JEE-MAIN EXAM APRIL, 2024

Date: - 09-04-2024 (SHIFT-2)

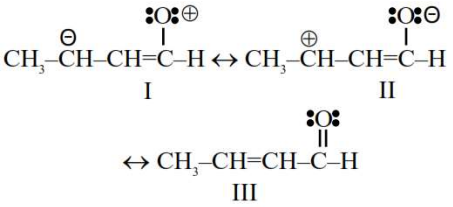
CHEMISTRY

SECTION-A

1. The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 'A' × 10^{12} hertz and that has a radiant intensity in that direction of $\frac{1}{\text{'B'}}$ watt per steradian. 'A' and 'B' are respectively

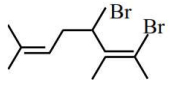
(1) 540 and $\frac{1}{683}$ (2) 540 and 683 (3) 450 and $\frac{1}{683}$ (4) 450 and 683

2. The correct stability order of the following resonance structures of $CH_3 - CH = CH - CHO$ is



(1) II > III > I (2) III > II > I (3) I > II > III (4) II > I > III

3. Total number of stereo isomers possible for the given structure:



(1) 8 (2) 2 (3) 4 (4) 3

4. The correct increasing order for bond angles among BF_3, PF_3 and $C_\ell F_3$ is :

(1) $PF_3 < BF_3 < C\ell F_3$ (2) $BF_3 < PF_3 < C\ell F_3$

(3) $C\ell F_3 < PF_3 < BF_3$ (4) $BF_3 = PF_3 < C\ell F_3$

5. Match List I with List II

Choose the correct answer from the options given below :

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

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

6. Match List I with List II

	List -I (Cell)		List-II (Use/Property/Reaction)
A	Leclanche cell	I.	Converts energy of combustion into electrical energy
B	Ni-Cd cell	II.	Does not involve any ion in solution and is used in hearing aids
C	Fuel cell	III.	Rechargeable
D	Mercury cell	IV.	Reaction at anode $Zn \rightarrow Zn^{2+} + 2e^-$

Choose the correct answer from the options given below:

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

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

7. Match List I with List II

LIST-I		LIST-II	
A.	$K_2[Ni(CN)_4]$	I.	sp^3
B.	$[Ni(CO)_4]$	II.	sp^3d^2
C.	$[Co(NH_3)_6]Cl_3$	III.	dsp^2
D.	$Na_3[CoF_6]$	IV.	d^2sp^3

Choose the correct answer from the options given below:

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

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

8. The coordination environment of Ca^{2+} ion in its complex with EDTA $^{4-}$ is :

(1) tetrahedral (2) octahedral (3) square planar (4) trigonal prismatic

9. The incorrect statement about Glucose is :

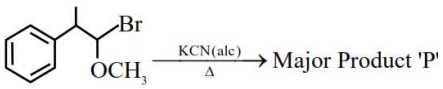
(1) Glucose is soluble in water because of having aldehyde functional group

(2) Glucose remains in multiple isomeric form in its aqueous solution

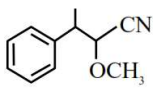
(3) Glucose is an aldohexose

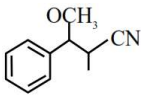
(4) Glucose is one of the monomer unit in sucrose

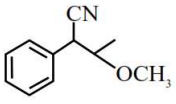
10.

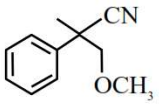


In the above reaction product 'P' is

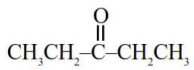
(1) 

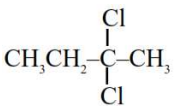
(2) 

(3) 

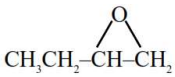
(4) 

11. Which of the following compound can give positive iodoform test when treated with aqueous KOH solution followed by potassium hypoiodite.

(1) 

(2) 

(3) $CH_3CH_2CH_2CHO$

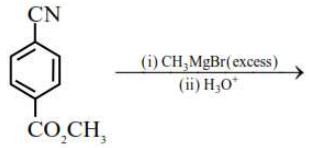
(4) 

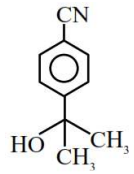
12. For a sparingly soluble salt AB_2, the equilibrium concentrations of A^{2+} ions and B^-ions are $1.2 \times 10^{-4}M$ and $0.24 \times 10^{-3}M$, respectively. The solubility product of AB_2 is :

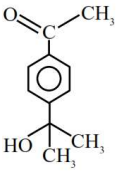
(1) 0.069×10^{-12} (2) 6.91×10^{-12}

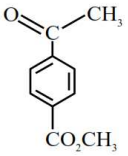
(3) 0.276×10^{-1} (4) 27.65×10^{-12}

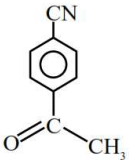
13. Major product of the following reaction is



(1) 

(2) 

(3) 

(4) 

14. Given below are two statements :

Statement I : The higher oxidation states are more stable down the group among transition elements unlike p-block elements.

Statement II : Copper can not liberate hydrogen from weak acids.

In the light of the above statements, 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

15. The incorrect statement regarding ethyne is

(1) The C-C bonds in ethyne is shorter than that in ethene

(2) Both carbons are sp hybridised

(3) Ethyne is linear

(4) The carbon-carbon bonds in ethyne is weaker than that in ethene

16. Match List I with List II

List-I (Element)		List-II (Electronic Configuration)	
A.	N	I.	[Ar] $3d^{10}4s^2\ 4p^5$
B.	S	II.	[Ne] $3s^2\ 3p^4$
C.	Br	III.	[He] $2s^2\ 2p^3$
D	Kr	IV.	[Ar] $3d^{10}\ 4s^2\ 4p^6$

Choose the correct answer from the options given below :

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

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

17. Match List I with List II

List-I		List-II	
A.	Melting point [K]	I.	Tl > In > Ga > Al > B
B.	Ionic Radius [M^{+3}/pm]	II.	B > Tl > Al ≈ Ga > In
C.	$\Delta_i H_1$ [kJ mol^{-1}]	III.	Tl > In > Al > Ga > B
D	Atomic Radius [pm]	IV.	B > Al > Tl > In > Ga

Choose the correct answer from the options given below :

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

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

18. Which of the following compounds will give silver mirror with ammoniacal silver nitrate?

(A) Formic acid (B) Formaldehyde

(C) Benzaldehyde (D) Acetone

Choose the correct answer from the options given below :

(1) C and D only (2) A, B and C only

(3) A only (4) B and C only

19. Which out of the following is a correct equation to show change in molar conductivity with respect to concentration for a weak electrolyte, if the symbols carry their usual meaning :

(1) $\Lambda^2{}_m C - K_a \Lambda_m^{\circ 2} + K_a \Lambda_m \Lambda_m^{\circ} = 0$ (2) $\Lambda_m - \Lambda_m^{\circ} + AC^{\frac{1}{2}} = 0$

(3) $\Lambda_m - \Lambda_m^{\circ} - AC^{\frac{1}{2}} = 0$ (4) $\Lambda^2{}_m C + K_a \Lambda_m^{\circ 2} - K_a \Lambda_m \Lambda_m^{\circ} = 0$

20. The electronic configuration of Einsteinium is :

(Given atomic number of Einsteinium $= 99$)

(1) $[Rn]5f^{12}6\,d^0 7\,s^2$ (2) $[Rn]5f^{11}6\,d^0 7\,s^2$

(3) $[Rn]5f^{13}6\,d^0 7\,s^2$ (4) $[Rn]5f^{10}6\,d^0 7\,s^2$

SECTION-B

21. Number of oxygen atoms present in chemical formula of fuming sulphuric acid is _____

22. A transition metal 'M' among Sc, Ti, V, Cr, Mn and Fe has the highest second ionisation enthalpy. The spin only magnetic moment value of M^+ion is BM (Near integer)

(Given atomic number Sc : 21, Ti : 22, V:23, Cr :

24, Mn : 25, Fe : 26)

23. The vapour pressure of pure benzene and methyl benzene at $27^{\circ}C$ is given as 80 Torr and 24 Torr, respectively. The mole fraction of methyl benzene in vapour phase, in equilibrium with an equimolar mixture of those two liquids (ideal solution) at the same temperature is $\times 10^{-2}$ (nearest integer)

24. Consider the following test for a group-IV cation.

$M^{2+} + H_2 S \rightarrow A$ (Black precipitate) + byproduct

A + aqua regia $\rightarrow B + NOCl + S + H_2O$

$B + KNO_2 + CH_3COOH \rightarrow C$ + byproduct

The spin only magnetic moment value of the metal complex C is BM.

(Nearest integer)

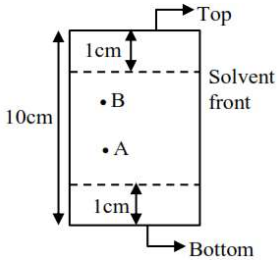
25. Consider the following first order gas phase reaction at constant temperature

$A(g) \rightarrow 2\,B(g) + C(g)$

If the total pressure of the gases is found to be 200 torr after $23sec.$ and 300 torr upon the complete decomposition of A after a very long time, then the rate constant of the given reaction is $\times 10^{-2}\ s^{-1}$ (nearest integer)

[Given : $\log_{10}(2) = 0.301$]

26.



In the given TLC, the distance of spot A & B are $5\ cm$&$7\ cm$, from the bottom of TLC plate, respectively. R_f value of B is $x \times 10^{-1}$ times more than A. The value of x is _____.

27. Based on Heisenberg's uncertainty principle, the uncertainty in the velocity of the electron to be found within an atomic nucleus of diameter $10^{-15}\ m$ is _____ $\times 10^9\ ms^{-1}$ (nearest integer)

[Given : mass of electron $= 9.1 \times 10^{-31}\ kg$, Plank's constant $(h) = 6.626 \times 10^{-34} Js$]

(Value of $\pi = 3.14$)

28. Number of compounds from the following which cannot undergo Friedel-Crafts reactions is : toluene, nitrobenzene, xylene, cumene, aniline, chlorobenzene, m-nitroaniline, m-dinitrobenzene

29. Total number of electron present in (π^*) molecular orbitals of O_2, O_2^+ and O_2^- is

30. When $\Delta H_{vap} = 30\ kJ/mol$ and $\Delta S_{vap} = 75\ J\,mol^{-1}\,K^{-1}$, then the temperature of vapour, at one atmosphere is K.

NTA ANSWERS

1.	**(2)**	**2.**	**(2)**	**3.**	**(1)**	**4.**	**(3)**	**5.**	**(2)**	**6.**	**(3)**	**7.**	**(4)**
8.	**(2)**	**9.**	**(1)**	**10.**	**(1)**	**11.**	**(2)**	**12.**	**(2)**	**13.**	**(2)**	**14.**	**(3)**
15.	**(4)**	**16.**	**(2)**	**17.**	**(3)**	**18.**	**(2)**	**19.**	**(1)**	**20.**	**(2)**	**21.**	**(7)**
22.	**(6)**	**23.**	**(23)**	**24.**	**(0)**	**25.**	**(3)**	**26.**	**(15)**	**27.**	**(58)**	**28.**	**(4)**
29.	**(6)**	**30.**	**(400)**										