



## PART : CHEMISTRY

1. Select the correct option :
- |     |                   |                  |                                |
|-----|-------------------|------------------|--------------------------------|
|     | Li <sub>2</sub> O | K <sub>2</sub> O | Na <sub>2</sub> O <sub>2</sub> |
| (1) | Diamagnetic       | Diamagnetic      | Diamagnetic                    |
| (2) | Paramagnetic      | Diamagnetic      | Diamagnetic                    |
| (3) | Paramagnetic      | Paramagnetic     | Diamagnetic                    |
| (4) | Paramagnetic      | Paramagnetic     | Paramagnetic                   |

Ans. (1)  
Sol. O<sup>2-</sup> & O<sub>2</sub><sup>2-</sup> are diamagnetic.

2. Give the correct order of bond dissociation energy ?
- (1) F - F > Cl - Cl > Br - Br > I - I  
 (2) F - F < Cl - Cl < Br - Br < I - I  
 (3) Cl - Cl > Br - Br > F - F > I - I  
 (4) Cl - Cl > Br - Br > I - I > F - F

Ans. (3)  
Sol. In F<sub>2</sub> due to small size LP - LP repulsion is high.

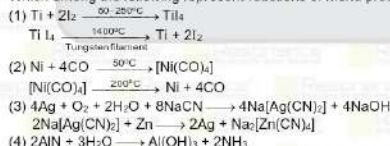
Halogens	Bond dissociation energy (KJ/Mol)
F <sub>2</sub>	158.8
Cl <sub>2</sub>	242.6
Br <sub>2</sub>	192.8
I <sub>2</sub>	151.1

Order of bond dissociation energy is Cl - Cl > Br - Br > F - F > I - I.

3. Arrange the following in decreasing order of their hydration energy  
Mg<sup>2+</sup>, Cs<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Rb<sup>+</sup>
- (1) Mg<sup>2+</sup> > Ca<sup>2+</sup> > K<sup>+</sup> > Rb<sup>+</sup> > Cs<sup>+</sup>  
 (2) Cs<sup>+</sup> > Rb<sup>+</sup> > K<sup>+</sup> > Ca<sup>2+</sup> > Mg<sup>2+</sup>  
 (3) Mg<sup>2+</sup> > Ca<sup>2+</sup> > Cs<sup>+</sup> > Rb<sup>+</sup> > K<sup>+</sup>  
 (4) K<sup>+</sup> > Rb<sup>+</sup> > Cs<sup>+</sup> > Ca<sup>2+</sup> > Mg<sup>2+</sup>

Ans. (1)  
Sol. Mg<sup>2+</sup> > Ca<sup>2+</sup> > K<sup>+</sup> > Rb<sup>+</sup> > Cs<sup>+</sup>  
Decreasing the size, hydration energy increases.

4. Which among the following represent reactions of Mond process ?



Ans. (2)  
Sol. Theory Based.

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5. Identify total number of odd electron species form following :

NO<sub>2</sub>, NO<sub>2</sub><sup>+</sup>, ClO<sub>2</sub>, NO, ICl<sub>4</sub><sup>-</sup>, BrF<sub>3</sub>

Ans. (3)

Sol.

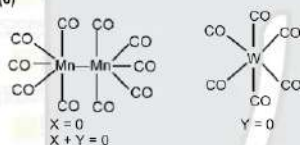
Species	Total electron
NO <sub>2</sub>	23
ClO <sub>2</sub>	33
NO	15

6. X = number of bridging CO present in Mn<sub>2</sub>(CO)<sub>10</sub>Y = number of bridging CO present in W(CO)<sub>6</sub>

Find out (X + Y)

Ans. (0)

Sol.

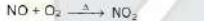


7. Oxidation of ammonia in Ostwald process leads to [A], which on further oxidation forms [B]. Hydration of [B] forms oxo acids, one of which again forms [A] on decomposition. [A] &amp; [B] are respectively.

- |                                   |                               |
|-----------------------------------|-------------------------------|
| [A]                               | [B]                           |
| (1) NO                            | NO <sub>2</sub>               |
| (2) NO <sub>2</sub>               | N <sub>2</sub> O <sub>5</sub> |
| (3) N <sub>2</sub> O              | NO                            |
| (4) N <sub>2</sub> O <sub>5</sub> | N <sub>2</sub> O <sub>4</sub> |

Ans. (1)

Sol.

8. Which of the following metal ion will release H<sub>2</sub> gas on reaction with dilute acid solutionGiven: E<sub>V<sup>2+</sup>/V<sup>3+</sup></sub><sup>0</sup> = -0.255 VE<sub>Co<sup>3+</sup>/Co<sup>2+</sup></sub><sup>0</sup> = -0.407 VE<sub>Mn<sup>3+</sup>/Mn<sup>2+</sup></sub><sup>0</sup> = 1.54 VE<sub>Co<sup>3+</sup>/Co<sup>2+</sup></sub><sup>0</sup> = 1.81 V

- (1) V
- <sup>2+</sup>
- , Cr
- <sup>2+</sup>
- (2) Mn
- <sup>2+</sup>
- , Co
- <sup>2+</sup>
- (3) V
- <sup>2+</sup>
- , Mn
- <sup>2+</sup>
- (4) Cr
- <sup>2+</sup>
- , Co
- <sup>2+</sup>

Ans. (1)

Sol.

The metal ion for which have less value of reduction potential than (E<sub>H<sup>+</sup>/H<sub>2</sub></sub><sup>0</sup> = 0) can release H<sub>2</sub> on reaction with dilute acid.**Resonance Eduventures Ltd.**

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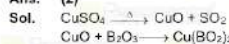
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9. In borax bead test, by heating  $\text{CuSO}_4$  a green blue bead is obtained in oxidising flame consist of following :

- (1) Cu (2)  $\text{Cu}(\text{BO}_2)_2$  (3)  $\text{Cu}_2\text{O}$  (4) CuO

Ans. (2)



10. For a reversible reaction at  $27^\circ\text{C}$



Value of  $\Delta G^\circ$  for above reaction is ——— KJ/mole  
(Nearest integer)

[Given  $R = 8.3 \frac{\text{J}}{\text{mole}\cdot\text{K}}$ ,  $\ln 10 = 2.3$ ]

Ans. (6)

Sol.  $K_{eq} = \frac{K_f}{K_b} = \frac{10^3}{10^2} = 10$

$$\Delta G^\circ = -RT \ln K_{eq}$$

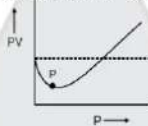
$$= -8.3 \times 300 \ln (10)$$

$$= -8.3 \times 300 \times 2.3$$

$$= -5.72 \times 10^3 \text{ J}$$

$$= -5.72 \text{ KJ}$$

11. For one mole real gas, the correct value of Z at point P using following graph is



- (1)  $1 + \frac{b}{V}$  (2)  $1 + \frac{a}{VRT}$  (3)  $1 - \frac{b}{V}$  (4)  $1 - \frac{a}{VRT}$

Ans. (4)

Sol. For 1 mole of real gas

$$\left(p + \frac{a}{V^2}\right)(V - b) = RT$$

In low pressure range

$$\left(p + \frac{a}{V^2}\right)V = RT$$

$$\Rightarrow PV + \frac{a}{V} = RT$$

$$\frac{PV}{RT} + \frac{a}{VRT} = 1$$

$$Z = 1 - \frac{a}{VRT}$$

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12. The millimole of  $\text{Ca}(\text{OH})_2$  dissolved to obtained 100 ml of solution of  $\text{pH} = 12$  is \_\_\_\_\_  $\times 10^{-1}$

Ans. (5)

Sol.  $\text{pH} = 12 \Rightarrow \text{pOH} = 2$  so  $[\text{OH}^-] = 10^{-2} \text{ M}$ .

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JEE MAIN-2023 | DATE : 29-01-2023 (SHIFT-1) | PAPER-1 | MEMORY BASED | CHEMISTRY12. The millimole of  $\text{Ca(OH)}_2$  dissolved to obtained 100 ml of solution of pH = 12 is  $\dots \times 10^{-1}$ 

Ans. (5)

Sol.  $\text{pH} = 12 \Rightarrow \text{pOH} = 2$  so  $[\text{OH}^-] = 10^{-2} \text{ M}$ .Millimole of  $[\text{OH}^-] = 10^{-2} \times 100 = 1$  $\text{Ca(OH)}_2 (\text{s}) \rightarrow \text{Ca}^{2+} (\text{aq.}) + 2 \text{OH}^- (\text{aq.})$ 

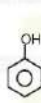
$\frac{1}{2}$ millimole	1 millimole
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millimole of  $\text{Ca(OH)}_2 = \frac{1}{2} = 5 \times 10^{-1}$  millimole.13. For reaction at  $P = 1$  bar and 2300 K. $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g})$  $K_p = 2 \times 10^{-3}$ , the value of degree of dissociation is  $\dots \times 10^{-2}$  [Nearest integer]

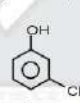
Ans. (2)

Sol.  $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g})$ 

$1 - \alpha$	$\alpha$	$\frac{\alpha}{2}$
--------------	----------	--------------------

 $K_p = \frac{\alpha \cdot \left(\frac{\alpha}{2}\right)^{\frac{1}{2}}}{1 - \alpha} = 2 \times 10^{-3}$  $= \frac{(\alpha)^{\frac{3}{2}}}{\sqrt{2} (1 - \alpha)} = 2 \times 10^{-3}$  $= (\alpha)^{\frac{3}{2}} = 2\sqrt{2} \times 10^{-3} (\alpha \ll 1)$  $(\alpha)^{\frac{3}{2}} = \sqrt{6} \times 10^{-3}$  $(\alpha)^3 = (2)^3 \times 10^{-6}$  $\alpha = 2 \times 10^{-2}$ 14. Write increasing order of  $\text{pK}_a$  of following compounds

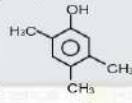
(a)



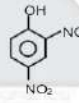
(b)



(c)



(d)



(e)

(1)  $a < b < c < d < e$ (3)  $e < c < b < a < d$ 

Ans. (3)

Sol.  $-M$  and  $-I$  group increases the acidity of phenol and  $+M$  and  $+I$  group decreases the acidity of phenol.

15. Select the correct statement from the given below

(1) Classical smog has high concentration of oxidising agent.

(2) Photochemical smog has high concentration of oxidising agent.

(3) Classical smog contains  $\text{SO}_2$  &  $\text{NO}_2$ .(4) Classical smog contains  $\text{NO}_2$ .

Ans. (2)

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Sol. Photochemical smog has high concentration of oxidising agent like oxides of nitrogen, oxides of sulphur, acrolein &amp; ozone.

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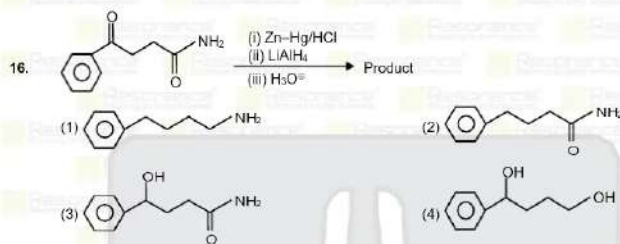
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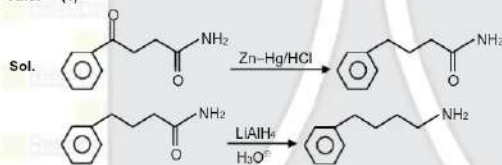




Sol. Photochemical smog has high concentration of oxidising agent like oxides of nitrogen, oxides of sulphur, acrolein & ozone.



Ans. (1)



17. Match the following given reaction (Column-I) and Reagent (Column-II).

Column-I Reaction	Column-II Reagent
(1) Hoffmann Degradation	(i) $\text{CHCl}_3, \text{NaOH}$
(2) Clemmensen reaction	(ii) $\text{Con. KOH}$
(3) Reimer-Tiemann reaction	(iii) $\text{NaOH}, \text{Br}_2$
(4) Cannizzaro reaction	(iv) $\text{Zn-Hg}, \text{HCl}$

- (1) (1)-(iii), (2)-(iv), (3)-(i), (4)-(ii)  
 (2) (1)-(iii), (2)-(iv), (3)-(ii), (4)-(i)  
 (3) (1)-(iv), (2)-(iii), (3)-(i), (4)-(ii)  
 (4) (1)-(ii), (2)-(iii), (3)-(iv), (4)-(iii)

Ans. (1)

Sol. Based on Facts.

18. Which of the following compounds give positive Lassaigne test for both nitrogen and halogen.

- (1)  $\text{NH}_4\text{Cl}$  (2)  $\text{NH}_4\text{OH} \cdot \text{HCl}$   
 (3)  $\text{NH}_4\text{OH} \cdot 2\text{HCl}$  (4)  $\text{CH}_3\text{NH}_2 \cdot 2\text{HCl}$

Ans. (4)

Sol. Lassaigne test for both Nitrogen & Halogen is given by the compound which have C, N as well as X atom in the compound.

19. How many cyclic tripeptides are formed by two amino acids (A) & (B).

- (1) 5 (2) 4 (3) 3 (4) 2

Ans. (2)

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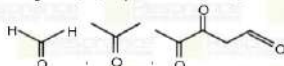
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**Sol.** With two amino acids (A) & (B) only two combination of tripeptides is possible. AAB and ABB. Further in cyclic tripeptides AAB & ABB has only one possible cyclic arrangements hence the answer is 2.

**20.** 17 mg of  $C_{10}H_{16}$  requires 6.4 mL of  $H_2$  at STP. A on Ozonolysis gives



Find number of double bonds in the compound.

**Ans.** (3)

**Sol.** Number of carbon in compound is 10.

Degree of unsaturation in (A) is 3.

Number of products formed on Ozonolysis is 4. Two moles of HCHO, one moles of  $CH_3COCH_3$  and one mole of  $CH_3CO-CH=CH_2$ .

Over all (4) fragments on Ozonolysis hence number of  $\pi$ -bond = 3.

**21.** Arrange the following compound in the increasing order of their boiling point.



(1) (i) > (ii) > (iii) > (iv)

(3) (iv) > (i) > (iii) > (ii)

**Ans.** (1)

**Sol.** Boiling point for Alkyl halide  $\propto$  Vander wall's forces.

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