CUET (UG)

Chemistry Sample Paper - 5

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. Solid HCl is a/an _____. **[5]**

   a) hydrogen-bonded molecular solid
   b) metallic solid
   c) ionic solid
   d) polar molecular solid

2. Which type of solid conduct electricity in molten state but not in solid state? **[5]**

   a) Covalent
   b) Network
   c) Metallic
   d) Ionic

3. Point defect is also known as **[5]**

   a) Single dimensional defect
   b) Two dimensional defect
   c) None of these
   d) Zero dimensional defect

4. The radius ratio of body centred cubic structure is **[5]**

   a) 0.155 to 0.225
   b) 0.225 to 0.414
   c) 0.732 to 1.00
   d) 0.414 to 0.732

5. Which among the following form nearly ideal solutions? **[5]**

   a) Chloroform and benzene
   b) Benzene and Toluene
   c) Alcohol and water
   d) Acetone and aniline

6. At equilibrium, the rate of dissolution of a solid solute in a volatile liquid solvent is _____. **[5]**

a) greater than the rate of crystallisation
b) less than the rate of crystallisation
c) zero
d) equal to the rate of crystallisation

7. Low concentration of oxygen in the blood and tissues of people living at high altitude is due to : **[5]**

a) low atmospheric pressure
b) low temperature
c) both low temperature and high atmospheric pressure
d) high atmospheric pressure

8. Value of Henry's law constant K_H _____. **[5]**

a) increases with increase in temperature.
b) decreases with increase in temperature.
c) first increases then decreases.
d) remains constant.

9. Electrolytic conduction is due to the movement of: **[5]**

a) molecules
b) atoms
c) ions
d) electrons

10. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called _____. **[5]**

a) Cell voltage
b) Cell potential
c) Potential difference
d) Cell emf

11. $Ag^+(aq) + e^- \rightarrow Ag(s)$ $E^o = +0.80$ V **[5]**
$Fe^{2+}(aq) + 2e^- \rightarrow Fe(s)$ $E^o = -0.44$ V
Find the E°_{cell} for:
$Fe(s) + 2Ag^+(aq) \rightarrow Fe^{2+}(aq) + 2Ag(s)$

a) 1.6 V
b) -1.16 V
c) 1.24 V
d) 2.04 V

12. For the reaction $A + 2B \rightarrow C + D$, the rate law is given by $r = k[A][B]^2$, the concentration of A is kept constant while that of B is doubled. The rate of the reaction will: **[5]**

a) not change
b) become half
c) quadruple
d) double

13. Order of the photochemical reaction occurring between hydrogen and chlorine is **[5]**

a) Second order
b) Third order
c) Zero order
d) First order

14. If the initial concentration is reduced to $\frac{1}{4}^{th}$ in a zero order reaction, then the time taken for half the reaction to complete: **[5]**

a) remains the same
b) doubles
c) increases four times
d) reduces to one-fourth

15. Catalyst used in hydrogenation of vegetable oil is **[5]**

a) Nickel
b) Platinum
c) Molybdenum
d) Vanadium

16. The adsorbent used to adsorb the dye particles in the dying industry is **[5]**

a) Activated charcoal
b) Silica gel
c) Animal charcoal
d) Alumina gel

17. Which among the following is an example of sorption? **[5]**

a) Ammonia on charcoal
b) Chalk dipped in ink
c) Water on calcium chloride
d) Ammonia on water

18. When adsorption of oxalic acid is carried out on activated charcoal, then activated charcoal is known as **[5]**

a) Absorption
b) Adsorbate
c) Adsorbent
d) Adsorber

19. Cinnabar is an ore of **[5]**

a) Copper
b) Zinc
c) Mercury
d) Lead

20. Percentage of carbon in pig iron is **[5]**

a) 1% b) 4%

c) 12% d) 22%

21. The furnace which gives the highest temperature is **[5]**

a) Muffle furnace b) Electrical furnace

c) Reverberatory furnace d) Blast furnace

22. Heating the pyrites in air for oxidation of sulphur is called **[5]**

a) Roasting b) Calcinations

c) Smelting d) Leaching

23. Which of the following hydrides is the strongest reducing agent? **[5]**

a) PH_3 b) AsH_3

c) BiH_3 d) NH_3

24. Which gas is evolved when urea is treated with NaOH? **[5]**

a) Nitrous oxide b) Laughing gas

c) Ammonia d) Nitrogen

25. Elements of which group are known as ore forming elements? **[5]**

a) Group 17 b) Group 16

c) Group 18 d) Group 15

26. In which of the following does the central atom exhibit an oxidation state of +3? **[5]**

a) $K_4[Fe(CN)_6]$ b) $[Cu(NH_3)_4]^{2+}$

c) $[Fe(C_2O_4)_3]^{3-}$ d) $K_2[Ni(CN)_4]$

27. There are 14 elements in the actinoid series. Which of the following elements does not belong to this series? **[5]**

a) U b) Tm

c) Np d) Fm

28. The lanthanoid contraction is due to: **[5]**

a) Filling of 5d before 4f b) Filling of 4f before 4d

c) Filling of 4d before 4f d) Filling of 4f before 5d

29. Which of the following is a homoleptic complex? **[5]**

a) $[Cr(NH_3)_3Cl_3]$ b) $[CoCl_2(en)_2]^+$

c) $[Co(NH_3)_4Cl_2]^+$ d) $[Cu(NH_3)_4]^{+2}$

30. A complex of platinum, ammonia and chlorine produces four ions per molecule in the solution. The structure consistent with the observation is **[5]**

a) $[Pt(NH_3)_2Cl_4]$ b) $[Pt(NH_3)_5Cl]Cl_3$

c) $[Pt(NH_3)_4Cl_2]Cl_2$ d) $[Pt(NH_3)_6]Cl_4$

31. The formula of the complex dichloridobis (ethane-1, 2-diamine) platinum (IV) nitrate is **[5]**

a) $[Pt\ (en)_2\ (NO_3)_2]\ Cl_2$ b) $[Pt\ Cl_2(en)_2]\ (NO_3)_2$

c) $[Pt\ Cl_2(en)_2\ (NO_3)_2]$ d) $[Pt\ Cl_2(en)_2\ (NO_3)]\ NO_3$

32. A dibromo derivative of an alkane reacts with sodium metal to form an alicyclic hydrocarbon. The derivative is **[5]**

a) 1, 1 – dibromopropane b) 2, 2 – dibromobutane

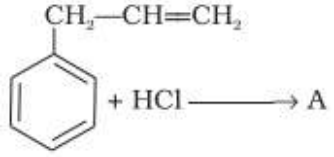
c) 1, 2 – dibromoethane d) 1, 4 – dibromobutane

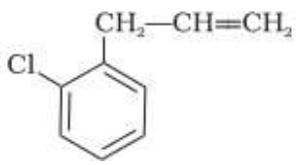
33. The iodine-containing hormone produced by our body is: **[5]**

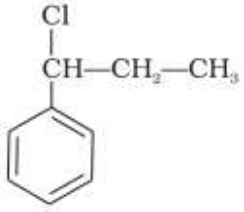
a) Progesterone b) Insulin

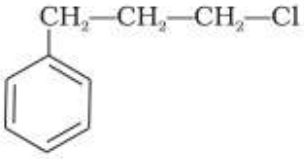
c) Thyroxine d) Adrenaline

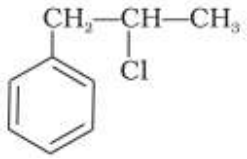
34. What is **A** in the following reaction? **[5]**



a) 

b) 

c) 

d) 

35. The reaction $C_2H_5ONa + C_2H_5I \rightarrow C_2H_5OC_2H_5 + NaI$ is known as: **[5]**

a) Williamson's synthesis

b) Grignard's synthesis

c) Wurtz's synthesis

d) Kolbe's synthesis

36. The preparation of ethers by acid dehydration of secondary or tertiary alcohols is not a suitable method. This is so because: **[5]**

a) Alkyl group is hindered.

b) None of these

c) Alkyl group should be unhindered.

d) Elimination competes over substitution and alkenes are easily formed.

37. The molecular formula of ethyl acetate is: **[5]**

a) C_4H_8O

b) $C_4H_8O_2$

c) $C_5H_{10}O_2$

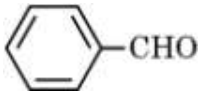
d) $C_5H_8O_2$

38. A compound (A) with molecular formula $C_5H_{10}O$, forms a phenyl hydrazone and gives negative Tollens' and iodoform tests. The compound on reduction gives n-pentane. The compound (A) is: **[5]**

a) $(CH_3)_2$ CH - CHO

b) HCHO

c) $(CH_3)_3$ C - CHO

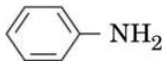
d) 

39. Which of the following is least basic? **[5]**

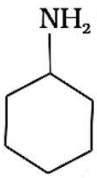
a) $(CH_3)_3N$

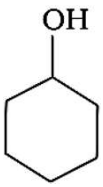
b) NH_3

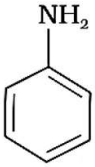
c) $(CH_3)_2NH$

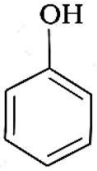
d) 

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

a) 

b) 

c) 

d) 

41. Amines are soluble in: **[5]**

a) only slightly soluble in water

b) water

c) organic solvents

d) only slightly soluble in organic solvents

42. One or more of the following vitamin is insoluble in water **[5]**

a) all of these

b) vitamin D

c) vitamin K

d) vitamin E

43. Building unit of a protein is **[5]**

a) β – Aminoacid

b) λ – Aminoacid

c) γ– Aminoacid

d) α– Aminoacid

44. The combination of nitrogen – containing heterocyclic base with 1' position of sugar is known as **[5]**

a) s – RNA

b) nucleotide

c) m – RNA

d) nucleoside

45. High density polythene is formed **[5]**

a) addition polymerisation of ethene in presence of a peroxide catalyst

b) by the polymerisation of ethene under high pressure and at high temperature in the presence of traces of dioxygen or a peroxide initiator

c) when addition polymerisation of ethene takes place in a hydrocarbon solvent in the presence of a catalyst

d) by heating ethene with a free radical or persulphate catalyst at high pressures

46. Rubber is **[5]**

a) All of these

b) natural polymer

c) formed from latex

d) linear polymer of isoprene

47. Which of the following polymers can have strong intermolecular forces? **[5]**

a) Nylon

b) Rubber

c) Polyesters

d) Both Nylon and Polyesters

48. Which of the following chemicals can be added for the sweetening of food items at cooking temperature and does not provide calories? **[5]**

a) Aspartame

b) Glucose

c) Sucrose

d) Sucrolose

49. Which of the following is not a tranquilizer? **[5]**

a) Seconal

b) Phenacetin

c) Serotonin

d) Barbituric acid

50. Which of the following types of drugs reduces fever? **[5]**

a) Anti-oxidants

b) Antipyretic

c) Antibiotic

d) Tranquilizer

Solutions

1. **(d)** polar molecular solid
   Explanation: polar molecular solid
2. **(d)** Ionic
   Explanation: In solid state the ions are not free to move about, hence they are electrical insulators. However, in molten state or when dissolved in water, the ions become free to move about and they conduct electricity.
3. **(d)** Zero dimensional defect
   Explanation: Point defect is zero dimensional defect. Point defects are the irregularities or deviations from ideal arrangement around a point or an atom in a crystalline substance.
4. **(c)** 0.732 to 1.00
   Explanation: The radius ratio of body centred cubic structure is 0.732-1.00.
5. **(b)** Benzene and Toluene
   Explanation: The intermolecular attractive forces between benzene-benzene and toluene-toluene are nearly equal to those between benzene-toluene, this leads to the formation of ideal solution.
6. **(d)** equal to the rate of crystallisation
   Explanation: At equilibrium, the rate of dissolution of solid solute is equal to the rate of crystallisation. As the number of solute particles going into the solution will equal to the solute particle separating out.
7. **(a)** low atmospheric pressure
   Explanation: Low concentration of oxygen in the blood and tissues of people living at high altitude is due to low atmospheric pressure. Because at high altitude, the partial pressure of oxygen is less than at the ground level.
8. **(a)** increases with increase in temperature.
   Explanation: Value of Henry's law constant increases with an increase in temperature.
9. **(c)** ions
   Explanation: The flow of electricity, through solutions of electrolytes, is due to the migration of ions when a potential difference is applied between the two electrodes.
10. **(d)** Cell emf
    Explanation: EMF is the difference between the electrode potentials of two electrodes cathode and anode when no current is drawn through the cell.
11. **(c)** 1.24 V

Explanation: E° cell will be 1.24 V

12. **(c)** quadruple
Explanation: The rate of the reaction is quadruple.

13. **(c)** Zero order
Explanation: light-dependent Photochemical reaction between H_2 and Cl_2 [$H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$] is 0 (zero) w.r.t. to reactants.

14. **(d)** reduces to one-fourth
Explanation: For a zero order reaction, reduce to one-fourth

15. **(a)** Nickel
Explanation: Vegetable oil is unsaturated fats which are hydrogenated by using Nickel(Ni) as catalyst.

16. **(c)** Animal charcoal
Explanation: animal charcoal removes the colours of the solutions by absorbing coloured impurities.

17. **(b)** Chalk dipped in ink
Explanation: When chalk is dipped in ink, absorption and adsorption both takes place.

18. **(c)** Adsorbent
Explanation: Surface on which adsorption occurs is known as adsorbent.

19. **(c)** Mercury
Explanation: HgS is brick red form of sulphide ore of Hg from which it can be profitably extracted. It resembles quartz in symmetry.

20. **(b)** 4%
Explanation: The iron obtained from blast furnace contains 4% of carbon and many other impurities. This iron is known as pig iron.

21. **(d)** Blast furnace
Explanation: Blast furnance maintains required highest temperature for extraction of metals.

22. **(a)** Roasting
Explanation: Roasting is a process in metallurgy in which a sulfide ore is heated in air. The process may convert a metal sulfide to a metal oxide or to a free metal. Pyrites are sulphur ores which can be converted to oxide by roasting.

23. **(c)** BiH_3
Explanation: The reducing character of the hydrides of Group 15 elements increases from

NH_3 to BiH_3(Bismuthine) because the reducing character depends upon the stability of the hydride. The greater the instability of hydride, the greater is its reducing character. Since the BiH_3 is least stable (because the size of a central atom is greatest and therefore its tendency to form stable covalent bond with small hydrogen atom decreases, as a result, the bond strength decreases) in this series, BiH_3 is a strongest reducing agent.

24.

(c) Ammonia

Explanation: Urea on reaction with NaOH liberates ammonia.

$NH_2CONH_2 + 2NaOH \rightarrow Na_2CO_3 + 2NH_3\uparrow$

25.

(b) Group 16

Explanation: A maximum number of ores contain group 16 elements (O, S etc). They are known as "chalcogens" which was derived from the Greek word chalcos , meaning "ore formers," since they all are be found in copper ores.

26.

(c) $[Fe(C_2O_4)_3]^{3-}$

Explanation: $[Fe(C_2O_4)_3]^{3-}$ central atom exhibits oxidation State of +3

27.

(b) Tm

Explanation: Tm (Thulium) is a lanthanoid series.

28.

(d) Filling of 4f before 5d

Explanation: This effect is particularly pronounced in the case of lanthanides, as the 4*f* subshell which is filled before 5d is not very effective at shielding the outer shell (n = 5 and n = 6) electrons. Thus the shielding effect is less able to counter the decrease in radius caused by increasing nuclear charge. This leads to "lanthanoid contraction".

29.

(d) $[Cu(NH_3)_4]^{+2}$

Explanation: Complexes in which the central metal is bound to only one kind of donor groups are called homoleptic complexes. $[Cu(NH_3)_6]^{+2}$ is a homoleptic complex because in this only ammonia group is the donor group bound to Cu^{+2}.

30.

(b) $[Pt(NH_3)_5Cl]Cl_3$

Explanation: On getting ionised this complex gives 3 Cl^- (ions outside the square brackets are ionisable) and a $[Pt(NH_3)_3Cl]^+$ i.e. 4 ions are produced per molecule of the compound.

31.

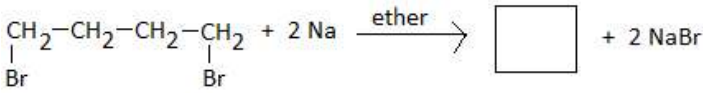
(b) $[Pt\ Cl_2(en)_2]\ (NO_3)_2$

Explanation: The formula of the compound Dichlorodobis(ethane-1,2-diamine)platinum (IV) nitrate is $[Pt\ Cl_2(en)_2]\ (NO_3)_2$

32.

(d) 1, 4 – dibromobutane

Explanation: Of all the given options, it is possible with 1,4-dibromobutane to form cyclobutane as shown by intramolecular wurtz reaction.



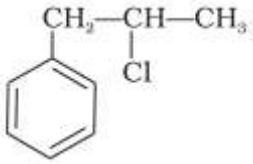
1,4 dibromobutane Cyclobutane

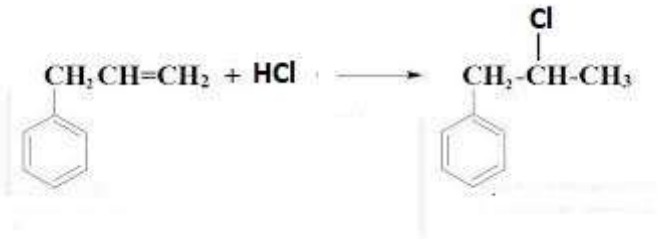
33.

(c) Thyroxine

Explanation: Our body produces iodine-containing hormone, thyroxine, the deficiency of which causes a disease called a goiter.

34.

(d) 

Explanation: 

The products obtained can be explained by Markonikov's rule. According to the rule, the hydrogen from HCl will get added to the carbon directly bonded to the most hydrogen atoms(addition reaction), and the –Cl will get bonded to the carbon directly bonded to the least hydrogens.

35. **(a)** Williamson's synthesis

Explanation: Williamson's synthesis: When an alkyl halide reacts with sodium alkoxide, ether is formed. This reaction is known as Williamson's synthesis. The reaction generally follows the S_N2 mechanism for primary alcohols.

$$R - X + R' - \ddot{O}\overset{+}{N}a \rightarrow R - \underset{\text{Williamson's synthesis}}{\ddot{O}} - R' + Na\ X$$

36.

(d) Elimination competes over substitution and alkenes are easily formed.

Explanation: The formation of ethers by dehydration of the alcohol is a bimolecular reaction (S_N2) involving the attack of an alcohol molecule on a protonated alcohol molecule. In the method, the alkyl group should be unhindered. In the case of secondary or tertiary alcohols, the alkyl group is hindered. As a result, elimination dominates substitution as 3° carbocation is more stable.

Hence, in place of ethers, alkenes are formed.

37.

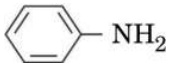
(b) $C_4H_8O_2$

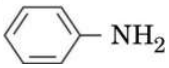
Explanation: Its molecular formula is $C_4H_8O_2$ and its chemical formula is $CH_3COOC_2H_5$.

38. **(a)** $(CH_3)_2$ CH - CHO

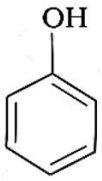
Explanation: $(CH_3)_2$ CH - CHO doesn't give cannizaro reaction.

39.

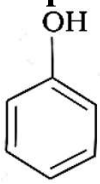
(d) 

Explanation: 

40.

(d) 

Explanation:

 is weakest Brönsted base.

41.

(b) water

Explanation: Amines are soluble in water due to hydrogen bonding with water.

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

Explanation: Vitamins which are soluble in fat and oils but insoluble in water are kept in fat soluble vitamins. These are vitamins A, D, E and K. They are stored in liver and adipose (fat storing) tissues. All these are insoluble in water.

43.

(d) α– Aminoacid

Explanation: Proteins are the polymers of α-amino acids. So building unit of a protein is α – Aminoacid.

44.

(d) nucleoside

Explanation: A unit formed by the attachment of a base to 1′ position of sugar is known as nucleoside. In nucleosides, the sugar carbons are numbered as 1′, 2′, 3′, etc. in order to distinguish these from the bases.

45.

(c) when addition polymerisation of ethene takes place in a hydrocarbon solvent in the presence of a catalyst

Explanation: High density polythene: It is formed when addition polymerisation of ethene takes place in a hydrocarbon solvent in the presence of a catalyst such as triethylaluminium and titanium tetrachloride (Ziegler-Natta catalyst) at a temperature of 333 K to 343 K and under a pressure of 6-7 atmospheres.

46. **(a)** All of these

Explanation: Rubber is a natural polymer and possesses elastic properties. It is

manufactured from rubber latex which is a colloidal dispersion of rubber in water. Natural rubber may be considered as a linear polymer of isoprene.

47. **(d)** Both Nylon and Polyesters
Explanation: Nylon and polyesters are fibres and have strong intermolecular forces. Fibres are the thread forming solids which possess high tensile strength and high modulus. These characteristics can be attributed to the strong intermolecular forces like hydrogen bonding.

48. **(d)** Sucrolose
Explanation: Sucralose is trichloro derivatives of sucrose. It is an artificial sweetening agent which is 600 times sweeter than sucrose and does not provide calories.

49. **(b)** Phenacetin
Explanation: Tranquilizers are a class of chemical compounds used for the treatment of stress, and mild or even severe mental diseases. Phenacetin is an analgesic (Analgesics reduce or abolish pain without causing impairment of consciousness, mental confusion, incoordination or paralysis or some other disturbances of nervous system) and antipyretic (fever reducing). It is not a tranquilizer.

50. **(b)** Antipyretic
Explanation: Drugs which reduce fever are called antipyretic drugs. For example, aspirin is a non-narcotic analgesic which is also antipyretic.