JEE-MAIN EXAM APRIL, 2024

Date: - 06-04-2024 (SHIFT-1)

CHEMISTRY

SECTION-A

1. Functional group present in sulphonic acid is :

(1) SO_4H (2) SO_3H (3) $-\underset{O}{S}-OH$ (4) $-SO_2$

2. Match List I with List II :

List I (Molecule / Species)		List II (Property / Shape)	
A.	SO_2Cl_2	I.	Paramagnetic
B.	NO	II.	Diamagnetic
C.	NO_2^-	III.	Tetrahedral
D.	I_3^-	IV.	Linear

Choose the correct answer from the options given below :

(1) A-IV, B-I, C-III, D-II (2) A-III, B-I, C-II, D-IV

(3) A-II, B-III, C-I, D-IV (4) A-III, B-IV, C-II, D-I

3. Given below are two statements :

Statement I : Picric acid is 2, 4, 6-trinitrotoluene.

Statement II : Phenol-2, 4-disulphuric acid is treated with conc. HNO_3 to get picric acid.

In the light of the above statement, choose the most appropriate answer from the options given below :

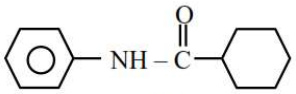
(1) Statement I is incorrect but Statement II is correct.

(2) Both Statement I and Statement II are incorrect.

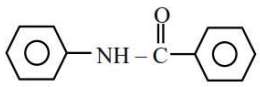
(3) Statement I is correct but Statement II is incorrect.

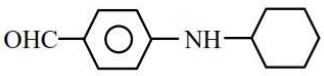
(4) Both Statement I and Statement II are correct.

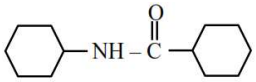
4. Which of the following is metamer of the given compound (X)?

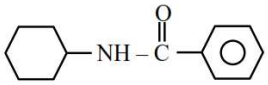


(X)

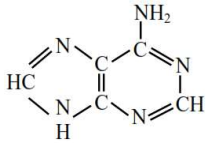
(1) 

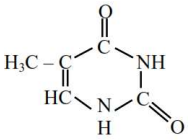
(2) 

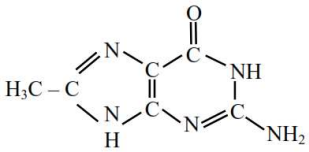
(3) 

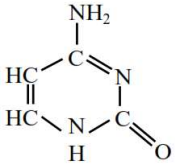
(4) 

5. DNA molecule contains 4 bases whoes structure are shown below. One of the structure is not correct, identify the incorrect base structure.

(1) 

(2) 

(3) 

(4) 

6. Match List I with List II :

LIST I (Hybridization)		LIST II (Orientation in Space)	
A.	sp^3	I.	Trigonal bipyramidal
B.	dsp^2	II.	Octahedral
C.	sp^3d	III.	Tetrahedral
D.	sp^3d^2	IV.	Square planar

Choose the correct answer from the options given below :

(1) A-III, B-I, C-IV, D-II (2) A-II, B-I, C-IV, D-III

(3) A-IV, B-III, C-I, D-II (4) A-III, B-IV, C-I, D-II

7. Given below are two statements :

Statement I : Gallium is used in the manufacturing of thermometers.

Statement II : A thermometer containing gallium is useful for measuring the freezing point $(256\ K)$ of brine solution.

In the light of the above statement, choose the correct answer from the options given below :

(1) Both Statement I and Statement II are false.

(2) Statement I is false but Statement II is true.

(3) Both Statement I and Statement II are true.

(4) Statement I is true but Statement II is false.

8. Which of the following statements are correct ?

A. Glycerol is purified by vacuum distillation because it decomposes at its normal boiling point.

B. Aniline can be purified by steam distillation as aniline is miscible in water.

C. Ethanol can be separated from ethanol water mixture by azeotropic distillation because it forms azeotrope.

D. An organic compound is pure, if mixed M.P. is remained same.

Choose the most appropriate answer from the options given below :

(1) A, B, C only (2) A, C, D only (3) B, C, D only (4) A, B, D only

9. Match List I with List II :

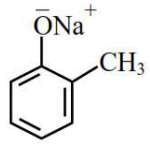
LIST I (Compound / Species)		LIST II (Shape / Geometry)	
A.	SF_4	I.	Tetrahedral
B.	BrF_3	II.	Pyramidal
C.	BrO_3^-	III.	See saw
D.	NH_4^+	IV.	Bent T-shape

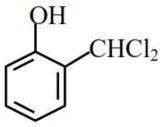
Choose the correct answer from the options given below :

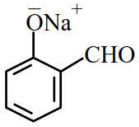
(1) A-II, B-III, C-I, D-IV (2) A-III, B-IV, C-II, D-I

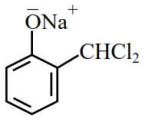
(3) A-II, B-IV, C-III, D-I (4) A-III, B-II, C-IV, D-I

10. In Reimer - Tiemann reaction, phenol is converted into salicylaldehyde through an intermediate. The structure of intermediate is _____.

(1) 

(2) 

(3) 

(4) 

11. Which of the following material is not a semiconductor.

(1) Germanium (2) Graphite (3) Silicon (4) Copper oxide

12. Consider the following complexes.

$[CoCl(NH_3)_5]^{2+}$, $[Co(CN)_6]^{3-}$, $[Co(NH_3)_5(H_2O)]^{3+}$, $[Cu(H_2O)_4]^{2+}$

(A) (B) (C) (D)

The correct order of A, B, C and D in terms of wavenumber of light absorbed is :

(1) C < D < A < B (2) D < A < C < B

(3) A < C < B < D (4) B < C < A < D

13. Match List I with List II :

LIST I (Precipitating reagent and conditions)		LIST II (Cation)	
A.	$NH_4Cl + NH_4OH$	I.	Mn^{2+}
B.	$NH_4OH + Na_2CO_3$	II.	Pb^{2+}
C.	$NH_4OH + NH_4Cl + H_2S$ gas	III.	Al^{3+}
D.	dilute HCl	IV.	Sr^{2+}

Choose the correct answer from the options given below :

(1) A-IV, B-III, C-II, D-I (2) A-IV, B-III, C-I, D-II

(3) A-III, B-IV, C-I, D-II (4) A-III, B-IV, C-II, D-I

14. The electron affinity value are negative for :

A. $Be \rightarrow Be^-$ B. $N \rightarrow N^-$ C. $O \rightarrow O^{2-}$ D. $Na \rightarrow Na$ E. $Al \rightarrow Al^-$

Choose the most appropriate answer from the options given below :

(1) D and E only (2) A, B, D and E only (3) A and D only (4) A, B and C only

15. The number of element from the following that do not belong to lanthanoids is :

Eu, Cm, Er, Tb, Yb and Lu

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

16. The density of ' x ' M solution (' x ' molar) of $NaOH$ is $1.12\ g\ mL^{-1}$. while in molality, the concentration of the solution is $3\ m$ (3 molal). Then x is (Given : Molar mass of $NaOH$ is $40\ g/mol$)

(1) 3.5 (2) 3.0 (3) 3.8 (4) 2.8

17. Which among the following aldehydes is most reactive towards nucleophilic addition reactions?

(1) $H-\overset{\overset{O}{\|}}{C}-H$ (2) $C_2H_5-\overset{\overset{O}{\|}}{C}-H$ (3) $CH_3-\overset{\overset{O}{\|}}{C}-H$ (4) $C_3H_7-\overset{\overset{O}{\|}}{C}-H$

18. At –20ºC and 1 atm pressure, a cylinder is filled with equal number of $H_2.I_2$ and HI molecules for the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, the K_P for the process is $x \times 10^{-1} \cdot x =$

[Given : $R = 0.082\ L\ atm\ K^{-1}\ mol^{-1}$]

(1) 2 (2) 1 (3) 10 (4) 0.01

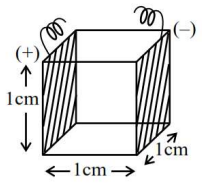
19. Match List I with List II :

LIST I (Compound)		LIST II (Uses)	
A.	Iodoform	I.	Fire extinguisher
B.	Carbon tetrachloride	II.	Insecticide
C.	CFC	III.	Antiseptic
D.	DDT	IV.	Refrigerants

Choose the correct answer from the options given below :

(1) A-I, B-II, C-III, D-IV (2) A-III, B-II, C-IV, D-I (3) A-III, B-I, C-IV, D-II (4) A-II, B-IV, C-I, D-III

20. A conductivity cell with two electrodes (dark side) are half filled with infinitely dilute aqueous solution of a weak electrolyte. If volume is doubled by adding more water at constant temperature, the molar conductivity of the cell will -



(1) increase sharply

(2) remain same or can not be measured accurately

(3) decrease sharply

(4) depend upon type of electrolyte

SECTION-B

21. Consider the dissociation of the weak acid HX as given below

$HX(aq) \rightleftharpoons H^+(aq) + X^-(aq), Ka = 1.2 \times 10^{-5}$

[K_a : dissociation constant]

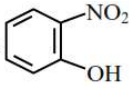
The osmotic pressure of $0.03M$ aqueous solution of HX at $300\ K$ is_____$\times 10^{-2}$ bar (nearest integer).

[Given : $R = 0.083\ LbarMol^{-1}\ K^{-1}$]

22. The difference in the 'spin-only' magnetic moment values of $KMnO_4$ and the manganese product formed during titration of $KMnO_4$ against oxalic acid in acidic medium is_____BM. (nearest integer)

23. Time required for 99.9% completion of a first order reaction is time the time required for completion of 90% reaction.(nearest integer).

24. Number of molecules from the following which can exhibit hydrogen bonding is . (nearest integer)

$CH_3OH, H_2O, C_2H_6, C_6H_6,$  HF, NH_3

25. 9.3 g of pure aniline upon diazotisation followed by coupling with phenol gives an orange dye. The mass of orange dye produced (assume 100% yield/ conversion) is g. (nearest integer)

26. The major product of the following reaction is P.

$$CH_3C \equiv C - CH_3 \xrightarrow[\substack{(ii)\text{dil.}KMnO_4 \\ 273K}]{(i)Na/liq.NH_3} \text{'P'}$$

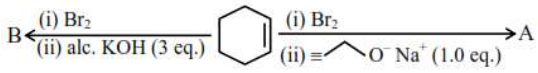
Number of oxygen atoms present in product ' P ' is _____ (nearest integer).

27. Frequency of the de-Broglie wave of election in

Bohr's first orbit of hydrogen atom is $\times 10^{13}$ Hz (nearest integer).

[Given : R_H (Rydberg constant) $= 2.18 \times 10^{-18}$ J. h (Plank's constant) $= 6.6 \times 10^{-34}$ J.s.]

28. The major products from the following reaction sequence are product A and product B.



The total sum of π electrons in product A and product B are_____(nearest integer)

29. Among CrO, Cr_2O_3 and CrO_3, the sum of spin-only magnetic moment values of basic and amphoteric oxides is _____ $10^{-2}BM$ (nearest integer).

(Given atomic number of Cr is 24)

30. An ideal gas, $\bar{C}_V = \frac{5}{2}R$, is expanded adiabatically against a constant pressure of $1\ atm$ untill it doubles in volume. If the initial temperature and pressure is $298\ K$ and $5\ atm$, respectively then the final temperature is _____ K (nearest integer).

[$\bar{C}_V$ is the molar heat capacity at constant volume]

NTA ANSWERS

1.	(2)	2.	(2)	3.	(1)	4.	(4)	5.	(3)	6.	(4)	7.	(4)
8.	(2)	9.	(2)	10.	(4)	11.	(2)	12.	(2)	13.	(3)	14.	(1)
15.	(3)	16.	(2)	17.	(1)	18.	(3)	19.	(3)	20.	(2)	21.	76
22.	(6)	23.	(3)	24.	(5)	25.	(20)	26.	(2)	27.	(658)	28.	(8)
29.	(877)	30.	(274)										