

KANKOR EXAMS QUESTIONS

3. The standard electrode potentials of three metals A, B and C are, respectively, + 0.34 V, – 1.18 V and – 0.25 V. The correct order of reducing power of these metals is :
- (A) $B > C > A$
(B) $A > B > C$
(C) $C > B > A$
(D) $A > C > B$
4. The rate of a reaction is doubled when the concentration of the reactant is doubled. The order of the reaction is :
- (A) 0 (B) 1
(C) 2 (D) 0.5
5. Which of the following is **not** a transition metal ?
- (A) Hg (B) Cu
(C) Ag (D) Pt
6. The secondary valency of Co in $[\text{Co}(\text{en})_3]_2(\text{SO}_4)_3$ is :
- (A) 12 (B) 2
(C) 3 (D) 6
7. Vitamin B₁₂ is a complex compound of :
- (A) Fe^{2+}
(B) Mg^{2+}
(C) Co^{3+}
(D) Cu^{2+}





8. Chloroform, in the presence of air and sunlight, produces a poisonous gas known as :
 - (A) Phosgene
 - (B) Phosphine
 - (C) Tear gas
 - (D) Mustard gas
9. Propan-2-ol on oxidation with CrO_3 gives :
 - (A) Propanal
 - (B) Propanoic acid
 - (C) Propene
 - (D) Propanone
10. The reaction of ammonia with a large excess of ethyl chloride will give mainly :
 - (A) Ethylamine
 - (B) Tetraethylammonium chloride
 - (C) Triethylamine
 - (D) Diethylamine
11. Acetamide reacts with Br_2 and aqueous KOH to form :
 - (A) Ethanamine
 - (B) Ammonia
 - (C) Methanamine
 - (D) Ethanenitrile
12. In the ring structure of fructose, the anomeric carbon is :

(A) C2	(B) C3
(C) C4	(D) C1





For Questions number 13 to 16, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

13. *Assertion (A) :* Transition metals have high melting points.

Reason (R) : Transition metals have incompletely filled d-orbitals.

14. *Assertion (A) :* Rate of reaction increases with an increase in temperature.

Reason (R) : Number of effective collisions decreases with an increase in temperature.

15. *Assertion (A) :* p-nitrophenol is less acidic than phenol.

Reason (R) : Nitro group is an electron-withdrawing group, which stabilises the phenoxide ion.

16. *Assertion (A) :* Boiling point of propylamine is higher than that of trimethylamine.

Reason (R) : In propylamine, intermolecular hydrogen bonding occurs, whereas trimethylamine does not undergo intermolecular hydrogen bonding.





SECTION B

17. State Raoult's law for a solution containing volatile components. Write any two characteristics of a solution which obeys Raoult's law at all concentrations. 2
18. Write any two differences between the order of a reaction and molecularity of a reaction. 2
19. Define the following terms : $2 \times 1 = 2$
- (a) Ambidentate ligand
 - (b) Crystal field splitting energy
20. What happens when : 2
- (a) n-butyl chloride is treated with alcoholic KOH ?
 - (b) Chlorobenzene is treated with CH_3Cl in the presence of anhydrous AlCl_3 ?
21. (a) What are essential amino acids ? How do you explain the amphoteric behaviour of amino acids ? 2

OR

- (b) Define the following terms : $1+1=2$
- (i) Peptide linkage
 - (ii) Nucleotide

SECTION C

22. Calculate the molarity and molality of a KI solution if the density of 20% (mass/mass) aqueous solution of KI is 1.2 g mL^{-1} . 3
- [Given : Molar mass of KI = 166 g mol^{-1}]





- 23.** Define conductivity and molar conductivity for a solution of an electrolyte. Why does the conductivity of a solution decrease with decrease in concentration ? 3
- 24.** A first order reaction is 50% complete in 20 minutes. Calculate the time for 75% completion of the reaction. $[\log 4 = 0.6]$ 3
- 25.** (a) Give reasons : $3 \times 1 = 3$
- (i) Why are low spin tetrahedral complexes not formed ?
 - (ii) Why is $[\text{Co}(\text{en})_3]^{3+}$ complex more stable than $[\text{Co}(\text{NH}_3)_6]^{3+}$?
 - (iii) Why are geometrical isomers not possible for tetrahedral complexes having two different types of unidentate ligands coordinated to the central metal ion ?

OR

- (b) (i) Write the hybridisation and magnetic behaviour of the following complexes :
- (I) $[\text{Ni}(\text{CN})_4]^{2-}$
 - (II) $[\text{FeF}_6]^{3-}$
- (ii) What type of isomerism is shown by $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]^{2+}$ and $[\text{Co}(\text{NH}_3)_5(\text{ONO})]^{2+}$? $2 + 1 = 3$
- [Given : Atomic number : Ni = 28, Fe = 26]

- 26.** Write two differences between $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ reactions. Out of chlorobenzene and 2,4,6-trinitrochlorobenzene, which one is more reactive towards nucleophilic substitution reactions ? 3





27. Explain the following :

$3 \times 1 = 3$

- (a) Carbylamine reaction
- (b) Hoffmann's bromamide degradation reaction
- (c) Diazotisation reaction

28. How do you convert the following ?

$3 \times 1 = 3$

- (a) Propanone to Propan-2-ol
- (b) Ethanal to Ethane
- (c) Sodium benzoate to Benzene

SECTION D

The following questions are Case-Based questions. Each question has an internal choice and carries 4 (2+1+1) marks. Read the passage carefully and answer the questions that follow.

29. The boiling points of alcohols and phenols increase with increase in the number of carbon atoms due to increase in van der Waals forces. The $-OH$ group in alcohols and phenols is involved in intermolecular hydrogen bonding, due to which their boiling points are higher than those of ethers, haloalkanes and haloarenes of comparable molecular masses. Alcohols and phenols are acidic in nature. Electron-withdrawing groups in phenol increase its acidic strength, while electron-releasing groups decrease it. The presence of $-OH$ group in phenols activates the aromatic ring towards electrophilic substitution and directs the incoming group to the ortho and para positions due to resonance effect. The Reimer-Tiemann reaction of phenol yields salicylaldehyde, whereas Kolbe's reaction of phenol yields salicylic acid. Aspirin is formed by the acetylation of salicylic acid.





- (a) (i) Write the name of the major product(s) formed in :
 (I) Reimer-Tiemann reaction
 (II) Kolbe's reaction
 (ii) Name the method by which aspirin is formed from salicylic acid. 2
- (b) (i) Why does phenol undergo electrophilic substitution reaction easily ? 1
- OR**
- (b) (ii) Why is phenol more acidic than alcohol ? 1
- (c) Arrange the following compounds in order of their increasing boiling points : 1
 Propan-1-ol, Ethanol, Butan-2-ol, Butan-1-ol

30. Carbohydrates are optically active polyhydroxy aldehydes or ketones or molecules that provide such units on hydrolysis. They are broadly classified into three groups : monosaccharides, oligosaccharides and polysaccharides. Monosaccharide units are held together by glycosidic linkages to form disaccharides or polysaccharides. Starch and cellulose are polysaccharides. Starch is a polymer of α -glucose and consists of two components : Amylose and Amylopectin. Amylose is water soluble, having 15 – 20% of starch, whereas Amylopectin is insoluble in water, having 80 – 85% starch. Chemically, amylose is a long unbranched chain of α -glucose units held together by C1 – C4 glycosidic linkage. Amylopectin is a branched chain of α -glucose units held together by C1 – C4 and C1 – C6 glycosidic linkages.

- (a) Write two differences between Amylose and Amylopectin. 2





- (b) (i) Classify the following into monosaccharides and disaccharides : 1
Fructose, Lactose, Glucose, Maltose

OR

- (b) (ii) Define polysaccharide with an example. 1
(c) Name the linkage which joins two monosaccharide units. 1

SECTION E

- 31.** (a) Give reasons for the following : 5×1=5

- (i) Oxidation of propanal is easier than propanone.
- (ii) There are two $-NH_2$ groups in semicarbazide. However, only one $-NH_2$ groups is involved in the formation of semicarbazones.
- (iii) $HCHO$ does not undergo aldol condensation reaction.
- (iv) Boiling points of carboxylic acids are higher than those of alcohols of comparable molecular masses.
- (v) Aldehydes are more reactive towards nucleophilic addition reactions than ketones.

OR

- (b) (i) Write the names of the product(s) formed when :
(I) Benzoyl chloride undergoes Rosenmund reduction.
(II) Ethanal is treated with CH_3MgBr , followed by hydrolysis.
(III) Benzaldehyde undergoes Cannizzaro's reaction.





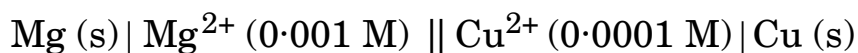
(ii) Write a simple chemical test to distinguish between :

(I) Propanal and Propanone

(II) Phenol and Benzoic acid

3+2=5

32. (a) (i) Write the Nernst equation and calculate the emf of the following cell at 298 K :



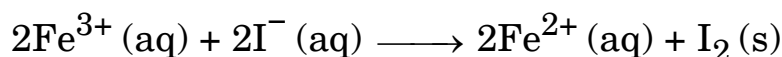
Given : $E_{\text{Mg}^{2+}/\text{Mg}}^{\circ} = -2.36 \text{ V}$, $E_{\text{Cu}^{2+}/\text{Cu}}^{\circ} = +0.34 \text{ V}$

[log 10 = 1]

(ii) Define fuel cell and write its two advantages. 3+2=5

OR

(b) (i) The cell in which the following reaction occurs :



has $E_{(\text{cell})}^{\circ} = 0.24 \text{ V}$ at 298 K. Calculate $\Delta_r G^{\circ}$ and

log K_C of the cell reaction.

[Given : 1 F = 96500 C mol⁻¹]

(ii) State the following laws :

(I) Faraday's first law of electrolysis

(II) Kohlrausch's law of independent migration of ions

3+2=5





- 33.** (a) (i) Define transition elements. Mention any two characteristics of transition elements.
- (ii) How will you prepare KMnO_4 from pyrolusite ore (MnO_2) ? 3+2=5

OR

- (b) (i) What is lanthanoid contraction ? What are the consequences (any two) of lanthanoid contraction ?
- (ii) (I) Why does $E^\circ_{\text{Cu}^{2+}/\text{Cu}}$ have positive value (+ 0.34 V) ?
- (II) Why do actinoids show a wide range of oxidation states ? 3+2=5

