

1. A weak acid HA of concentration 0.001 mole/litre have conductance  $2 \times 10^{-5} \text{ Scm}^{-1}$  and molar conductivity at infinite dilution is  $190 \text{ Scm}^2 \text{ mole}^{-1}$  then value of  $K_a$  of weak acid is  $[x] \times 10^{-6}$ , then value of  $x$  in nearest integer is :

Ans. 11.00

Sol.  $\lambda_M^C = \frac{K \times 1000}{M} = \frac{2 \times 10^{-5} \times 10^3}{10^{-3}} = 20 \text{ Scm}^3 \text{ mole}^{-1}$

For weak acid  $(\alpha) = \frac{\lambda_M^C}{\lambda_M^\infty} = \frac{20}{190} = \frac{2}{19}$

$K_a = \frac{C\alpha^2}{1-\alpha} \cong C\alpha^2 = 10^{-3} \times \left(\frac{2}{19}\right)^2 = 0.011 \times 10^{-3} = 11 \times 10^{-6}$

So,  $x = 11$

- |   |   |
|---|---|
| <p>2. <b>List -I</b></p> <p>(a) NaOH</p> <p>(b) <math>\text{Be}(\text{OH})_2</math></p> <p>(c) <math>\text{Ca}(\text{OH})_2</math></p> <p>(d) <math>\text{Al}(\text{OH})_3</math></p> <p>(e) <math>\text{B}(\text{OH})_3</math></p> | <p><b>List -II</b></p> <p>(i) Acid</p> <p>(ii) Base</p> <p>(iii) Amphoteric</p> |
|---|---|

Correct Matching of List-I and List -II is :

- (1) (a) - (ii), (b) - (iii), (c) - (ii), (d) - (iii), (e) - (i)
- (2) (a) - (ii), (b) - (ii), (c) - (iii), (d) - (iii), (e) - (iii)
- (3) (a) - (ii), (b) - (i), (c) - (iii), (d) - (ii), (e) - (i)
- (4) (a) - (ii), (b) - (iii), (c) - (ii), (d) - (ii), (e) - (ii)

Ans. (1)

Sol.

Species	Nature
(i) NaOH	Base
(ii) $\text{Ca}(\text{OH})_2$	Base

3. Lattice Parameter for a crystal Lattice is  $a \neq b \neq c$  and  $\alpha = 90^\circ$ ,  $\gamma = 90^\circ$  and  $\beta = 120^\circ$  this represent which type of Bravais Lattice.

- (1) Monoclinic (2) Triclinic (3) Hexagonal (4) Orthorhombic

Ans. (1)

Sol.	Unit Cell	Lattice Parameter
(i)	Monoclinic	$a \neq b \neq c$ & $\alpha = 90^\circ$ , $\gamma = 90^\circ$ & $\beta = 120^\circ$

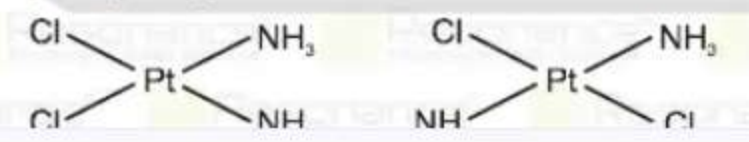
**Seven Crystal System**

S.No.	Crystal System	Edge length	Angles
1	Cubic	$a = b = c$	$\alpha = \beta = \gamma = 90^\circ$
2	Tetragonal	$a = b \neq c$	$\alpha = \beta = \gamma = 90^\circ$
3	Orthorhombic	$a \neq b \neq c$	$\alpha = \beta = \gamma = 90^\circ$
4	Monoclinic	$a \neq b \neq c$	$\alpha = \gamma = 90^\circ$ $\beta \neq 120^\circ$ , $\neq 90^\circ, \neq 60^\circ$
5	Hexagonal	$a = b \neq c$	$\alpha = \beta = 90^\circ$ $\gamma \neq 120^\circ$
6	Rhombohedral or Trigonal	$a = b = c$	$\alpha = \beta = \gamma \neq 90^\circ$
7	Triclinic	$a \neq b \neq c$	$\alpha \neq \beta \neq \gamma \neq 90^\circ$

4. Number of Geometrical isomers of complex's  $[\text{Ni}(\text{CO})_4]$ ,  $[\text{PtCl}_2(\text{NH}_3)_2]$ ,  $[\text{RuCl}_3(\text{NH}_3)_3]$ , are respectively :  
 (1) 0, 2, 2 (2) 2, 2, 2 (3) 0, 1, 2 (4) 0, 0, 2

Ans. (1)

Sol.	Complex	Number of G.I.
(1)	$[\text{Ni}(\text{CO})_4]$	0
(2)	$[\text{PtCl}_2(\text{NH}_3)_2]$	2

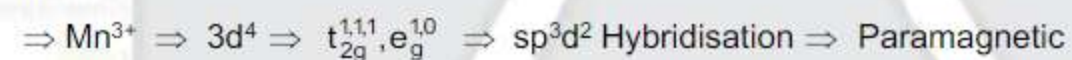


5. Identify the correct hybridisation and Magnetic nature of complex  $[\text{MnCl}_6]^{3-}$

- (1)  $sp^3d^2$ , Diamagnetic (2)  $sp^3d^2$ , Paramagnetic  
(3)  $d^2sp^3$ , Paramagnetic (4)  $d^2sp^3$ , Diamagnetic

Ans. (2)

Sol.  $[\text{MnCl}_6]^{3-}$



6. Difference between bond order of CO and  $\text{NO}^+$  is  $\left(\frac{x}{2}\right)$ , then value of 'x' to the nearest integer

Ans. 0

Sol.	Species	Bond order
	(i) CO	3
	(ii) $\text{NO}^+$	3

So difference in bond order = 0

So value of x = 0

7. The value of  $(\Delta H - \Delta U)$  for vaporisation of water at  $100^\circ\text{C}$  is  $x \times 10^2$  J/mole, assume water vapour to be an ideal gas [Take  $R = 8.31$  J/mole.K]

[report your answer to nearest integer]

Ans. 31.00

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Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

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11. Oxidation number of P in  $H_4P_2O_7$ ,  $H_4P_2O_5$  and  $H_4P_2O_6$  are respectively:  
(1) 5, 3, 4      (2) 3, 4, 5      (3) 5, 4, 3      (4) 5, 4, 5

Ans. (1)

Compound	Oxidation number of P
(i) $H_4P_2O_7$	5
(ii) $H_4P_2O_5$	3
(iii) $H_4P_2O_6$	4

12. Statement-I : Rutherford's model of Atom cannot explain hydrogen Spectrum  
Statement-II : Bohr's model is not in accordance with Heisenberg's uncertainty principle

- (1) Both statements are true
- (2) Both statements are false
- (3) Statement-I is true and Statement-II is false
- (4) Statement-I is false and Statement-II is true

Ans. (1)

Sol. Theory Based

13. Statement-I : Generally halides of Li are covalent  
Statement-II : Lithium has high polarising power

- (1) Both Statement-I & Statement-II are correct
- (2) Statement-I is correct and Statement-II is incorrect
- (3) Statement-I is incorrect and Statement-II is correct
- (4) Both Statement-I and Statement-II are incorrect

Ans. (1)

Sol. Due to small size of Li has high polarising power so most of the compounds of Li are covalent

14. Unit of rate constant of  $n^{th}$  order reaction is :

- (1)  $\text{mole}^{1-n} \text{ Lit.}^{n-1} \text{ Sec}^{-1}$
- (2)  $\text{mole}^x \text{ Lit.}^{-n} \text{ Sec}^{-1}$
- (3)  $\text{mole}^{-n} \text{ Lit.}^n \text{ Sec}^{-1}$
- (4)  $\text{mole}^{n-1} \text{ Lit.}^{1-n} \text{ Sec}^{-1}$

Ans. (1)

- (2) Statement-I is correct and Statement-II is incorrect
- (3) Statement-I is incorrect and Statement-II is correct
- (4) Both Statement-I and Statement-II are incorrect

Ans. (1)

Sol. Due to small size of Li have high polarising power so most of the compound of Li are covalent

14. Unit of rate constant of  $n^{\text{th}}$  order reaction is :

- (1)  $\text{mole}^{1-n} \text{ Lit.}^{n-1} \text{ Sec}^{-1}$
- (2)  $\text{mole}^x \text{ Lit.}^{-n} \text{ Sec}^{-1}$
- (3)  $\text{mole}^{-n} \text{ Lit.}^n \text{ Sec}^{-1}$
- (4)  $\text{mole}^{n-1} \text{ Lit.}^{1-n} \text{ Sec}^{-1}$

Ans. (1)

Sol. Rate =  $k[A]^n$

$$\frac{\text{mole}}{\text{Lit} \times \text{Sec}} = k \left[ \frac{\text{mole}}{\text{Lit}} \right]^n$$

$$\Rightarrow \text{Unit of } k = (\text{mole})^{1-n} \text{ Lit.}^{n-1} \text{ Sec}^{-1}$$

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JEE MAIN-2021 | DATE : 27-07-2021 (SHIFT-1) | PAPER-1 | MEMORY BASED | CHEMISTRY

15. Equilibrium constant  $K_c$  for dissociation of  $\text{PCl}_5$  according to  $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$  is 1.844.

15. Equilibrium constant  $K_c$  for dissociation of  $\text{PCl}_5$  according to  $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$  is 1.844.

Initially 3 mole of  $\text{PCl}_5$  is present in a flask of 1 Lit., then number of moles of  $\text{PCl}_5$  after equilibrium is set

Up. Is :

Ans. 1.60

Sol.  $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \quad K_c = 1.844$

Initially 3 0 0

At equilibrium  $(3-x)$  x x

$$K_c = \frac{x^2}{3-x} = 1.844$$

$$x^2 = 1.844(3-x)$$

$$x^2 = 5.532 - 1.844x$$

$$x^2 + 1.844x - 5.532 = 0$$

$$x = \frac{-1.844 \pm \sqrt{(1.844)^2 - 4(1)(-5.532)}}{2}$$

On solving

$$x = 1.60$$

So at equilibrium number moles of  $\text{PCl}_5 = 1.60$

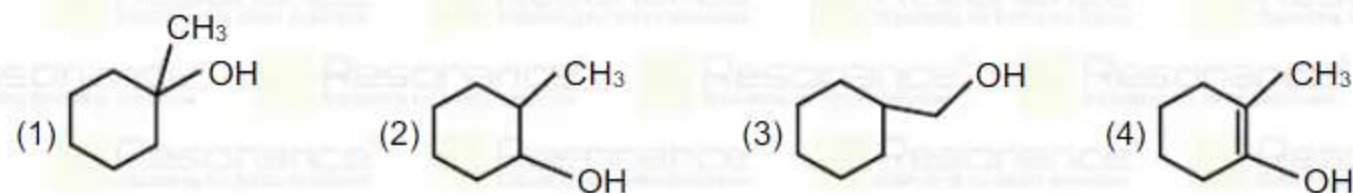
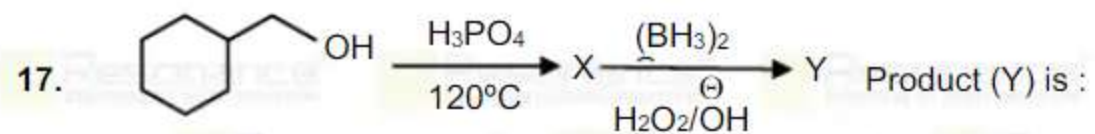
16. According to Freundlich adsorption isotherm  $\left(\frac{x}{m}\right) = k(P)^{\frac{1}{n}}$  when pressure increased 2 times, then extent

of adsorption becomes 64 times. Find the value of  $\left(\frac{1}{n}\right)$ .

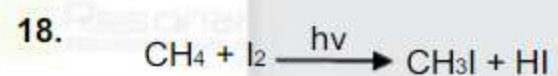
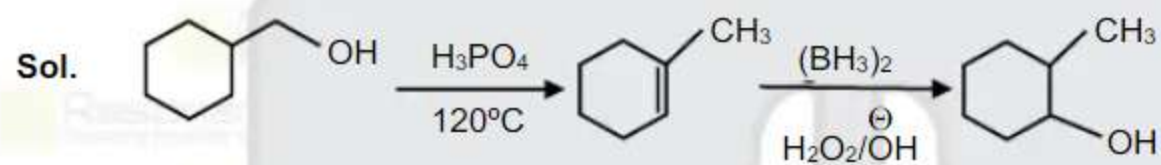
Ans. 6

Sol.  $\left(\frac{x}{m}\right) = k(P)^{\frac{1}{n}} \dots\dots (i)$

$64\left(\frac{x}{m}\right) = k(2P)^{\frac{1}{n}} \dots\dots (ii)$



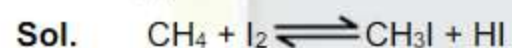
Ans. (2)



What shall be added so the reaction proceeds in one direction-

- (1) Con.  $\text{HIO}_3$  (2)  $\text{HOCl}$  (3)  $\text{NH}_3$  (4)  $\text{HNO}_2$

Ans. (1)



Reaction is reversible due to reducing nature of HI. Oxidising agent like  $\text{HNO}_3$ ,  $\text{HIO}_3$  should be added to make it irreversible (one direction).

19. Monosaccharide and disaccharides are differentiate by

- (1) Iodine test (2) Seliwanoff test (3) Barfoed test (4) Tollen's test

Ans. (3)

Sol. Carbohydrates are polyhydroxy aldehydes and ketones. Carbohydrates may have an aldehyde group (aldoses) or ketose group. Barfoed's test distinguishes monosaccharides from disaccharides. In this test, copper acetate in dilute acid is reduced in 30 seconds by monosaccharides whereas disaccharides take several minutes.



20. In DNA complementary base Thymine is-

- (1) Uracil                      (2) Adenine                      (3) Cytosine                      (4) Guanine

Ans. (2)

Sol. In DNA thymine bind with adenine by to hydrogen bonding.


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JEE MAIN-2021 | DATE : 27-07-2021 (SHIFT-1) | PAPER-1 | MEMORY BASED | CHEMISTRY

21. **Statement-1:** Aniline is less basic then Acetamide

**Statement-2:** In Aniline, the lone pair delocalised so electron density reduce.

- (1) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.  
(2) Statement-1 is False, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement -1.  
(3) Statement -1 is True, Statement-2 is False.  
(4) Statement -1 is False, Statement-2 is False.

Ans. (2)

22. Which of the following given statements on Eutrophication are not correct?

(2) Statement-1 is False, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement -1.

(3) Statement -1 is True, Statement-2 is False.

(4) Statement -1 is False, Statement-2 is False.

Ans. (2)

22. Which of the following given statements on Eutrophication are not correct?

(1) Eutrophication decrease oxygen level in water.

(2) <6ppm oxygen fishes can't survive.

(3) Eutrophication involve anaerobic respiration.

(4) Eutrophication increase oxygen level in water.

Ans. (4)

23. Match the column:

Column-I

(i) Furacine

(ii) Dimetane

(iii) Arsphenamine

(iv) Valium

Column-II

(a) Antiseptic

(b) Synthetic antihistamine

(c) Tranquilizer

(d) Antibiotic

(1) (i) - b, (ii) - a, (iii) - c, (iv) - d

(3) (i) - a, (ii) - d, (iii) - c, (iv) - b

(2) (i) - a, (ii) - b, (iii) - d, (iv) - c

(4) (i) - c, (ii) - d, (iii) - a, (iv) - b

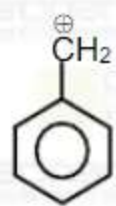
Ans. (2)

24. What is formula of mustard gas-

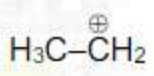


Ans. (1)

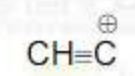
25. Stability of given molecules is:



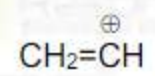
(i)



(ii)



(iii)



(iv)

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

Ans. (1)

26. Staggered and eclipsed form of ethane are

- (1) Enantiomer      (2) Anomer      (3) Epimer      (4) Rotamer

Ans. (4)

