

**SECTION-A**

1. **Statement I:** KMnO_4 is oxidising agent in neutral, acidic and in basic medium.

Statement II: Noble gases have lowest ionization energies in their respective periods.

- (1) Statement I and Statement II both are correct.
- (2) Statement I and Statement II both are incorrect.
- (3) Statement I is correct but Statement II is incorrect.
- (4) Statement I is incorrect but Statement II is correct.

2. Given

$$E_{\text{Cr}^{3+}/\text{Cr}}^\circ = -0.74 \text{ V}; E_{\text{MnO}_4^-/\text{Mn}^{2+}}^\circ = 1.51 \text{ V}$$

$$E_{\text{Cr}_2\text{O}_7^{2-}/\text{Cr}^{3+}}^\circ = 1.33 \text{ V}; E_{\text{Cl}^-/\text{Cl}_2}^\circ = 1.36 \text{ V}$$

Based on the data given above, the strongest oxidising agent will be:

- (1) Mn^{2+}
- (2) MnO_4^-
- (3) Cl^-
- (4) Cr^{3+}

3. Which is **correct** relation in between $\frac{dc}{dt}$, $\frac{dn}{dt}$ and $\frac{dp}{dt}$, where c, n, p, represents concentration, mole and pressure terms for gaseous phase reactant $\text{A(g)} \rightarrow \text{product?}$

- (1) $-\frac{dc}{dt} = -\frac{1}{V} \frac{dn}{dt} = -\frac{1}{RT} \frac{dp}{dt}$
- (2) $\frac{dc}{dt} = \frac{dn}{dt} = -\frac{dp}{dt}$
- (3) $\frac{dc}{dt} = \frac{RT}{V} \frac{dn}{dt} = -\frac{dp}{dt}$
- (4) All of these

4. For an endothermic reaction where ΔH represents the enthalpy of the reaction in kJ/mol, the minimum value for the energy of activation will be:

- (1) less than ΔH
- (2) zero
- (3) more than ΔH
- (4) equal to ΔH

5. An unripe mango placed in a concentrated salt solution to prepare pickle, shrivels because:

- (1) it gains water due to osmosis.
- (2) it gains water due to reverse osmosis.
- (3) it loses water due to reverse osmosis.
- (4) it loses water due to osmosis.

6. An electrochemical cell can behave like an electrolytic cell when:

- (1) $E_{\text{cell}} = 0$
- (2) $E_{\text{cell}} = E_{\text{ext}}$
- (3) $E_{\text{ext}} > E_{\text{cell}}$
- (4) $E_{\text{cell}} > E_{\text{ext}}$

7. On cooling a sugar solution of 1 M to -1°C :

- (1) sugar + water freezes
- (2) only water freezes and ice separates out
- (3) ice containing sugar + water separates out
- (4) sugar is separated out from solution

8. **Statement I:** Boiling point of water at higher altitude is lower than 100°C .

Statement II: Boiling point is a colligative property.

- (1) Statement I and Statement II both are correct.
- (2) Statement I and Statement II both are incorrect.
- (3) Statement I is correct but Statement II is incorrect.
- (4) Statement I is incorrect but Statement II is correct.

9. **Assertion (A):** Order and molecularity of a reaction are always equal.

Reason (R): Complex reactions takes place in two or more steps and fastest step determine the molecularity of reaction.

- (1) **Assertion (A)** and **Reason (R)** both are true and **Reason (R)** is the correct explanation of **Assertion (A)**.
- (2) **Assertion (A)** and **Reason (R)** both are true and **Reason (R)** is not the correct explanation of **Assertion (A)**.
- (3) **Assertion (A)** is true but **Reason (R)** is false.
- (4) **Assertion (A)** and **Reason (R)** both are false.



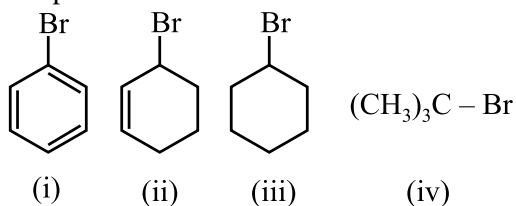
10. Solubility of H_2S gas in water at STP is $0.195 \text{ mol kg}^{-1}$. Thus, Henry's law constant, K_H (in atm) for H_2S is:
(1) 285.9 (2) 282
(3) 284 (4) 384
11. In the following reaction; $x\text{A} \rightarrow y\text{B}$
$$\log_{10} \left[-\frac{d[\text{A}]}{dt} \right] = \log_{10} \left[\frac{d[\text{B}]}{dt} \right] + 0.3010$$

A and B respectively can be:
(1) n-butane and iso-butane
(2) C_2H_2 and C_6H_6
(3) C_2H_4 and C_4H_8
(4) N_2O_4 and NO_2
12. **Assertion (A):** Glycine is the only amino acid which is optically inactive.
Reason (R) (R): Glycine has no chiral carbon.
(1) **Assertion (A)** and **Reason (R)** both are true and **Reason (R)** is the correct explanation of **Assertion (A)**.
(2) **Assertion (A)** and **Reason (R)** both are true and **Reason (R)** is not the correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** and **Reason (R)** both are false.
13. In the reaction,
$$\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3 + \text{HI} \xrightarrow{\text{Heated}}$$

Which of the following compound will be formed?
(1) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2\text{I}$
(2) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_3$
(3) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2\text{OH}$
(4) $\text{CH}_3 - \text{CH}_2 - \text{OH}$
14. $\text{C}_6\text{H}_6 \xrightarrow[\text{anhyd. AlCl}_3/\text{CuCl}]{\text{CO, HCl}} \text{C}_6\text{H}_5\text{CHO}$
This chemical reaction is known as:
(1) Gatterman reaction
(2) Tischenko reaction
(3) Frankland reaction
(4) Gatterman-Koch reaction
15. Which one of the following fluorides does not exist?
(1) NF_5 (2) PF_5
(3) AsF_5 (4) SbF_5
16. In which of the following compounds, does the transition metal atoms have +3 oxidation number?
(1) $[\text{Mn}(\text{H}_2\text{O})_3\text{Cl}_3]$
(2) CrO_5
(3) $[\text{Fe}(\text{CO})_5]$
(4) $[\text{Fe}(\text{CN})_6]^{4-}$
17. Glucose reacts with acetic anhydride to form:
(1) Mono acetate
(2) Tetra acetate
(3) Penta acetate
(4) Hexa acetate
18. How many coulombs are required for the oxidation of 1 mole of H_2O_2 to O_2 ?
(1) 9.65×10^4
(2) 93000
(3) 1.93×10^5
(4) 19.3×10^2
19. At 300 K, 36 g of glucose present in one litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bar at the same temperature, what would be its concentration?
(1) 0.061 M
(2) 0.61 M
(3) 0.0061 M
(4) 6.1 M
20. Zn and Hg do not show variable valency like transition elements because:
(1) They are soft
(2) Their d-subshells are complete
(3) They have only two electrons in the outermost subshell
(4) Their d-subshells are incomplete



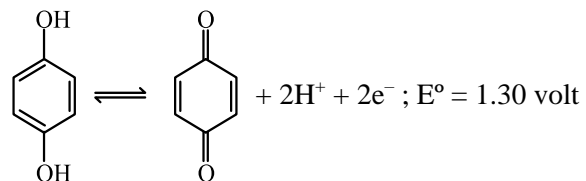
21. The increasing order of hydrolysis of the following compounds is:



- (1) (i) < (iii) < (ii) < (iv)
 (2) (i) < (iv) < (iii) < (ii)
 (3) (iv) < (ii) < (iii) < (i)
 (4) (i) < (iii) < (iv) < (ii)
22. The crystal field stabilization energy (CFSE) of $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ and $\text{K}_2[\text{NiCl}_4]$, respectively are:
 (1) $-0.4\Delta_o$ and $-0.8\Delta_t$
 (2) $-0.6\Delta_o$ and $-0.8\Delta_t$
 (3) $-2.4\Delta_o$ and $-1.2\Delta_t$
 (4) $-0.4\Delta_o$ and $-1.2\Delta_t$
23. **Statement I:** The reciprocal of time in which 66% of the reactant is converted to product is equal to the rate constant of first order reaction.
Statement II: The rate constant for first order reaction depends on initial concentration of reactants.
 (1) Statement I and Statement II both are correct.
 (2) Statement I and Statement II both are incorrect.
 (3) Statement I is correct but Statement II is incorrect.
 (4) Statement I is incorrect but Statement II is correct.
24. **Assertion (A):** 1° , 2° and 3° amines are separated by Hinsberg's reagent.
Reason (R): Hinsberg's reagent is $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$.
 (1) **Assertion (A)** and **Reason (R)** both are true and **Reason (R)** is the correct explanation of **Assertion (A)**.
 (2) **Assertion (A)** and **Reason (R)** both are true and **Reason (R)** is not the correct explanation of **Assertion (A)**.
 (3) **Assertion (A)** is true but **Reason (R)** is false.
 (4) **Assertion (A)** and **Reason (R)** both are false.
25. The outer electronic configuration of lawrencium ($Z = 103$) is:
 (1) $[\text{Rn}]5f^{13}7s^27p^2$
 (2) $[\text{Rn}]5f^{13}6d^17s^27p^1$
 (3) $[\text{Rn}]5f^{14}6d^17s^2$
 (4) $[\text{Rn}]5f^{14}7s^27p^1$

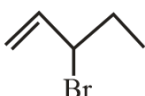
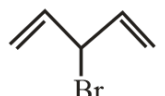
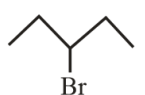
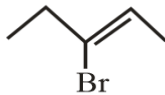
26. Match **List-I** with **List-II** and select the correct answer using codes given ahead in the lists:

List-I (Metal ions)		List-II (Magnetic Moments (B. M.))	
(A)	Cr^{3+}	(I)	$\sqrt{35}$
(B)	Fe^{2+}	(II)	$\sqrt{30}$
(C)	Ni^{2+}	(III)	$\sqrt{24}$
(D)	Mn^{2+}	(IV)	$\sqrt{15}$
		(V)	$\sqrt{8}$

- (1) A-I, B-III, C-V, D-IV
 (2) A-II, B-III, C-V, D-I
 (3) A-IV, B-III, C-V, D-I
 (4) A-IV, B-V, C-III, D-I
27. First synthetic element is:
 (1) La (2) Po
 (2) Y (4) Tc
28. The cell reaction involving quinhydrone electrode is:

 What will be the electrode potential at pH = 3?
 (1) 1.48 V (2) 1.20 V
 (3) 1.10 V (4) 1.30 V
29. The value of the reaction quotient Q, for the cell $\text{Zn(s)} | \text{Zn}^{2+}(0.01\text{M}) || \text{Ag}^+(1.25\text{M}) | \text{Ag(s)}$ is:
 (1) 156 (2) 125
 (3) 1.25×10^{-2} (4) 6.4×10^{-3}
30. The order of acidity of oxides of chlorine is: Cl_2O (I), Cl_2O_3 (II), Cl_2O_5 (III), Cl_2O_7 (IV)
 (1) I < II < III < IV
 (2) I > II > III > IV
 (3) I > III > II > IV
 (4) IV > I > II > III
31. Pure water boils at 100°C and pure nitric acid boils at 359 K. The azeotropic mixture of water and nitric acid boils at:
 (1) $T > 359\text{ K}$
 (2) $T < 359\text{ K}$
 (3) $T < 100^\circ\text{C}$ but $> 359\text{ K}$
 (4) Can not be predicted



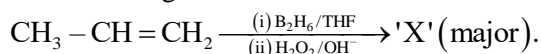
32. Which among the following will undergo substitution reaction most readily via S_N1 mode?

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

33. The alkyl halide that shows least boiling point is:

- (1) $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{Cl}$
 (2) $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{Cl}$
 (3) $(\text{CH}_3)_3\text{CCl}$
 (4) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{Cl}$

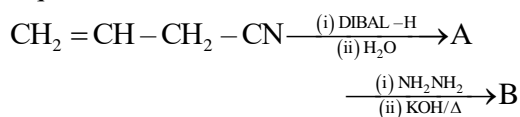
34. Consider the given reaction:



Major product (X) will be:

- (1) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{BH}_2$
 (2) $(\text{CH}_3 - \text{CH}_2 - \text{CH}_2)_2\text{BH}$
 (3) $(\text{CH}_3 - \text{CH}_2 - \text{CH}_2)_3\text{B}$
 (4) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

35. Final product (B) obtained in the following sequence of reactions is:



- (1) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
 (2) $\text{CH}_2 = \text{CH} - \text{CH}_3$
 (3) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{CH}_3$
 (4) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$

SECTION-B

36. IUPAC name of phthalic acid is:

- (1) Benzene -1, 4-dicarboxylic acid
 (2) Benzene-1, 2-dicarboxylic acid
 (3) 2-Hydroxy benzoic acid
 (4) 4-Hydroxy benzoic acid

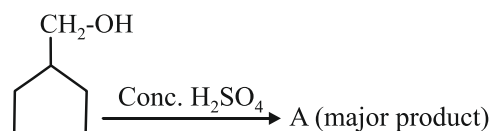
37. The correct order of wavelength of absorption in visible region for the following complexes is:

- (I) $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ (II) $[\text{Ni}(\text{NH}_3)_6]^{2+}$
 (III) $[\text{Ni}(\text{NO}_2)_6]^{4-}$
 (1) $\text{I} < \text{II} < \text{III}$ (2) $\text{I} = \text{II} = \text{III}$
 (3) $\text{III} < \text{II} < \text{I}$ (4) $\text{III} < \text{I} < \text{II}$


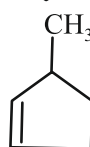
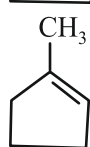
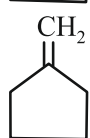
38. In which of the following coordination entities, the magnitude of Δ_o [CFSE in octahedral field] will be maximum?

- (1) $[\text{CoF}_6]^{3-}$
 (2) $[\text{Co}(\text{CN})_6]^{3-}$
 (3) $[\text{Co}(\text{NO}_2)_6]^{3-}$
 (4) $[\text{Co}(\text{NH}_3)_6]^{3+}$

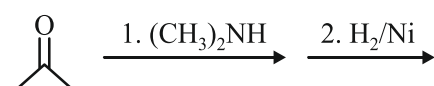
39.



The major product A is:

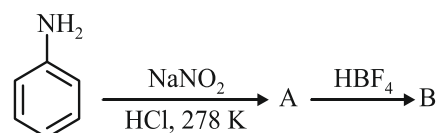
- (1) 
 (2) 
 (3) 
 (4) 

40. The product of the following sequence of reaction is:



- (1) 1° amine (2) 2° amine
 (3) 3° amine (4) None of these

41.



The compounds 'A' and 'B' respectively are:

- (1) Nitrobenzene and chlorobenzene
 (2) Nitrobenzene and fluorobenzene
 (3) Phenol and benzene
 (4) Benzene diazonium chloride and fluorobenzene

42. The total number of stereoisomers of aldopentose is:

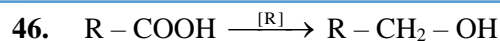
- (1) 2 (2) 4
 (3) 6 (4) 8



43. Match **List-I** with **List-II** and select answer using the codes given below:

List-I		List-II	
(I)	Monohydric phenol	(A)	Benzyl alcohol
(II)	Dihydric phenol	(B)	Picric acid
(III)	Trihydric phenol	(C)	Pyrogallol
(IV)	Aromatic alcohol	(D)	Resorcinol

- (1) I-B, II-D, III-C, IV-A
(2) I-D, II-C, III-B, IV-A
(3) I-B, II-C, III-D, IV-A
(4) I-D, II-C, III-A, IV-B
44. Which of the following alcohols can be most easily dehydrated?
- (1) Ethanol
(2) Propan-2-ol
(3) Propan-1-ol
(4) Trimethyl carbinol
45. Which of the following is most acidic?
- (1)
- (2)
- (3)
- (4)



Here reagent [R] is:

- (1) LiAlH_4
(2) NaBH_4
(3) Red P/HI
(4) Both (1) and (2)
47. The amine which can liberate N_2 gas on reaction with HNO_2 is:
- (1) 1° amine
(2) 2° amine
(3) 3° amine
(4) All of these
48. Following reaction occurs via:
-
- (1) $\text{S}_{\text{N}}1$ (2) $\text{S}_{\text{N}}2$
(3) $\text{S}_{\text{N}}^{\text{i}}$ (4) $\text{ArS}_{\text{N}}2$
49. Which of the following is most viscous?
- (1) Propan-1-ol
(2) Propan-1, 2-diol
(3) Propane-1, 2, 3-triol
(4) Benzenol
50. Chromyl chloride test will not be given by:
- (1) HgCl_2 (2) LiCl
(3) NaBr (4) All of these