolysis in water?

(A) Sodium sulphate

- (B) Ammonium sulphate
- (C) Aluminimum sulphate

#### (D) All the salts will hydrolyse

#### **CORRECT ANSWER: A**

Salt of  $S_A/S_B$  do not undergo hydrolysis. So  $Na_2SO_4$  is a salt of  $S_A/S_B$ .

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Q-12 - 11037546

Which of the following salts will not change the pH of pure water

on dissociation?

(A) KCI

(B)  $AICI_3$ 

(C)  $Na_2CO_3$ 

(D)  $AI_2(SO_4)_3$ 

#### **CORRECT ANSWER: A**

Salt of  $S_A / S_B$  do not hydrolyse in  $H_2O$ . So pH does not change on adding KCI to  $H_2O$ .

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Q-13 - 11037548

The pH of a solution 7.00. To this solution, sufficient base is added to increase the pH to 12.0. The increase in OH ion concentration is

(A)  $5 \times$ 

(B) 100 imes

(C)  $10^5$  imes

(D)  $4 \times$ 

#### **CORRECT ANSWER: C**

### Initial pH or $pOH = 7, \therefore \begin{bmatrix} \Theta \\ OH \end{bmatrix}$ $= 10^{-7}M$

# Final $pH = 12, \therefore pOH$ $= 2, \begin{bmatrix} \Theta \\ OH \end{bmatrix} = 10^{-2}M$

Increase in 
$$\begin{bmatrix} \Theta \\ OH \end{bmatrix} = rac{10^{-2}}{10^{-7}} = 10^5$$
 times

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#### When 20mL of M/20NaOH is added to 10mL of M/10HCI,

the resulting solution will

(A) Turn blue litmus red.

(B) Turn phenolpthalein solution pink.

(C) Turns methy orange red.

(D) Will have no effect on either red or blue litmus

CORRECT ANSWER: D

SOLUTION:

mEq of $NaOH = 20 imes rac{1}{20} = 1$ 

mEq of  $HCI = 10 imes rac{1}{10} = 1$ 

#### So, slat of $S_A / S_B(NaCI)$ will be formed which do not

#### hydrolyse and pH = 7. So at pH = 7, litmus has no

#### effect. Since, blue litmus turns red a acidic solution, and

#### red litmus turns blue, a basic solution.

i. phenolphtalein solution turns pink a basic solution of

pH > 7.

iii. Methy1 orange turns red a acidic solution of pH < 7.

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Q-15 - 11037562

Solubility of salt  $A_2B_3$  is  $1 \times 10^{-4}$ , its solubility product is

(A)  $1.08 imes 10^{20}$ 

(B)  $1.08 imes 10^{18}$ 

(C)  $2.6 imes 10^{\,-\,18}$ 

(D)  $1.08 imes10^{-18}$ 

#### **CORRECT ANSWER: D**

#### SOLUTION:

 $egin{array}{rcl} A_2B_3 \Leftrightarrow & 2A^{3\,+} + & 3B^{2\,-} \ & 2S & & 3S \end{array}$ 

$$egin{aligned} K_{sp} &= (2S)^2 (3S)^2 \ &= 108 S^5 = 108 \ & imes \left( 10^{-4} 
ight)^5 \end{aligned}$$

$$egin{aligned} &= 108 imes 10^{-20} \ &= 1.08 imes 10^{-20} \ &= 1.08 imes 10^{-18} \end{aligned}$$

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Q-16 - 11037563

The value of  $K_{sp}$  is  $HgCI_2$  at room temperature is  $4.0 \times 10^{-15}$ .

#### The concentration of $CI^{\Theta}$ ion in its aqueous solution at saturation

point is

(A)  $1\,\times\,10^{-\,5}$ 

(B)  $2 imes 10^{-5}$ 

(C)  $2\,\times\,10^{\,-\,15}$ 

(D)  $8\,\times\,10^{\,-\,15}$ 

#### CORRECT ANSWER: B

SOLUTION:

$$egin{aligned} K_{sp} &= 4S^3.\ S &= \sqrt[3]{rac{K_{sp}}{4}}\ &= \sqrt[3]{rac{4 imes10^{-15}}{4}}10^{-5} \end{aligned}$$

# $\therefore 2S = 2 imes 10^{-5} \ = \left[ CI^{\Theta} ight]$



What is the solubility of  $PbSO_4$  in  $0.01MNa_2SO_4$  solution if  $K_{sp}$ for  $PbSO_4 = 1.25 \times 10^{-9}$ ?

(A) 
$$1.25 imes 10^{-7}molL^{-1}$$

(B)  $1.25 imes 10^{-9} mol L^{-1}$ 

(C) 
$$1.25 imes10^{-10}molL^{-1}$$

(D)  $0.10 mol L^{-1}$ 

#### CORRECT ANSWER: A

#### SOLUTION:

_	•
	6 1
<u> </u>	$\sim \sim 1$

# $egin{array}{rll} PbSO_4 \Leftrightarrow & Pb^{2+} + & SO_4^{2-} \ & S & & S \end{array}$

	$Na_2SO_4  ightarrow$	$2Na^{\oplus}$ +	$SO_4^{2-}$
Initial	0.01	0	0
Final	0	2 imes 0.01	0.01

(Since  $Na_2SO_4$  is salt of  $S_A \,/\, S_B$  it is completely

ionised).

 $\therefore SO_4^{2-} = (x + 0.01)$ = 0.01

(Since x is very small)

$$\therefore K_{sp} pfPbSO_4$$
$$= \left[ Pb^{2+} \right] \left[ SO_4^{2-} \right]$$

$$egin{array}{ll} 1.25 imes10^{-9}=x\ imes0.01 \end{array}$$

$$\therefore x = \frac{1.25 \times 10^{-9}}{0.01}$$

#### $\mathbf{0.01}$

= 1.25

$$imes 10^{-7} mol L^{-1}$$



Which of the following metal sulphides has maximum solubility in water?

(A)  

$$CdS(K_{sp} = 36$$
  
 $imes 10^{-30})$   
(B)  
 $FeS(K_{sp} = 11$   
 $imes 10^{-20})$   
(C)  
 $HgS(K_{sp} = 32$   
 $imes 10^{-54})$ 



 $ZnS(K_{sp}=11$  $imes 10^{\,-\,22}ig)$ 

- )

#### **CORRECT ANSWER: B**

Higher the  $K_{sp}$ , more soluble is that compound in  $H_2O$ 

 $\therefore K_{sp}$  of  $FeS(11 imes 10^{-20})$  is highest.

So, it is more soluble and has maximum solubility in  $H_2O$ .

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Q-19 - 11037580

 $K_{sp}$  for lead iodate  $\left[Pb(IO_3)_2is3.2 \times 10^{-14} \text{ at a given}\right]$ 

temperature. The solubility in  $molL^{-1}$  will be

(A)  $2.0 imes10^{\,-5}$ 

(B)  $\left(3.2 \times 10^{-7}\right)^{1/2}$ 

#### (C) $\left(3.8 \times 10^{-7}\right)$

(D)  $4.0 \times 10^{-6}$ 

#### CORRECT ANSWER: A

## SOLUTION: $\begin{bmatrix} Pb(IO_3)_2 \end{bmatrix} \Leftrightarrow Pb^{2+} + 2IO_3^{\Theta} \\ 2S \qquad S$



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Q-20 - 11037587

#### Buffer solutions can be prepared form mixtures of

#### (A) HCI and NaCI

(B)  $NaH_2PO_4$  and  $Na_2HPO_4$ 

(C)  $CH_3COOH + NaCI$ 

(D)  $NH_4OH + NH_3$ 

CORRECT ANSWER: B

SOLUTION:

Buffer solution is a mixture of

 $W_A + sa \, < \, of W_A \, / \, S_B$ 

or a mixture of  $W_B + \operatorname{Salt} \operatorname{of} W_B / S_A$ .

So

 $(NaH_2PO_4)$ 

 $+ Na_2HPO_4)$ 

is a buffer.

a. |HCI + NaCI, |

b.  $|NaH_2PO_4|$ 

 $+ Na_2HPO_4$ 

c.  $[CH_3COOH]$ 

+ NaCI

 $S_A + \text{Salt of} S_A$  $/S_B(\text{not buffer})$  $W_A + \text{Salt of} W_A / S_B$ . (It is a buffer)  $W_A + \text{Salt of} S_A$  $/S_B(\text{not buffer})$ 

d.  $[NH_4OH + NH_3] = W_B + W_B$ (not buffer)

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Q-21 - 11037590

What are the units in which the solubility product of  $Ca_3(PO_4)_2$  is

expressed?

(A)  $moldm^{-3}$ 



(C)  $mol^3 dm^{-9}$ 

#### (D) $mol^5 dm^{\,-\,15}$

#### CORRECT ANSWER: D

SOLUTION: $Ca_3(PO_4)_2 \Leftrightarrow 3Ca^{2+} + 2PO_4^{3-}$ 3x = 2x

$$egin{aligned} &K_{sp} = (3x)^2 (2x)^2 \ &= 108 x^5 \end{aligned}$$

 $\therefore$  Units of  $K_{sp}$  is (concentration)<sup>5</sup>  $= \left( \mathrm{mol} \ \mathrm{dm}^{-3} \right)^5$  $= \mathrm{mol}^5 \mathrm{dm}^{-15}$  $= \mathrm{mol}^5 \mathrm{dm}^{-15}$ 

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#### Q-22 - 11037616

#### When equal volumes of the following solutions are mixed,

precipitation of  $AgCI(K_{sp} = 1.8 \times 10^{-10})$  will occur only wity

(A) 
$$10^{-4}M(Ag^{\oplus})$$
 and  $10^{-4}M(CI^{\Theta})$   
(B)  $10^{-5}M(Ag^{\oplus})$  and  $10^{-5}M(CI^{\Theta})$   
(C)  $10^{-5}M(Ag^{\oplus})$  and  $10^{-6}M(CI^{\Theta})$   
(D)  $10^{-4}M(Ag^{\oplus})$  and  $10^{-10}M(CI^{\Theta})$ 

CORRECT ANSWER: A

SOLUTION:

Since equal volumes are added

a. Ionic product

$$=rac{10^{-4}}{2} imesrac{10^{-4}}{2}$$



#### b. Ionic product



c. Ionic produt

$$= \frac{10^{-5}}{2} \times \frac{10^{-6}}{2} \\ = \frac{10^{-11}}{4}$$

d. lonic product

$$= \frac{10^{-10}}{2} \times \frac{10^{-10}}{2} \\ = \frac{10^{-20}}{4}$$

#### Only in (a) Ionic product



$$imes 10^{-10}$$
)

#### So precipitate will take place only with (a)



Q-23 - 11037617

- The gatric juice in our stomach contains enough HCI to make the hydrogen ion concentration about  $0.01mol^{-1}$ . The *pH* of gastric juice is
  - (A) 0.01
  - (B) 1
  - (C) 2

(D) 14

#### SOLUTION:


$$pH = -\log(10^{-2})$$
  
= 2  
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## A solution contains 10mL of 0.1NNaOH and 10mL of

 $0.05Na_2SO_4$ , pH of this solution is

## (A) 7

- (B) Less than 7
- (C) Greater than 7
- (D) Zero

#### CORRECT ANSWER: C

#### SOLUTION:

 $NaOH = 10 imes 0.1 \ = 1mEq$ 

 $egin{aligned} Na_2SO_4 &= 10 imes 0.05 \ &= 0.5mEq \end{aligned}$ 

But pH of solution id due to only strong base, NaOHand will be greater than 7. Salt of  $S_A / S_B$ , has no effect on pH, since its pH is 7.

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Q-25 - 11037626

In which of the following solvents will AgBr has highest

solubility?

## (C) Pure water

## (B) $10^{-3}MNH_4OH$

## (A) $10^{-3}MNaBr$

(D)  $10^{-3}MHBr$ 

## CORRECT ANSWER: B

SOLUTION:

 $AgBr 
ightarrow Ag^{\,\oplus} + Br^{\,\Theta}$ 

a. $NaBr 
ightarrow Na^+ + Br^{\Theta}$ 

Due to common ion effect of  $Br^{\Theta}$ , solubility of AgBr will be less.

b. $NH_4OH o NH_4^{\oplus} + \stackrel{\Theta}{OH}$ 

$$Ag^{\,\oplus}\,+ \stackrel{\Theta}{O}\!\!\!\!\!OH o AgOH$$

## $\stackrel{\Theta}{OH}$ combines with $Ag^{\oplus}$ ions to given AgOH. So

#### accroding to Le Chatelier's principle, reaction will proced

## in formed direction and hence solubility of AgBr in $H_2O$

will increases.

c. Solubility of AgBr in  $H_2O$  will remain unaffected (here  $\stackrel{\Theta}{O}H$  from water is very less i.e.,  $\left| \stackrel{\Theta}{O}H \right| = 10^{-7}$ )

d.  $HBr 
ightarrow H^{\oplus} + Br^{\Theta}$ 

So again due to common ion effect of  $Br^{\Theta}$ , solubility of AgBr will decrease.

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Q-26 - 11037627

Which of the following mixture solution has  $pH \approx 1.0$ ?

(A) 100mLM/10HCI

#### + 100mLM

## /10NaOH

## **(B)**

## 55mLM/10HCI+45 m LM / 10 NaOH

(C) 10mLM/10HCI+ 90mLM/10NaOH

(D) 75mLM/5HCI+ 25mLM/5NaOH

## CORRECT ANSWER: D

SOLUTION:

a.

$$egin{aligned} HCI &= 100 imes rac{1}{10} \ &= 10mEq \end{aligned}$$

NaOH = 1001



## Salt of $S_A \,/\, S_B$ is formed, pH=7

b.

$$egin{aligned} HCI &= 55 imes rac{1}{10} \ &= 5.5 mEq \end{aligned}$$

$$egin{array}{l} NaOH = 45 imes rac{1}{10} \ = 4.5mEq \end{array}$$

1.0mEq of HCI is left. So pH will be in acidic range but not equal to one, since concentration fo HCI is very low.

C.

$$egin{aligned} HCI &= 10 imes rac{1}{10} \ &= 1mEq \end{aligned}$$

$$NaOH = 90 \times \frac{1}{100}$$





## 8mEqofNaOH is left and pH > 7.



$$egin{aligned} HCI &= 75 imes rac{1}{5} \ &= 15 mEq \end{aligned}$$

$$egin{array}{l} NaOH = 25 imes rac{1}{5} \ = 5mEq \end{array}$$

15-5= 10mEqofHCI

is left.

$$\therefore [HCI] = [H_3 O^{\oplus}]$$
 $= rac{10mEq}{(75+25)mL}$ 
 $= rac{10}{100} = 0.1M$ 

$$pH = -\log(10^{-1})$$
 $= 1$ 



Q-27 - 11037629

Which buffer solution out of the following will have pH > 7?

(A)  $CH_3COOH$  $+ CH_3COONa$ (B) HCOOH + HCOOK(C)  $CH_3COONH_4$ (D)  $NH_4OH + NH_4CI$ **CORRECT ANSWER: D** 

SOLUTION:

a. Acidic buffer, and have pH < 7

b. Also acidic buffer, pH < 7

## c. Salt of $W_A / W_B, pH = 7$

## .d Basic buffer, and pH > 1

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Which of the following is most soluble?

(A)  
$$Bi_2S_3(K_{sp} = 1 \times 10^{-70})$$
  
(B)  
 $MnS(K_{sp} = 7 \times 10^{-16})$   
(C)  
 $CuS(K_{sp} = 8 \times 10^{-37})$   
(D)

 $\Delta a_{2} S(K - 6)$ 

$$Ag_2 S(\Lambda_{sp} = 0 \times 10^{-51})$$

#### **CORRECT ANSWER: B**

## SOLUTION:

Most soluble compound is that which have highest  $K_{sp}$  value.  $K_{sp}$  of  $MnSig(7 imes10^{-6}ig)$  is highest.

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Q-29 - 11037641

Assertion (A): pH value of HCN solution decreases when NaCN is added to it.

Reason (R) : NaCN provides a common ion  $CN^{\Theta} \rightarrow HCN^{\circ}$ .

(A) If both (A) and (R) are correc, and (R) is the correct explanation of (A).

#### (B) If both (A) and (R) are correct but (R) is not the

#### correct explanation of (A).

## (C) If (A) is correct, but (R) is incorrect.

## CORRECT ANSWER: D

SOLUTION:

(A) is wrong because addition of NaCN to HCN, due to common ion  $(CN^{\Theta})$ . The degree of dissociation of HCN is supressed and hence less  $[H^{\oplus}]$  and increase in pH. (R) is correc.



Q-30 - 11037642

Assertion (A): pH of water increases with an increase in



#### Reason (R) : $K_w$ or water increases with increase in temperature.

### (A) If both (A) and (R) are correc, and (R) is the correct

explanation of (A).

(B) If both (A) and (R) are correct but (R) is not the correct explanation of (A).

(C) If (A) is correct, but (R) is incorrect.

(D) If (A) is incorrect, but (R) is correct.

## CORRECT ANSWER: D

SOLUTION:

(A) is wrong . Dissociation of water is an endothermic reaction, so increasing T will increase  $\left[H^{\oplus}
ight]$  and hence decreases in pH.~(R) is correct.

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#### Q-31 - 11036770

#### In the dissociation of $PCl_5$ as

 $PCl_5(g) \Leftrightarrow PCl_3(g) \ + Cl_2(g)$ 

If the degree of dissociation is  $\alpha$  at equilibrium pressure P, then the equilibrium constant for the reaction is

(A) 
$$K_p = rac{lpha^2}{1 + lpha^2 P}$$
  
(B)  $K_p = rac{lpha^2 P^2}{1 - lpha^2}$   
(C)  $K_p = rac{P^2}{1 - lpha^2}$   
(D)  $K_p = rac{lpha^2 P}{1 - lpha^2}$ 

CORRECT ANSWER: D

SOLUTION:



Total "mole"

$$=1-lpha+lpha+lpha=1$$
  $+lpha$ 

$$K_p = rac{rac{lpha}{1+lpha}P. rac{lpha}{1+lpha}.P}{rac{1-lpha}{1+lpha}P} \ = rac{lpha^2 P}{1-lpha^2}$$

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Q-32 - 11036774

The solubility of  $CO_2$  in water increases with

(A) Increasing in temperature

## (B) Reduction of gas pressure

#### (C) Increasing in gas pressure

#### (D) Increasing in volume

## CORRECT ANSWER: C

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Q-33 - 11036775

The equilibrium constant for a reaction

 $A + 2B \Leftrightarrow 2C$  is 40. The equilibrium constant for reaction  $C \Leftrightarrow B + 1/2A$  is

(A) 1/40(B)  $(1/40)^{1/2}$ (C)  $(1/40)^2$ 

(D) 40

#### **CORRECT ANSWER: B**

#### SOLUTION:

 $egin{aligned} A+2B &\Leftrightarrow 2C, & ext{(i)}\ K=40 \ & ext{and for} \quad c \Leftrightarrow B+rac{1}{2}A, & ext{(i)}\ K_1=? \ K=rac{1}{\sqrt{K}}=rac{1}{\left(40
ight)^{1/2}} \end{aligned}$ 

Since equation (2) is obtained by reversing and dividing

by 2, the equation (1).

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Q-34 - 11036777

The equilibrium constant K for the reaction

 $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$  at room temperature is 2.85 and that at 698K is  $1.4 \times 10^{-2}$ . This implies



## (B) Endothermic

## (C) Exergonic

## CORRECT ANSWER: A

SOLUTION:

With the increase of temperature, k value decreases, so the forward reaction decreases with increase of temperature. This implies that reaction will proceed in forward direction with decrease of temperature, i.e., heat is librated and hence forward reaction is exthoermic.

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Q-35 - 11036776

Inert gas has been added to the following equilibrium system at

#### constant volume

## $egin{array}{l} SO_2(g)+1/2O_2(g)\ \Leftrightarrow SO_3(g) \end{array}$

To which direction will the equilibrium shift?

(A) Forward

(B) Backward

(C) No effect

(D) Unpredictable

CORRECT ANSWER: C

SOLUTION:

Since there is no effect on the equilibrium by adding inert

gas at constant volume.

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#### Q-36 - 11036779

## For the reaction $N_2O_4(g) \Leftrightarrow 2NO_2(g)$ , the degree of dissociation

at equilibrium is 0.2 at 1 atm pressure. The equilibrium constant  $K_p$ 

#### will be

(A) 1/2

(B) 1/4

(C) 1/6

(D) 1/8

## **CORRECT ANSWER: C**

SOLUTION:

 $N_2O_4 \iff 2NO_2$ Initial 1 Final  $1 - \alpha$ 

0

2 lpha

Total moles = 
$$1 - \alpha$$

$$+2lpha=1+lpha]$$

#### Partial pressure

$$egin{array}{ccc} rac{1-lpha}{1+lpha} imes P & rac{2lpha}{1+lpha} \ imes P \end{array}$$

Given, 
$$lpha=0.2, P=1$$

Partial pressure of

$$N_2 O_4 = rac{1-0.2}{1+0.2} imes \ = rac{0.8}{1.2} = rac{2}{3}$$

$$p_{NO_2} = rac{2 imes 0.2}{1+0.2} imes 1 \ = rac{0.4}{1.2} = rac{1}{3}$$

$$K_p = rac{\left[ p_{NO_2} 
ight]^2}{\left[ p_{N_2O_4} 
ight]}$$



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#### Q-37 - 11036781

1 mol of  $N_2$  is mixed with 3 mol of  $H_2$  in a litre container. If 50 %

of  $N_2$  is converted into ammonia by the reaction

 $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ , then the total number of moles of

gas at the equilibrium are

(A) 1.5

(B) 4.5

(C) 3.0

(D) 6.0

### **CORRECT ANSWER: C**

SOLUTION:





reaction flask is tripled, the equilibrium constant will be

The equilibrium constant of a reaction is 300, if the volume of the

(A) 100

## (B) 300

## (C) 250

## (D) 150

SOLUTION:

The equilibrium constant depends only upon

temperature.

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Q-39 - 11036786

Consider the reaction

 $A(g) + B(g) \Leftrightarrow C(g)$ + D(g)

Which occurs in one step. The specific rate constant are 0.25 and

#### 5000 for the forward and reverse reaction, respectively. The

#### equilibrium constant is

## (A) $2.0 imes10^{-4}$

(B)  $4.0 imes 10^2$ 

(C)  $5.0 imes10^{-5}$ 

(D)  $2.5 imes10^{-6}$ 

## CORRECT ANSWER: C

SOLUTION:

$$egin{aligned} K = rac{R_f}{R_b} = rac{0.25}{5000} \ = 5.0 imes 10^{-5} \end{aligned}$$

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Q-40 - 11036788

## In alkaline solution, the following equilibria exist

a. 
$$S^{2-} + S \rightarrow S_2^{2-}$$
 equilibrium constant  $K_1$ 

b. 
$$S_2^{2-} + S \rightarrow S_3^{2-}$$
 equilibrium constant  $K_2$ 

#### $K_1$ and $K_2$ have values 12 and 11, respectively.

 $S_3^{2-} \rightarrow S^{2-} + 2S$ . What is equilibrium constant for the reaction

(A) 132

(B)  $7.58 imes10^{-3}$ 

(C) 1.09

(D) 0.918

**CORRECT ANSWER: B** 

SOLUTION:

- i.  $S^{2-}+S
  ightarrow S_2^{2-}k_1$
- ii.  $S_2^{2\,-} + S 
  ightarrow S_3^{2\,-} k_2$

The equation constant for the reaction,

iii.  $S_3^{2-} 
ightarrow S^{2-} + 2S$ ,

#### Since eq. (iii) is obtained by reversing and adding

#### equations (i) and (ii).



When the reaction,  $2NO_2(g) \Leftrightarrow N_2O_4(g)$  reaches equilibrium at 298K. The partial pressure of  $NO_2$  and  $N_2O_4$  are 0.2Kpa and 0.4Kpa, respectively. What is the equilibrium constant  $K_p$  of the above reaction at 298K?

(A) 0.1

(B) 0.5

(C) 1.0

(D) 10

CORRECT ANSWER: D

#### SOLUTION:

# $2NO_2 \iff N_2O_4$ At equilibrium $0.2kPa \qquad 0.4kPa$



The vapour density of a mixture consisting of  $NO_2$  and  $N_2O_4$  is 38.3 at 275K. The number of moles of  $NO_2$  in the mixture:

(A) 0.2

(B) 0.4

(C) 0.8

#### (D) 1.6

#### **CORRECT ANSWER: B**

#### SOLUTION:

$$\alpha = \frac{D-d}{d}$$

D= Vapour density before dissociation

d= vapour density after dissociation

 $N_2O_4 \Leftrightarrow 2NO_2$ 

Vapour density of  $N_2O_4$  before dissociation (D) $\_ 14 imes 2 + 16 imes 4$ 

$$= 2$$
  
 $= \frac{92}{2} = 46$ 

Vapour density after dissociation (d) = 38.3

$$\therefore \alpha = \frac{46 - 38.3}{38.3} = 0.2$$

## $N_2O_4 \iff 2NO_2$

Initial 1 0

## At equilibrium $1 - \alpha$ $2\alpha$

## Number of moles of $NO_2$ at eq.

=2lpha=2 imes 0.2=0.4

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Q-43 - 11036796

One mole of  $SO_3$  was placed in a litre reaction flask at a given temperature when the reaction equilibrium was established in the reaction.

 $2SO_3 \Leftrightarrow 2SO_2 + O_2$  the vessel was found to contain 0.6 mol of

 $SO_2$ . The value of the equilibrium constant is

(A) 0.36

(B) 0.675

(C) 0.45

## (D) 0.54

#### **CORRECT ANSWER: B**

SOLUTION:

 $2SO_3 \iff 2SO_2 + O_2$ Initial 1 0 0 At equilibrium 1-2x 2x x

$$\therefore 2x = 0.6, \ \therefore X = 0.3$$

$$egin{aligned} [SO_3] &= 1 - 2x = 1 \ &- 0.6 = 0.4 \end{aligned}$$

$$egin{aligned} [SO_2] &= 2x = 0.6 \ [O_2] &= x = 0.3 \ K = rac{x imes (2x)^2}{(1-2x)^2} \ &= rac{0.3 imes 0.6 imes 0.6 \end{aligned}$$



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#### Q-44 - 11036802

For the reaction

 $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ 

The equilibrium constant  $K_p$  changes with

(A) Total pressure

(B) Catalyst

(C) The amounts of  $H_2$  and  $I_2$  present

(D) Temperature

CORRECT ANSWER: D

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Q-45 - 11036803

#### The equilibrium constant K for the reaction

## $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$ at room temperature is 2.85 and that at

$$698K$$
 is  $1.4 \times 10^{-2}$ . This implies

(A) HI is exothermic compound

(B) HI is very stable at room temperature

(C) HI is relatively less stable than  $H_2$  and  $I_2$  at room

temperature

(D) HI is resonance stablised

**CORRECT ANSWER: C** 

SOLUTION:

With increase in temperature, K value decreases, which

means that at high temperature the reaction proceeds in

backward direction or proceeds forward at room

#### temperature. In another words, at room temperature, HI

#### dissociates or HI is less stable than $H_2$ and $I_2$ .



 $K_1$  and  $K_2$  are equilibrium constants for reaction (i) and (ii)  $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$  (i)  $NO(g) \Leftrightarrow 1/2N_2(g) + 1$   $/2O_2(g)$ (ii)

then,

(A) 
$$K_1 = \left( {1 \, / \, K_2} 
ight)^2$$
  
(B)  $K_1 = K_2^2$   
(C)  $K_1 = {1 \, / \, K_2}$   
(D)  $K_1 = \left( {K_2} 
ight)^\circ$ 

#### **CORRECT ANSWER: A**

#### SOLUTION:

## $N_2+O_2 \Leftrightarrow 2NO$ (i)

$$NO \Leftrightarrow rac{1}{2}N_2 + rac{1}{2}O_2$$
 (ii)

Equation (ii) is obtained by reversing equation (i) and

dividing by 2.



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Q-47 - 11036805

The equilibrium constant  $K_p$  for a homogeneous gaseous reaction is

 $10^{-8}$ . The standard Gibbs free energy change  $\Delta G^{?}$  for the reaction

$$\left( \mathrm{using} R = 2 cal K^{-1} mol^{-1} 
ight)$$
 is

## (A) 10.98*kcal*

 $(\mathsf{B})-1.9kcal$ 

(C) -4.1454kcal

(D) + 4.1454 kcal

## CORRECT ANSWER: A

SOLUTION:

 $\Delta G^{\,?} =$ 

- $-2.303 RT \log K$
- = -2.303 imes 2  $imes 298 {
  m log}\, 10^{-8}$



### = 10.98 kcal



Q-48 - 11036806

Which of the following will not change the concentration of

ammonia in the equilibrium

 $N_2(g) + 3H_2(g)$  $\Leftrightarrow 2NH_3(g), \Delta H = -xkJ$ 

(A) increase of temperature

(B) increase of volume

(C) decrease of volume

(D) addition of catalyst

**CORRECT ANSWER: D** 

SOLUTION:

Effect of catalyst is only to alter the speed of the

#### reaction, it does not effect the equilibrium constant and

#### concentration of reactant or product.

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4 moles of A are mixed with 4 moles of B, when 2 moles of C are formed at equilibrium according to the reaction  $A + B \Leftrightarrow C + D$ . The value of equilibrium constant is

(A) 4

(B) 1

(C) 1/2

(D) 1/4

### CORRECT ANSWER: B

SOLUTION:



$$\therefore [A] = 4 - 2 = 2,$$
 $[B] = 4 - 2 = 2$ 

$$egin{aligned} [C] &= 2, \, [D] \, = \, 2 \ K &= \, rac{[C][D]}{[A][B]} = \, rac{2 \, imes \, 2}{2 \, imes \, 2} \ &= \, 1 \end{aligned}$$

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Q-50 - 11036815

in closed container at equilibrium. What would be the effect of

addition of  $CaCO_3$  on the equilibrium concentration of  $CO_2$ .



### (B) Decreases

### (C) Data is not sufficient

# CORRECT ANSWER: D

SOLUTION:

 $K_c = P_{CO_2}$ , therefore,  $K_c$  only depends upon concentration of  $CO_2$  as long as temperature remains constants and both  $CaCO_3(s)$  and CaO(s) are present.

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### Q-51 - 11036816

### The equilibrium constant for a reacton

# $N_2(g) + O_2(g) = 2NO(g)$ is $4 \times 10^{-4}$ at 2000K. In the

presence of catalyst, the equilibrium constant is attained 10 times

faster. The equilibrium constant in the presence of catalyst, at 2000K is

(A)  $40 imes 10^{-4}$ (B)  $4 imes 10^{-4}$ (C)  $4 imes 10^{-2}$ 

(D) incomplete data

CORRECT ANSWER: B

SOLUTION:

Catalyst does not change the extent of reaction, and

### hence does not alter the value of K.



### Q-52 - 11036819

For a reaction  $A(g) \Leftrightarrow B(g) + C(g)$ .  $K_p$  at 400C is  $1.5 \times 10^{-4}$ 

and  $K_p$  at 600*C* is 6 × 10<sup>-3</sup>. Which statement is incorrect?

(A) The reaction is exothermic

(B) Increase in temperature increases the formation of B

(C) Increase in pressure increases the formation of A

(D) Decrease in temperature and increase in pressure

shift the equilibrium towards left

CORRECT ANSWER: A

SOLUTION:

 $A(g) \Leftrightarrow B(g) + C(g)$ 

a. With increase of temperature  $K_p$  increases, i.e., with

### increase of temperature, the reaction is favoured in

### forward direction and hence reaction is endothermic.

### Thus statement (a) is incorrect.

Increase of temperature favours forward reaction and

hence the formation of B increases. Correct statement.

c.  $\Delta n = 1 + 1 - 1 = 1$ 

 $\Delta n = + ve$ , i.e., with the increase of pressure,

reaction is favoured backward direction and hence the formation of A(g) increases. Correct statement. d. As from the above statement in (i) and (iii), the reaction is favoured backward with decrease of temperature and increase of pressure. Correct statement.

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### How will the lowering of temperature affect the chemical

equilibrium in the system

 $2NO + O_2 \Leftrightarrow 2NO_2, \Delta H$ < 0

(A) Relative concentration of products and reactants

does not change.

(B) Relative concentration of products and reactants change.

(C) Equilibrium is shift to the left.

(D) Equilibrium is shift to the right.

CORRECT ANSWER: B::D

SOLUTION:

Since  $\Delta H < 0$  i.e.,  $\Delta H < -ve$ 

Reaction is exothermic, so lowering of temperature will

shift equilibrium towards right. Statement (d) is correct

### and also the concentration of reactants decreases and

### products increases. So statement (b) is also correct.



At constant temperature, the equilibrium constant  $(K_p)$  for the decomposition reaction

 $N_2O_4 \Leftrightarrow 2NO_2$ 

is expressed by  $K_p = 4x^2 p / (1 - x^2)$ , where p=pressure x= extent

of decomposition. Which of the following statements is true?

(A)  $K_p$  increase with increase in p

(B)  $K_p$  increases with increase in x

(C)  $K_p$  increases with decrease in x.

(D)  $K_p$  remains constant with change in p and x





### Q-55 - 11036832

## The equilibrium constant $K_{p_2}$ and $K_{p_2}$ for the reactions $A \Leftrightarrow 2B$

and  $P \Leftrightarrow Q + R$ , respectively, are in the ratio of 2:3. If the degree

of dissociation of A and P are equal, the ratio of the total pressure at equilibrium is,

(A) 1:36

(B) 1:9

(C) 1:6

(D) 1:4

SOLUTION:			
for	A	$\iff$	2B
Initial	1		0
At equilibrium	1-lpha	, ,	2lpha
$\text{Total moles} = 1 - \alpha$			

+ 2lpha = 1 + lpha

 $\therefore P_A$ 

- = (mole fraction of A)
- $\times$  Initial pressure

$$=igg(rac{1-lpha}{1+lpha}igg)P_1$$

Similarly 
$$P_B = \left(\frac{2\alpha}{1+\alpha}\right)P$$
  
 $\therefore K_{P_1} = \frac{\left(P_B\right)^2}{\left(P_A\right)}$   
 $= \frac{\left[\left(\frac{2\alpha}{1+\alpha}\right)P_1\right]^2}{\left(\frac{1-\alpha}{1+\alpha}\right)P_1}$   
 $= \frac{4\alpha^2 P_1}{(1-\alpha^2)}$ 

for Initial

### At equilibrium 1-lpha

P

Т

R

0

 $\alpha$ 

Q +

0

 $\alpha$ 

 $\iff$ 

# 

$$egin{aligned} & \therefore P_p = \left(rac{1-lpha}{1+lpha}
ight) P_2, \ & P_Q = \left(rac{lpha}{1+lpha}
ight) P_2, P_R \ & = \left(rac{lpha}{1+lpha}
ight) P_2 \end{aligned}$$

$$egin{aligned} K_{p_2} &= rac{P_R imes P_Q}{P_P} \ &= rac{\left(rac{lpha}{1+lpha}
ight) P_2 imes \left(rac{lpha}{1+lpha}
ight) P_2 \ &= rac{\left(rac{1-lpha}{1+lpha}
ight) P_2}{\left(rac{1-lpha}{1+lpha}
ight) P_2} \ &= rac{lpha^2 P_2}{(1-lpha^2)} \end{aligned}$$

$$\therefore rac{K_{p_1}}{K_{p_2}} = rac{2}{3} ext{(given)} \ 4 \swarrow^2 P_1$$





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Q-56 - 11036830

When two reactants A and B are mixed to give products C and D,

the reaction quotient (Q) at the initial stages of the reaction

(A) Is zero

(B) Decreases with time

(C) Is independent of time

(D) Increases with time

### CORRECT ANSWER: D

### SOLUTION:

### For the reaction $A + B \rightarrow C + D$ , the reaction

quotient is defined as

$$Q = rac{[C][D]}{[A][B]}$$

In the initial stages of the reaction, the concentrations of

C and D increase while those of A and B decrease.

Hence, the value of Q increases with time.

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Q-57 - 11036944

Pure ammonia is placed in a vessel at a temperature where its dissociation constant ( $\alpha$ ) is appreciable. At equilibrium,

(A)  $K_p$  does not change significantly with pressure

### (B) $\alpha$ does not change with pressure

### (C) The concentration of $NH_3$ does not change with

### pressure.

(D) The concentration of hydrogen is less than that of

nitrogen.

**CORRECT ANSWER: A** 

SOLUTION:

The equilibrium constant does not change at all with changes in concentrations, pressure, presence of catalyst, etc. It changes only with changes in temperature of the system. For endothermic reaction, the value of K increases with increase in temperature and vice versa. For exothermic reaction, the value of K decreases with increase in temperature and vice versa.





### Q-58 - 11036946

### One "mole" of $N_2O_4(g)$ at 300K is kept in a closed container

under 1 atm. It is heated to 600K, when 20 % by mass of  $N_2O_4(g)$ 

decomposes to  $NO_2(g)$ . The resultant pressure is

(A) 1.2 atm

(B) 2.4 atm

(C) 2.0 atm

(D) 1.0 atm

CORRECT ANSWER: B

SOLUTION:

$N_2O_4$	$\iff$	$2NO_2$
1		0
(1 - 0.2)		2 imes 0.2=0.4

### Total pressure = 1.2

### As the temperature is doubled, the pressure becomes

### double. Therefore, the total final pressure is

1.2 imes 2 = 2.4 atm.

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Q-59 - 11036948

For the reversible reaction

 $N_2(g)+3H_2(g) \Leftrightarrow 2NH_3(g)$ 

at 500*C*, the value of  $K_p$  is  $1.44 \times 10^{-5}$  when the partial pressure

is measured in atmophere. The corresponding value of  $K_c$  with

concentration in mol  $L^{-1}$  is

$$\begin{array}{l} \text{(A)} & \frac{1.44 \times 10^{-5}}{\left(0.082 \times 500\right)^{-2}} \\ \text{(B)} & \frac{1.44 \times 10^{-5}}{\left(8.314 \times 773\right)^{-2}} \\ \text{(C)} & \frac{1.44 \times 10^{-5}}{\left(0.082 \times 773\right)^2} \\ \text{(D)} & \frac{1.44 \times 10^{-5}}{\left(0.082 \times 773\right)^{-2}} \end{array}$$

# SOLUTION:

 $N_2(g)+3H_2(g)$  $\Leftrightarrow 2NH_3(g)$ 

$$\Delta n_g = 2 - 4 = -2$$
  
 $K_p = K_c (RT)^{\Delta n}$ 

or

$$egin{aligned} 1.44 imes 10^{-5} &= K_c \ imes \left( 0.0821 imes 773 
ight)^{-2} \end{aligned}$$

or

 $K_c$ 

$$1.44 imes10^{-5}$$

 $(0.0821 imes 7\overline{73})^{-2}$ 



Q-60 - 11036835

Assertion (A) :  $K_p$  can be equal to or less than or even greater than value of  $K_c$ 

Reason (R):  $K_p = K_c (RT)^{\Delta n}$ 

Relation between  $K_p$  and  $K_c$  depends on the change in the number of moles of gaseous reactants and products.

(A) If both (A) and (R) are correct, and (R) is the correct explanation for (A)

(B) If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

(C) If (A) is correct, but (R) is incorrect

(D) If (A) is incorrect, but (R) is correct.

### **CORRECT ANSWER: A**

### SOLUTION:

 $K_p = K_c (RT)^{\Delta n}$ 

When  $\Delta n > 1, K_p > K_c$ 

When  $\Delta n < 1, K_p < K_c$ 

When  $\Delta n=0, K_p=K_c$ 

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