

6. How can an electrochemical cell be converted into an electrolytic cell ?
- (1) Applying an external opposite potential greater than E_{cell}^0
 - (2) Reversing the flow of ions in salt bridge.
 - (3) Applying an external opposite potential lower than E_{cell}^0 .
 - (4) Exchanging the electrodes at anode and cathode.
7. Arrange the following elements in the increasing order of number of unpaired electrons in it.
- (A) Sc (B) Cr (C) V (D) Ti
(E) Mn

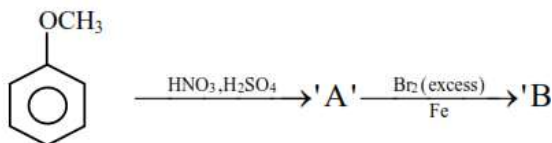
Choose the correct answer from the options given below:

- (1) (C) < (E) < (B) < (A) < (D)
 - (2) (B) < (C) < (D) < (E) < (A)
 - (3) (A) < (D) < (C) < (B) < (E)
 - (4) (A) < (D) < (C) < (E) < (B)
8. Match List-I with List-II.

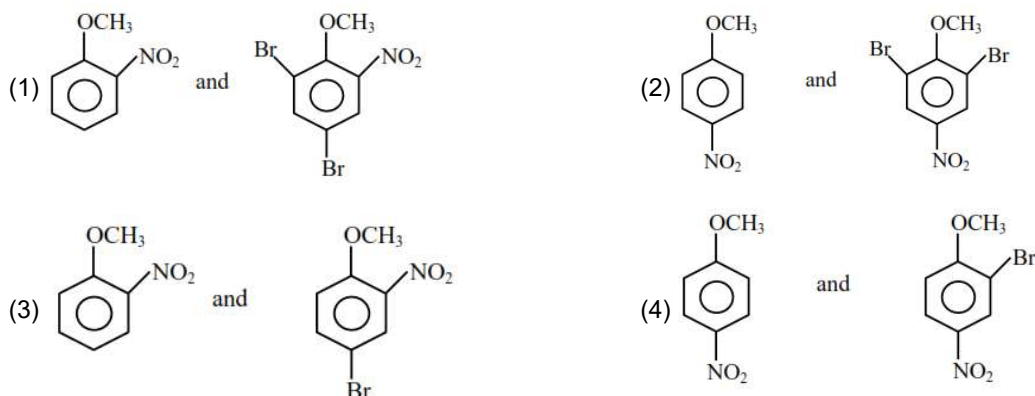
List-I Alkali Metal	List-II Emission Wavelength in nm
(A) Li	(I) 589.2
(B) Na	(II) 455.5
(C) Rb	(III) 670.8
(D) Cs	(IV) 780.0

Choose the correct answer from the options given below:

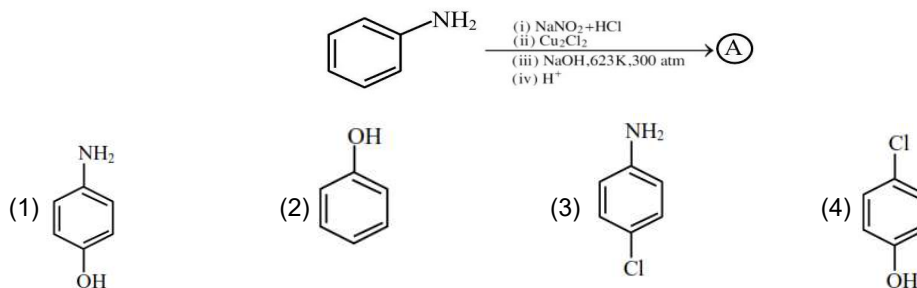
- (1) (A)-(I), (B)-(IV), (C)-(III), (D)-(II)
 - (2) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)
 - (3) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)
 - (4) (A)-(II), (B)-(IV), (C)-(III), (D)-(I)
9. The major products formed :



A and B respectively are:



10. The incorrect statement regarding the geometrical isomers of 2-butene is :
- (1) cis-2-butene and trans-2-butene are not interconvertible at room temperature.
 - (2) cis-2-butene has less dipole moment than trans-2-butene.
 - (3) trans-2-butene is more stable than cis-2-butene.
 - (4) cis-2-butene and trans-2-butene are stereoisomers.
11. Given below are two statements:
- Statement I: PF_5 and BrF_5 both exhibit $\text{sp}^3 \text{d}$ hybridisation.
- Statement II: Both SF_6 and $[\text{Co}(\text{NH}_3)_6]^{3+}$ exhibit $\text{sp}^3 \text{d}^2$ hybridisation.
- In the light of the above statements, choose the correct answer from the options given below :
- (1) Statement I is true but Statement II is false
 - (2) Both Statement I and Statement II are true
 - (3) Both Statement I and Statement II are false
 - (4) Statement I is false but Statement II is true
12. The number of ions from the following that are expected to behave as oxidising agent is:
 $\text{Sn}^{4+}, \text{Sn}^{2+}, \text{Pb}^{2+}, \text{Tl}^{3+}, \text{Pb}^{4+}, \text{Tl}^+$
- (1) 3
 - (2) 4
 - (3) 1
 - (4) 2
13. Identify the product (A) in the following reaction.



14. The correct statements among the following, for a "chromatography" purification method is :
- (1) Organic compounds run faster than solvent in the thin layer chromatographic plate.
 - (2) Non-polar compounds are retained at top and polar compounds come down in column chromatography.
 - (3) R_f of a polar compound is smaller than that of a non-polar compound.
 - (4) R_f is an integral value.
15. Evaluate the following statements related to group 14 elements for their correctness.
- (A) Covalent radius decreases down the group from C to Pb in a regular manner.
 - (B) Electronegativity decreases from C to Pb down the group gradually.
 - (C) Maximum covalence of C is 4 whereas other elements can expand their covalence due to presence of d orbitals.
 - (D) Heavier elements do not form $p\pi-p\pi$ bonds.
 - (E) Carbon can exhibit negative oxidation states.

Choose the correct answer from the options given below :

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

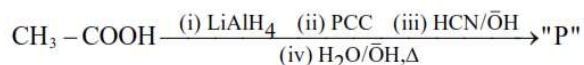
16. Match List-I with the List-II

List-I Reaction	List-II Type of redox reaction
(A) $\text{N}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightarrow 2\text{NO}_{(\text{g})}$	(I) Decomposition
(B) $2\text{Pb}(\text{NO}_3)_{2(\text{s})} \rightarrow 2\text{PbO}_{(\text{s})} + 4\text{NO}_{2(\text{g})} + \text{O}_{2(\text{g})}$	(II) Displacement
(C) $2\text{Na}_{(\text{s})} + 2\text{H}_2\text{O}_{(\text{l})} \rightarrow 2\text{NaOH}_{(\text{aq.})} + \text{H}_{2(\text{g})}$	(III) Disproportionation
(D) $2\text{NO}_{2(\text{g})} + 2\text{OH}_{(\text{aq.})}^- \rightarrow \text{NO}_{2(\text{aq.})}^- + \text{NO}_{3(\text{aq.})}^- + \text{H}_2\text{O}_{(\text{l})}$	(IV) Combination

Choose the correct answer from the options given below :

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

17. Consider the given reaction, identify the major product P.



- (1) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$ (2) $\text{CH}_3 - \text{CH}_2 - \overset{\text{O}}{\parallel} \text{C} - \text{NH}_2$
 (3) $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_2\text{CH}_3$ (4) $\text{CH}_3 - \overset{\text{OH}}{\text{CH}} - \text{COOH}$

18. The correct IUPAC name of $[\text{PtBr}_2(\text{PMe}_3)_2]$ is:

- (1) bis(trimethylphosphine)dibromoplatinum(II) (2) bis[bromo(trimethylphosphine)]platinum(II)
 (3) dibromobis(trimethylphosphine)platinum(II) (4) dibromodi(trimethylphosphine)platinum(II)

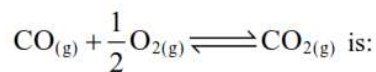
19. Match List-I with List-II

List-I Tetrahedral Complex	List-II Electronic configuration
(A) TiCl_4	(I) e^2, t_2^0
(B) $[\text{FeO}_4]^{2-}$	(II) e^4, t_2^3
(C) $[\text{FeCl}_4]^-$	(III) e^0, t_2^0
(D) $[\text{CoCl}_4]^{2-}$	(IV) e^2, t_2^3

Choose the correct answer from the option given below :

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

20. The ratio $\frac{K_P}{K_C}$ for the reaction:



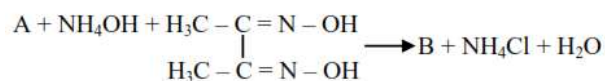
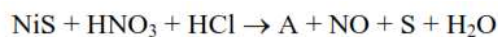
- (1) $(RT)^{1/2}$ (2) RT (3) 1 (4) $\frac{1}{\sqrt{RT}}$

SECTION-B

21. An amine (X) is prepared by ammonolysis of benzyl chloride. On adding p-toluenesulphonyl chloride to it the solution remains clear. Molar mass of the amine (X) formed is _____ g mol^{-1} .

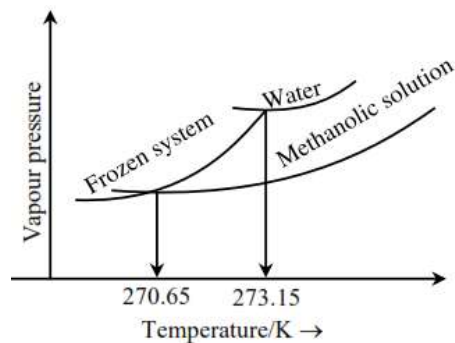
(Given molar mass in g mol^{-1} : C: 12, H: 1, O: 16, N: 14)

22. Consider the following reactions



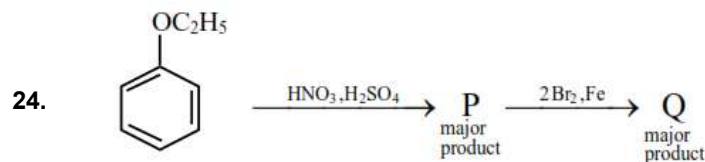
The number of protons that do not involve in hydrogen bonding in the product B is _____.

23. When ' x ' $\times 10^{-2}$ mL methanol (molar mass = 32 g; density = 0.792 g/cm^3) is added to 100 mL water (density = 1 g/cm^3), the following diagram is obtained.



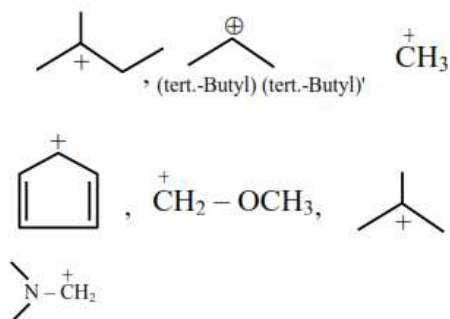
$x =$ (nearest integer)

[Given: Molal freezing point depression constant of water at 273.15 K² is $1.86 \text{ K kg mol}^{-1}$]



The ratio of number of oxygen atoms to bromine atoms in the product Q is $\times 10^{-1}$.

25. Number of carbocation from the following that are not stabilized by hyperconjugation is.



26. For the reaction at 298 K, $2A + B \rightarrow C$. $\Delta H = 400 \text{ kJ mol}^{-1}$ and $\Delta S = 0.2 \text{ kJ mol}^{-1} \text{ K}^{-1}$. The reaction will become spontaneous above K.
27. Total number of species from the following with central atom utilising $2p^2$ hybrid orbitals for bonding is $\text{NH}_3, \text{SO}_2, \text{SiO}_2, \text{BeCl}_2, \text{C}_2\text{H}_2, \text{C}_2\text{H}_4, \text{BCl}_3, \text{HCHO}, \text{C}_6\text{H}_6, \text{BF}_3, \text{C}_2\text{H}_4\text{Cl}_2$
28. Consider the two different first order reactions given below
 $A + B \rightarrow C$ (Reaction 1)
 $P \rightarrow Q$ (Reaction 2)
 The ratio of the half life of Reaction 1: Reaction 2 is 5:2. If t_1 and t_2 represent the time taken to complete $2/3^{\text{rd}}$ and $4/5$ of Reaction 1 and Reaction 2, respectively, then the value of the ratio $t_1:t_2$ is $\times 10^{-1}$ (nearest integer).
 [Given: $\log_{10}(3) = 0.477$ and $\log_{10}(5) = 0.699$]
29. For hydrogen atom, energy of an electron in first excited state is -3.4eV , K.E. of the same electron of hydrogen atom is $x\text{eV}$. Value of x is $\times 10^{-1}\text{eV}$. (Nearest integer)
30. Among $\text{VO}_2^+, \text{MnO}_4^-, \text{Cr}_2\text{O}_7^{2-}$, the spin-only magnetic moment value of the species with least oxidising ability is .BM (Nearest integer).
 (Given atomic member $V = 23, \text{Mn} = 25, \text{Cr} = 24$)

NTA ANSWERS

1.	(2)	2.	(2)	3.	(3)	4.	(2)	5.	(1)	6.	(1)	7.	(4)
8.	(2)	9.	(2)	10.	(2)	11.	(3)	12.	(4)	13.	(2)	14.	(3)
15.	(1)	16.	(4)	17.	(4)	18.	(3)	19.	(4)	20.	(4)	21.	(287)
22.	(12)	23.	(543)	24.	(15)	25.	(5)	26.	(2000)	27.	(6)	28.	(17)
29.	(34)	30.	(0)										