CUET (UG)

Chemistry Sample Paper - 9

Solved

Time Allowed: 45 minutes **Maximum Marks: 200**

General Instructions:

1. The test is of 45 Minutes duration.
2. The test contains 50 questions out of which 40 questions need to be attempted.
3. Marking Scheme of the test:

a. Correct answer or the most appropriate answer: Five marks (+5).
b. Any incorrectly marked option will be given minus one mark (-1).
c. Unanswered/Marked for Review will be given zero mark (0).

Attempt any 40 questions

1. In which of the following crystals alternate tetrahedral voids are occupied? **[5]**

a) Na_2O b) ZnS

c) NaCl d) CaF_2

2. Dislocation defect is also known as **[5]**

a) frenkel defect b) interstitial defect

c) metal excess defect d) schottky defect

3. How many tetrahedral holes are occupied in diamond? **[5]**

a) 100% b) 25%

c) 75% d) 50%

4. Nature of binding forces present in carbon dioxide molecules in solid-state are **[5]**

a) Metallic forces b) Electrostatic forces

c) Hydrogen bonding d) London forces

5. An aqueous solution of methanol and water has vapour pressure **[5]**

a) Equal to that of water b) More than that of water

c) Equal to that of methanol d) Less than that of water

6. The plant cell will shrink when placed in: **[5]**

a) water
b) hypotonic solution
c) hypertonic solution
d) isotonic solution

7. Which among the following show positive deviation? **[5]**

a) Chloroform and benzene
b) Acetone and aniline
c) Hydrochloric acid and water
d) Acetone and ethanol

8. The factor $\frac{\Delta T_f}{K_f}$ represents **[5]**

a) formality
b) molarity
c) normality
d) molality

9. The correct cell to represent the following reaction is: **[5]**
$Zn + 2Ag^+ \rightarrow Zn^{2+} + 2Ag$

a) $2Ag \mid Ag^+ \parallel Zn \mid Zn^{2+}$
b) $Zn \mid Zn^{2+} \parallel Ag^+ \mid Ag$
c) $Ag \mid Ag^+ \parallel Zn \mid Zn^{2+}$
d) $Ag^+ \mid Ag \parallel Zn^{2+} \mid Zn$

10. Which of the following is a redox reaction? **[5]**

a) $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl2 + 2NH_4OH$
b) $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$
c) $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$
d) $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

11. The SI units of molar conductance are: **[5]**

a) Sm^3mol^{-1}
b) $Sm^{-1}mol^{-1}$
c) Sm^2mol^{-1}
d) $Sm^{-2}mol$

12. Reaction which takes place in one step is known as **[5]**

a) Elementary reaction
b) Unimolecular reaction
c) Reaction rate
d) Bimolecular reaction

13. The slope in the plot of $\log \frac{[R]_0}{[R]}$ vs. time for a first order reaction is **[5]**

a) -k
b) $\frac{-k}{2.303}$

c) $\frac{+k}{2.303}$ d) +k

14. For the reaction A $\rightarrow$ products, at $[A] = 0.4\ M,\ t_{1/2} = 24\ s$ and at $[A] = 0.2\ M,\ t_{1/2} = 12\ s$. The unit for the rate constant is **[5]**

a) S^{-2} b) $mol\ L^{-1}s^{-1}$

c) $L^2/mol^2/s$ d) S^{-1}

15. Adsorption is accompanied with: **[5]**

a) all of these b) decrease in enthalpy

c) the value of $\Delta S \cdot T$ is negative d) decrease in entropy of system

16. Bredig's arc method is used to prepare colloidal solutions of _____. **[5]**

a) Au, Pt, S b) S, Au, $Fe(OH)_3$

c) Pt, Ag, As_2S_3 d) Au, Pt, Ag

17. A catalyst: **[5]**

a) increases the average kinetic energy of reacting species b) alter the state of equilibrium

c) increases collision frequency d) decreases the activation energy

18. Which of the following will show Tyndall effect? **[5]**

a) Aqueous solution of soap above critical micelle concentration b) Aqueous solution of sugar

c) Aqueous solution of soap below critical micelle concentration d) Aqueous solution of sodium chloride

19. Which among the following reaction takes place in zone of heat absorption? **[5]**

a) All of these b) $CaCO_3 \xrightarrow{1123K} CaO + CO_2$

c) $CO_2 + C \rightarrow 2CO$ d) $C + O_2 \rightarrow CO_2$

20. Metal halides are found in lakes and seas because **[5]**

a) They are lighter than water b) They are insoluble in water

c) They are soluble in water

d) They are heavier than water

21. In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with **[5]**

a) FeS

b) Cu_2S

c) SO_2

d) CO

22. An ore has impurities which are lighter than the ore. The process used for the concentration of ore is **[5]**

a) Froth floatation

b) Hydraulic washing

c) Magnetic separation

d) Leaching

23. Which of the following is an amphoteric oxide? **[5]**

a) SnO_2

b) V_2O_5

c) Cl_2O_7

d) Cr_2O_3

24. The structure of ClF_3 is **[5]**

a) Octahedral

b) T-shaped

c) Pyramidal

d) Tetrahedral

25. Fluorine reacts with conc. NaOH to produce **[5]**

a) NaF and O_2F

b) NaF and O_3

c) NaF and OF_2

d) NaF and O_2

26. In a neutral solution, how many moles of $KMnO_4$ is required for the oxidation of 10 moles of ferric oxalate? **[5]**

a) 6

b) 5

c) 2

d) 4.5

27. Which is least soluble in water? **[5]**

a) AgBr

b) AgI

c) Ag_2S

d) AgCl

28. Haemoglobin and chlorophyll contain: **[5]**

a) Fe and Mg

b) Fe and Mn

c) Fe and Co

d) Mg and Fe

29. The coordination number of Cr in $[CrCl_2(ox)_2]^{3-}$ is: **[5]**

a) 6

b) 4

c) 3

d) 5

30. According to Werner's theory , the primary valences of the central atom **[5]**

a) Are equal to its coordination number

b) Are satisfied by negative ions

c) Decide the geometry of the complex

d) Are satisfied by negative ions or neutral molecules

31. Which complex gives three chloride ions per formula unit? **[5]**

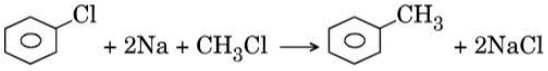
a) $CrCl_3 \cdot 5H_2O$

b) $CrCl_3 \cdot 6H_2O$

c) All of these

d) $CrCl_3 \cdot 4H_2O$

32. The reaction given below: **[5]**



is called:

a) Gattermann reaction

b) Wurtz - Fittig reaction

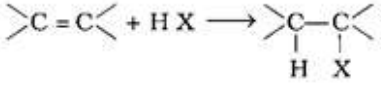
c) Wurtz reaction

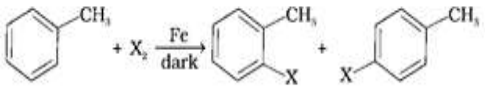
d) Fittig reaction

33. Which of the following is halogen exchange reaction? **[5]**

a) R X + NaI $\rightarrow$ RI + NaX

b) $R - OH + HX \xrightarrow{ZnCl_2} R - X + H_2O$

c) 

d) 

34. When a haloalkane with β – hydrogen atom is heated with alcoholic solution of potassium hydroxide then: **[5]**

a) All of these

b) elimination of halogen atom from α – carbon

c) elimination of hydrogen atom from β– carbon

d) alkene is formed as a product

35. An organic compound X is oxidized by using acidified $K_2Cr_2O_7$. The product obtained reacts with Phenyl hydrazine but does not answer the silver mirror test. The possible structure of X is: **[5]**

a) $(CH_3)_2CHOH$

b) None of these

c) CH_3CHO

d) CH_3CH_2OH

36. The correct IUPAC name of $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{OH}{|}}{C}} - CH_2CH_3$ is **[5]**

a) 2-Methylbutan-2-ol

b) 3-Methylbutan-3-ol

c) 2,2-Dimethylpropanol

d) tert-butyl alcohol

37. The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is **[5]**

a) Benzophenone

b) Acetophenone

c) Benzoic acid

d) Benzyl alcohol

38. The compound which forms acetaldehyde when heated with dilute NaOH is: **[5]**

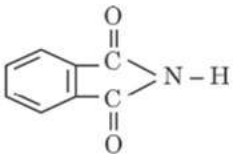
a) 1, 2 dichloroethane

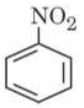
b) 1, 1, 1 trichloroethane

c) 1 chloroethane

d) 1, 1 dichloroethane

39. Hoffmann Bromamide Degradation reaction is given by: **[5]**

a) 

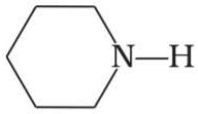
b) 

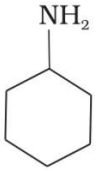
c) CH_3 - C ≡ N

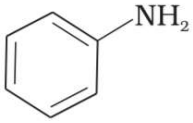
d) $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - NH_2$

40. Which of the following is the weakest Brönsted base? **[5]**

a) CH_3NH_2

b) 

c) 

d) 

41. When a 1° amine reacts with an alkyl sulfonyl chloride, the major organic product is _____. **[5]**

a) a sulfoxide

b) None of these

c) a sulphonamide

d) a nitrile

42. Certain vitamins cannot be stored in the body because **[5]**

a) they are readily excreted in urine

b) they are used up very fast in the body

c) they are insoluble in water

d) they are soluble in fat

43. DNA fingerprinting means the **[5]**

a) sequencing the nucleotides in DNA

b) sequencing the bases present in double helix

c) information regarding the unique sequence of bases on DNA for a person

d) information reagrding the unique imprints on the fingertip for a person

44. Deficiency of which of the following vitamins causes Pernicious anaemia? **[5]**

a) Vitamin B_2

b) Vitamin B_1

c) Vitamin B_{12}

d) Vitamin B_6

45. Nylon – 2 – Nylon – 6 is **[5]**

a) non-biodegradable

b) polyamide copolymer

c) homopolymer

d) aromatic polyester

46. Given the polymers: A = Nylon; B = Buna – S; C = Polythene. Arrange these in decreasing order of their intermolecular forces. **[5]**

a) A > C>B

b) A>B>C

c) C >A>B

d) B > C > A

47. Which of the following polymers of glucose is stored by animals? **[5]**

a) Cellulose

b) Amylopectin

c) Glycogen

d) Amylose

48. In seasonal rhinitis and conjunctivitis, the drugs administered are **[5]**

a) Anti – histamine

b) Sulpha drugs

c) Hypnotics

d) Anti – microbials

49. Which is not true for a detergent molecule? **[5]**

a) It is a sodium salt of fatty acid

b) It is a surface active agent

c) It is not easily biodegraded

d) It has a non polar organic part and a polar group

50. Aspirin is not administered for **[5]**

a) pain – relief

b) blood – clotting

c) reducing fever

d) prevention of heart attacks

Solutions

1. **(b)** ZnS

   Explanation: ZnS crystallizes as a cubic close-packed array of S^{2-} ions with Zn^{2+} ions in tetrahedral holes.

   If S^{2-} ions occupy the lattice points of a face-centered cubic unit cell and Zn^{2+} ions are packed into every other tetrahedral hole, we get the unit cell of ZnS.
2. **(a)** frenkel defect

   Explanation: In frenkel defect, cation gets dislocated from its position.
3. **(d)** 50%

   Explanation: Diamond has a ZnS type structure. the carbon atoms occupy all the fcc lattice points along with alternative tetrahedral voids.

   total no.of tetrahedral voids in fcc unit cell = 8

   Where carbon atom occupy only 4 of them therefore percentage of tetrahedral voids occupied by carbon atom in diamond is 50 percent.
4. **(d)** London forces

   Explanation: In carbon dioxide molecules in solids state, the atoms or molecules are held by weak dispersion forces or London forces. These solids are soft and non-conductors of electricity. They have low melting points and are usually in a liquid or gaseous state at room temperature and pressure.
5. **(b)** More than that of water

   Explanation: They show positive deviation.
6. **(c)** hypertonic solution

   Explanation: The plant cell will shrink when placed in a hypertonic solution. Hypertonic solutions are more concentrated than the plant cell. The water from inside the cytoplasm of the cell diffuses out and the plant cell is said to have become flaccid. The cytoplasm has also shrunk and pulled away from the cell wall. This phenomenon is called plasmolysis.
7. **(d)** Acetone and ethanol

   Explanation: (Solute- solute and > solute – solvent interactions Solvent – solvent)
8. **(d)** molality

   Explanation: Molality (m) is defined as the number of moles of the solute per kilogram (kg) of the solvent

   molality $= \frac{\Delta T_f}{K_f}$

9.

(b) $Zn \mid Zn^{2+} \parallel Ag^{+} \mid Ag$

Explanation: $Zn \mid Zn^{2+} \parallel Ag^{+} \mid Ag$ is correct cell representation

10.

(d) $Zn + 2AgCN \rightarrow 2Ag + Zn\ (CN)_2$

Explanation: In redox both oxidation and reduction take place simultaneously.
zinc is oxidised and silver is reduced.

11.

(c) Sm^2mol^{-1}

Explanation: Sm^2mol^{-1}

$\Lambda m = k \times 1000/C = Sm^{-1} \times m^3$ /mol/L = Sm^2/mol

12. **(a)** Elementary reaction

Explanation: An elementary reaction is a chemical reaction in which one or more chemical species react directly to form products in a single reaction step and with a single transition state.

13.

(c) $\frac{+k}{2.303}$

Explanation: First order of reaction is $\frac{+k}{2.303}$.

14.

(b) mol $L^{-1}s^{-1}$

Explanation: The order of reaction will be zero because as concentration is decreased half-life is also decreasing so the unit of rate constant is $mol\ L^{-1}s^{-1}$

15. **(a)** all of these

Explanation: Adsorption is accompanied with a decrease in entropy and enthalpy of the system. The value of $T\Delta S$ is negative.
Adsorption decreases randomness and thus, ΔS = −ve and also, $T\Delta S$ = −ve.

16.

(d) Au, Pt, Ag

Explanation: Metal sols can be prepared by Bredig's arc method.

17.

(d) decreases the activation energy

Explanation: decreases the activation energy

18. **(a)** Aqueous solution of soap above critical micelle concentration

Explanation: At high concentration, soap solution behaves as associated colloid and form micelles. But micelles formation occurs only above Kraft temperature(T_K) and above a particular concentration called critical micelle concentration (CMC). Colloidal particles can only show the Tyndall effect.

19.

(c) $CO_2 + C \rightarrow 2CO$

Explanation: During extraction of Fe, CO_2 reduces to CO, which involves heat absorption. This reaction take place at zone of heat absorption in blast furnace.

20.

(c) They are soluble in water

Explanation: Metal halides found in sea or lakes, since they get dissolved in rain water and collected in the sea or lakes.

21.

(b) Cu_2S

Explanation: In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with Cu_2S. This reaction completes the process of auto reduction.

Chemical reaction occurring in this reaction is as follows:

$Cu_2O + \frac{1}{2}\ Cu_2S \rightarrow 3Cu + \frac{1}{2}\ SO_2$

In this process, solidified copper obtained has blistered appearance so it is called blister copper.

22.

(b) Hydraulic washing

Explanation: This is hydraulic washing or gravity separation. Here when stream of water is passed it takes away all the lighter impurities with it and the heavier ore particles are left behind.

23.

(d) Cr_2O_3

Explanation: Higher oxidation state oxides are acidic while lower oxidation state oxides are basic. Intermediate oxidation state oxides are amphoteric. In other words, it behaves acidic with bases and as basic with acids.

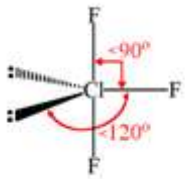
The oxidation state of Cr in Cr_2O_3 is +3 , Vanadium in V_2O_5 is +5, Cl in Cl_2O_7 is +7 and Sn in SnO_2 is +4.

24.

(b) T-shaped

Explanation: CN=0.5(V+M-C+A) For. ClF_3 CN= 5 so hybridisation is sp3d. The structure is trigonal bipyramidal.

ClF_3 has 10 electrons around the central atom. this means there are 5 electron pairs arranged in a trigonal bipyramidal shape with a 90^0 F-Cl-F bond angle. There are 2 equatorial lone pairs making the final structure T- shaped.



25.

(d) NaF and O_2

Explanation: Fluorine reacts with conc. NaOH to produce NaF and O_2. But with dilute alkali it forms OF_2 and NaF.

$2F_2 + 4NaOH \rightarrow 4NaF + 2H_2O + O_2\uparrow$

26. **(a)** 6
Explanation: $N_1V_1 = N_2V_2$
This equation can also be written as:
$N_1 \times$ no. of moles of 1 = $N_2 \times$ no. of moles of
As per the question, N_1 (n factor of $KMnO_4$) = 5 and N_2 (n factor of ferrous oxalate) = 3
Also no. of moles of 2 = 10
Substituting the values we get,
$= 5 \times$ no. of moles of $1 = 3 \times 10$
no. of moles of 1 = 6
Thus, **6 moles** of $KMnO_4$ are required in an acidic medium to oxidise 10 moles of ferric oxalate.
27.
(c) Ag_2S
Explanation: Ag_2S is least soluble in water. It's K_{sp} (solubility product) in water is 6×10^{-51}. K_{sp} value indicates how soluble a compound is.
28. **(a)** Fe and Mg
Explanation: Haemoglobin contains Fe and Chlorophyll contains Mg.
29. **(a)** 6
Explanation: 6
30.
(b) Are satisfied by negative ions
Explanation: Primary valence of the central metal atom/ion is ionisable and is satisfied by negative ions.
31.
(b) $CrCl_3 \cdot 6H_2O$
Explanation: $CrCl_3 .6H_2O$ can be written as $[Cr(H_2O)_6]Cl_3$. The three chloride ions are outside the square bracket means they satisfy the primary valence and hence are ionisable. Thus, it will give three chloride ions per formula unit.
32.
(b) Wurtz - Fittig reaction
Explanation: Wurtz - Fittig reaction
33. **(a)** $R X + NaI \rightarrow RI + NaX$
Explanation: Halogen exchange reactions are those reactions in which one halide replaces another. This reaction is known as the Finkelstein reaction. In
a. Halogen (-X) is replaced by iodine(presence of dry acetone).
b. Addition of hydrogen halide on the alkene.
c. Halogen replaces the alcoholic group.
d. Halogen replaces the hydrogen of the benzoic ring.
34. **(a)** All of these
Explanation: When a haloalkane with β-hydrogen atom is heated with an alcoholic solution of potassium hydroxide, there is an elimination of hydrogen atom from β-carbon

and a halogen atom from the α-carbon atom. As a result, an alkene is formed as a product. Since the β-hydrogen atom is involved in elimination, it is often called β-elimination.

35. **(a)** $(CH_3)_2CHOH$

    Explanation: Secondary alcohol on oxidation forms ketone which reacts with hydrazine bus doesn't gives a silver mirror test.

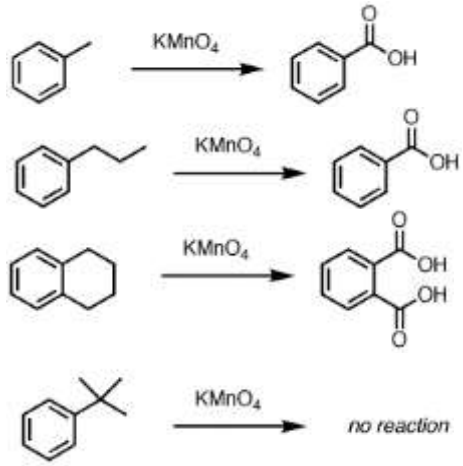
36. **(a)** 2-Methylbutan-2-ol

    Explanation: The correct IUPAC name of $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{OH}{|}}{C}} - CH_2CH_3$ is 2-Methylbutan-2-ol

37. **(c)** Benzoic acid

    Explanation:

    Alkylbenzenes having at least one alpha hydrogen when reacts with $KMnO_4$ then, alkyl group oxidises to COOH group.



    $C_6H_5C_2H_5 + KMnO_4 \rightarrow C_6H_5COOH$

38. **(d)** 1, 1 dichloroethane

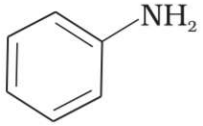
    Explanation: $CH_3CHCl_2 + OH^- \rightarrow CH_3CH(OH)_2 \rightarrow CH_3CHO + H_2O$

    Gem diols like ($CH_3CH(OH)_2$) are generally not stable. The 2 -OH group attached to the same C removes H_2O and forms carbonyl compounds.

39. **(d)** $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - NH_2$

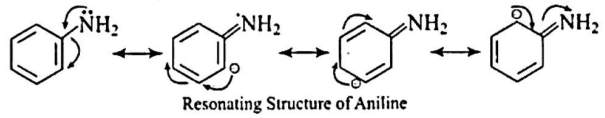
    Explanation: $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - NH_2$

40. **(d)**



Explanation:
Due to the delocalization of the lone pair of electrons on the N-atom into the benzene ring making it less available for protonation, $C_6H_5NH_2$ is the weakest base.

Resonating Structure of Aniline



Resonating Structure of Aniline

41.
(c) a sulphonamide
Explanation: Sulphonyl chloride reacts with the primary amine to form sulphonamide.
$RNH_2 + R^I SO_2Cl \rightarrow R^I SO_2NHR + HCl$

42. **(a)** they are readily excreted in urine
Explanation: B group vitamins and vitamin C are soluble in water so they are grouped together as water soluble vitamins. These must be supplied regularly in diet because they are readily excreted in urine and cannot be stored (except vitamin B_{12}) in our body.

43.
(c) information regarding the unique sequence of bases on DNA for a person
Explanation: A sequence of bases on DNA is unique for a person and information regarding this is called DNA fingerprinting. It is same for every cell and cannot be altered by any known treatment.

44.
(c) Vitamin B_{12}
Explanation: Deficiency of vitamin B_{12} (cyanocobalamin) causes the disease pernicious anaemia.

45.
(b) polyamide copolymer
Explanation: Nylon 2–Nylon 6 is an alternating polyamide copolymer of glycine ($H_2N–CH_2–COOH$) and aminocaproic acid [$H_2N(CH_2)_5COOH$]. it is an example of biodegradable.

46. **(a)** A > C>B
Explanation: Fibers have strong intermolecular forces. For example, Nylon. Elastomers have weakest intermolecular forces. For example Buna-S .Thermoplastic polymers have intermediate intermolecular forces between elastomers and fibers. For example polythene. Nylon has strongest intermolecular forces, polythene has intermediate and Buna-S has weakest.

47.
(c) Glycogen
Explanation: Glycogen is a polymer of glucose found in the liver, brain, and muscles of the animals. The cellulose is a polymer found in the plant while amylase and amylopectin are structural units of the starch.

48. **(a)** Anti – histamine
Explanation: Histamine is a potent vasodilator. It has various functions. It contracts the smooth muscles in the bronchi and gut and relaxes other muscles, such as those in the walls

of fine blood vessels. Histamine is also responsible for the nasal congestion associated with common cold and allergic response to pollen. So anti-histamine is given to treat seasonal rhinitis and conjunctivitis. They interfere with the natural action of histamine by competing with histamine for binding sites of receptor where histamine exerts its effect and thus relieve the symptoms.

49. **(a)** It is a sodium salt of fatty acid
Explanation: Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons. Cationic detergents are quarternary ammonium salts of amines with acetates, chlorides or bromides as anions. Cationic part possesses a long hydrocarbon chain and a positive charge on the nitrogen atom. Non-ionic detergents do not contain any ion in their constitution. One such detergent is formed when the stearic acid reacts with polyethylene glycol. Thus detergents are not a sodium salt of a fatty acid.

50. **(b)** blood – clotting
Explanation: Aspirin prevents platelet coagulation. Because of its anti blood-clotting action, aspirin finds use in prevention of heart attacks. So it is not used for blood-clotting.