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SOLVED Question Paper 2022

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Our Highly Useful
Question Bank

for
CLASS 12

CHEMISTRY

Total No. of Questions : 96]
Time : 3 Hr. 15 Min.]

Solved Question Paper : 2022

[Marks : 70

CHEMISTRY

Section—A

(Objective Type Questions)

Question Nos. 1 to 70 have four options, out of which only one is correct. You have to mark your selected option, on the OMR Sheet. Answer any 35 questions.

 $35 \times 1 = 35$

- Vitamin C is
(A) Ascorbic acid (B) Nicotinic acid
(C) Citric acid (D) Tartaric acid **Ans.—(A)**
- Which one of the following contains cobalt?
(A) Chlorophyll (B) Haemoglobin
(C) Vitamin C (D) Vitamin B₁₂ **Ans.—(D)**
- Which of the following is an addition polymer?
(A) Nylon-6 (B) Nylon-6, 6
(C) High density polythene (D) Dacron **Ans.—(C)**
- $F_2C = CF_2$ is a monomer of which of the following?
(A) Teflon (B) Glyptal
(C) Nylon-6 (D) Buna-S **Ans.—(A)**
- Chloroquine is an
(A) analgesic (B) antibiotic
(C) antimalarial (D) antipyretic **Ans.—(C)**
- Which of the following is not a broad spectrum antibiotic?
(A) Tetracycline (B) Chloromycetin
(C) Penicillin (D) None of these **Ans.—(C)**
- Which of the following is Gammexane?
(A) Chlorobenzene (B) DDT
(C) Benzene hexachloride (D) None of these **Ans.—(C)**
- Which of the following acts both as oxidising as well as reducing agents?
(A) H_2S (B) H_2SO_4
(C) SO_2 (D) SO_3 **Ans.—(C)**
- Which of the following is coloured?
(A) NH_3 (B) NO_2
(C) N_2O (D) NO **Ans.—(B)**
- The general electronic configuration of transition elements is
(A) $(n-1)d^5$ (B) $(n-1)d^{1-10}ns^{0, 1 \text{ or } 2}$
(C) $(n-1)d^{1-10}ns^1$ (D) ns^2np^6 **Ans.—(B)**
- In which of the following is the oxidation state of Mn lowest?
(A) $MnSO_4$ (B) MnO_2
(C) Mn_2O_3 (D) Mn_2O_7 **Ans.—(A)**
- Which of the following is not an actinide?
(A) Curium (B) Californium
(C) Uranium (D) Terbium **Ans.—(D)**

- Which of the following ions is colourless?
(A) Cu^+ (B) Co^{2+}
(C) Ni^{2+} (D) Fe^{3+} **Ans.—(A)**
- Which of the following ions is diamagnetic?
(A) Cr^{3+} (B) V^{2+}
(C) Sc^{3+} (D) Ti^{3+} **Ans.—(C)**
- Sulphide ores are generally concentrated by which of the following?
(A) Gravity separation process
(B) Magnetic separation process
(C) Froth floatation process
(D) Carbon reduction process **Ans.—(C)**
- Which of the following metals is not extracted by the process of electrolysis?
(A) Na (B) Mg
(C) Al (D) Fe **Ans.—(D)**
- Which of the following metals is purified by Hoopes process?
(A) Cu (B) Al
(C) Fe (D) Zn **Ans.—(B)**
- Which of the following is the gas with lowest boiling point?
(A) Hydrogen (B) Helium
(C) Nitrogen (D) Argon **Ans.—(B)**
- Which of the following forms only one oxyacid?
(A) F_2 (B) Cl_2
(C) Br_2 (D) I_2 **Ans.—(A)**
- The oxidation state of S in S_8 is
(A) +2 (B) +4
(C) +8 (D) 0 **Ans.—(D)**
- Which of the following is the least volatile?
(A) H_2Se (B) H_2Te
(C) H_2S (D) H_2O **Ans.—(D)**
- When acetylene is passed through dil. H_2SO_4 in the presence of $HgSO_4$, the compound formed is
(A) Ethyl alcohol (B) Acetone
(C) Acetaldehyde (D) Carbide of Hg **Ans.—(C)**
- The reaction, $R-\overset{\overset{O}{||}}{C}-Cl + H_2 \xrightarrow{Pd/BaSO_4} RCHO + HCl$ is called
(A) Cannizzaro's reaction
(B) Rosenmund reaction
(C) Haloform reaction
(D) Clemmensen Reaction **Ans.—(B)**
- Which of the following does not give Aldol condensation?
(A) Methanal (B) Ethanal
(C) Propanone (D) Propanal **Ans.—(A)**

25. When formaldehyde reacts with NH_3 , then which of the following compounds is formed?
 (A) Formaldehyde ammonia
 (B) Hexamethylene tetramine
 (C) Formalin
 (D) Methylamine **Ans.—(B)**
26. Which of the following is the functional group of an ester?
 (A) $-CHO$ (B) $-CONH_2$
 (C) $-COOR$ (D) $-COOCO-$ **Ans.—(C)**
27. By which of the following can formic acid and formaldehyde be distinguished?
 (A) Benedict's solution (B) Tollen's reagent
 (C) Fehling's solution (D) Sodium bicarbonate **Ans.—(D)**
28. The reaction, $RCOOAg + Br_2 \xrightarrow{CCl_4} RBr + AgBr + CO_2$ is called
 (A) HVZ reaction (B) Hunsdicker reaction
 (C) Hoffmann reaction (D) Carbylamine reaction **Ans.—(B)**
29. The chemical reaction $2O_3 \longrightarrow 3O_2$, proceeds as follows :
 $O_3 \rightarrow O_2 + O$ (fast)
 $O + O_3 \rightarrow 2O_2$ (slow)
 then the rate law expression of this reaction is
 (A) Rate = $K[O_3]^2$ (B) Rate = $K[O_3]^2[O_2]^{-1}$
 (C) Rate = $K[O_3][O_2]$ (D) Rate = $K[O_3][O_2]^2$ **Ans.—(B)**
30. The temperature coefficient of most of the reactions lies between which of the following?
 (A) 2 and 3 (B) 1 and 2
 (C) 2 and 4 (D) 3 and 4 **Ans.—(A)**
31. Which of the following is not a lyophilic colloid?
 (A) Milk (B) Gum
 (C) Fog (D) Blood **Ans.—(C)**
32. The size of the colloidal particles is in between which of the following?
 (A) 10^{-7} – 10^{-9} cm (B) 10^{-9} – 10^{-11} cm
 (C) 10^{-5} – 10^{-7} cm (D) 10^{-2} – 10^{-3} cm **Ans.—(C)**
33. Which of the following enzymes is used in the hydrolysis of starch?
 (A) Maltase (B) Zymase
 (C) Invertase (D) Diastase **Ans.—(D)**
34. The rate of chemisorption
 (A) decreases with increase in pressure
 (B) is independent of pressure
 (C) is maximum at one atmospheric pressure
 (D) increases with increase in pressure **Ans.—(D)**
35. The most abundant metal in earth crust is
 (A) Al (B) Fe
 (C) Ca (D) Na **Ans.—(A)**
36. The number of Bravais lattices in a cubic crystal is
 (A) 3 (B) 1
 (C) 4 (D) 14 **Ans.—(A)**
37. An octahedral void is surrounded by which of the following numbers of spheres?
 (A) 4 (B) 6
 (C) 8 (D) 12 **Ans.—(B)**
38. Which of the following types of defects causes a decrease in density of a crystal?
 (A) Frenkel (B) Schottky
 (C) Interstitial (D) F-centre **Ans.—(B)**
39. Which of the following is a ferromagnetic substance?
 (A) NaCl (B) Fe_3O_4
 (C) O_2 (D) N_2 **Ans.—(B)**
40. An example of colligative property of a solution is
 (A) Density (B) Mass
 (C) Elevation of boiling point
 (D) Temperature **Ans.—(C)**
41. The number of moles of solute per kg of solvent is called
 (A) Molarity (B) Molality
 (C) Normality (D) Mole fraction **Ans.—(B)**
42. Solutions which boil at a constant temperature without any change in composition is called
 (A) Azeotropic mixture (B) Unsaturated
 (C) Supersaturated (D) Ideal **Ans.—(A)**
43. All ligands are
 (A) Lewis acids (B) Lewis bases
 (C) Neutral (D) None of these **Ans.—(B)**
44. Which of the following is paramagnetic?
 (A) $Ni(CO)_4$ (B) $[Ni(CN)_4]^{2-}$
 (C) $[NiCl_4]^{2-}$ (D) $[Co(NH_3)_6]^{3+}$ **Ans.—(C)**
45. Magnesium is an important component of which biomolecule?
 (A) Haemoglobin (B) Chlorophyll
 (C) Florigen (D) ATP **Ans.—(B)**
46. The complex ion in which central metal atom has no d-electron is
 (A) $[MnO_4]^-$ (B) $[Co(NH_3)_6]^{3+}$
 (C) $[Fe(CN)_6]^{3-}$ (D) $[Cr(H_2O)_6]^{3+}$ **Ans.—(A)**
47. Which statement is incorrect?
 (A) $Ni(CO)_4$ — Tetrahedral, paramagnetic
 (B) $[Ni(CN)_4]^{2-}$ — Square planar, diamagnetic
 (C) $[Ni(NH_3)_6]^{2+}$ — Octahedral, paramagnetic
 (D) $[NiCl_4]^{2-}$ — Tetrahedral, paramagnetic **Ans.—(A)**
48. Which of the following compounds is used in fire extinguisher?
 (A) CCl_4 (B) $CHCl_3$
 (C) CH_3Cl (D) $COCl_2$ **Ans.—(A)**
49. Monohalogen derivative on reaction with alcoholic KOH gives
 (A) Alkane (B) Alkene
 (C) Alkyne (D) Alicyclic hydrocarbon **Ans.—(B)**

50. The reagent which is used to prepare 1-Bromobutane from Butan-1-ol is

- (A) CHBr_3 (B) Br_2
(C) CH_3Br (D) PBr_3 **Ans.—(D)**

51. Which of the following compounds is formed when—

- $\text{C}_6\text{H}_6 + \text{Cl}_2$ (excess) $\xrightarrow{\text{sunlight}}$?
(A) Chlorobenzene (B) *p*-Dichlorobenzene
(C) Hexachlorobenzene (D) Benzene hexachloride
Ans.—(D)

52. Which of the following gives iodoform test?

- (A) CH_3OH (B) $[\text{CH}_3]_2\text{CHOH}$
(C) $[\text{CH}_3]_3\text{COH}$ (D) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{OH}$
Ans.—(B)

53. From which of the following is methyl alcohol prepared on a large scale?

- (A) From pyroligneous acid
(B) From fermentation of molasses
(C) By reacting methyl chloride with dry Ag_2O
(D) By reacting methylamine with HNO_2 **Ans.—(A)**

54. Which of the following functional groups is present in alcohol?

- (A) $-\text{OH}$ (B) $-\text{CHO}$
(C) $\text{C}=\text{O}$ (D) $-\text{NH}_2$ **Ans.—(A)**

55. Which of the following is the most acidic?

- (A) Phenol (B) Benzyl alcohol
(C) *m*-chlorophenol (D) Cyclohexanol
Ans.—(C)

56. Catalytic dehydrogenation of primary alcohol gives?

- (A) Ketone (B) Ester
(C) Secondary alcohol (D) Aldehyde **Ans.—(D)**

57. Which of the following will have maximum depression in freezing point?

- (A) K_2SO_4 (B) NaCl
(C) Urea (D) Glucose **Ans.—(A)**

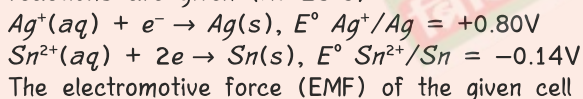
58. 1 Faraday is equal to

- (A) 9,650 coulomb (B) 10,000 coulomb
(C) 19,640 coulomb (D) 96,500 coulomb
Ans.—(D)

59. What happens when a lead storage battery is charged?

- (A) Lead dioxide dissolves
(B) Sulphuric acid is regenerated
(C) Lead electrode becomes coated with lead sulphate
(D) The concentration of sulphuric acid decreases
Ans.—(B)

60. The standard electrode potentials for the following reactions are given (At 25°C):



- $\text{Sn} | \text{Sn}^{2+}_{1\text{M}} || \text{Ag}^+_{1\text{M}} | \text{Ag}$ is
(A) 0.66 V (B) 0.80 V
(C) 1.08 V (D) 0.94 V **Ans.—(D)**

61. Hydrogen-oxygen cell is which of the following types of cell?

- (A) Primary cell (B) Secondary cell
(C) Fuel cell (D) Lead storage cell
Ans.—(C)

62. The rate of a chemical reaction

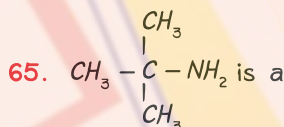
- (A) increases with time
(B) decreases with time
(C) may increase or decrease with time
(D) remains constant with time **Ans.—(B)**

63. Which of the following is not a first order reaction?

- (A) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O} \xrightarrow{\text{H}^+} \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH}$
(B) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \longrightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$
(C) $2\text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O} + \text{O}_2$
(D) $2\text{N}_2\text{O}_5 \longrightarrow 4\text{NO}_2 + \text{O}_2$ **Ans.—(B)**

64. Pyroligneous acid contains

- (A) 2% acetic acid (B) 50% acetic acid
(C) 10% acetic acid (D) 20% acetic acid
Ans.—(C)



- (A) Primary amine (B) Secondary amine
(C) Tertiary amine (D) Quaternary salt
Ans.—(A)

66. Which of the following is the strongest base in aqueous solution?

- (A) $\text{C}_6\text{H}_5\text{NH}_2$ (B) CH_3NH_2
(C) $[\text{CH}_3]_2\text{NH}$ (D) $(\text{CH}_3)_3\text{N}$ **Ans.—(C)**

67. Which of the following can be represented by molecular formula $\text{C}_3\text{H}_9\text{N}$?

- (A) Primary amine
(B) Secondary amine
(C) Tertiary amine
(D) All of these **Ans.—(D)**

68. Which of the following is reduced to get a secondary amine?

- (A) Nitrile (B) Nitro compound
(C) Carbylamine (D) Amide **Ans.—(C)**

69. Cane sugar on hydrolysis gives which of the following?

- (A) Only glucose
(B) Glucose and maltose
(C) Glucose and fructose
(D) Glucose and lactose **Ans.—(C)**

70. Enzymes are

- (A) Carbohydrates (B) Lipids
(C) Proteins (D) None of these **Ans.—(C)**

Short Answer Type Questions

$$10 \times 2 = 20$$

- Intermolecular hydrogen bond

- $\Delta t =$
- Specified interval of time.

Instantaneous rate of a reaction—The change in concentration of any one of the reactants or any one of the products at a particular instant of time is called the instantaneous rate of reaction for the particular reaction at that instant of time. It is equal to the slope of the tangent at that moment.

$$\text{Instantaneous rate of a reaction} = \frac{-d[R]}{dt} \text{ or } \frac{d[P]}{dt}$$

Where $d[R]$ = The change in concentration of any one of the reactants in infinitesimally small interval of time.

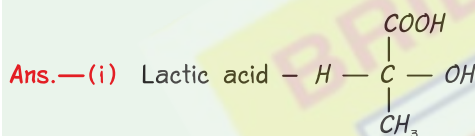
$d[P]$ = The change in concentration of any one of the products in infinitesimally small interval of time.

dt = infinitesimally small interval of time.

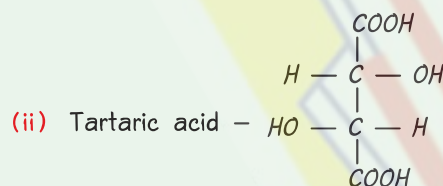
9. Write structural formulae and IUPAC names of the following :

(i) Lactic acid

(ii) Tartaric acid



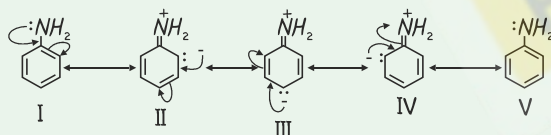
2-Hydroxypropanoic acid



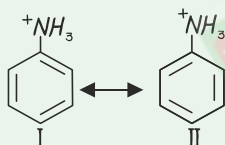
2,3-Dihydroxybutane-1, 4-dioic acid.

10. "Aniline is a weaker base." Explain.

Ans.—Aniline is a weaker base. It is because in aniline, the $-\text{NH}_2$ group is attached directly to the benzene ring. It results in the unshared electron pair on nitrogen atom to be in conjugation with the benzene ring and thus making it less available for protonation. Aniline is a resonance hybrid of the following five structures.



Anilinium ion obtained by accepting a proton can have only two resonating structures (kekule).



We know that greater the number of resonating structures, greater is the stability. Thus aniline (five resonating structures) is more stable than anilinium ion. Hence, the proton acceptability or the basic nature of aniline weak.

11. What are ideal and non-ideal solutions?

Ans.—**Ideal Solutions**—The solutions which obey Raoult's law over the entire range of concentration and temperature are known as ideal solutions. For ideal solution of two liquids A & B.

(i) The inter molecular attractive force between A
 $A = B \dots\dots B = A \dots\dots B$

(ii) $\Delta_{\text{mix}} H = 0$

(iii) $\Delta_{\text{mix}} V = 0$

Examples— A mixture of benzene and toluene.

Non-ideal solutions—Those solutions which do not obey Raoult's law over the entire range of concentration are called non-ideal solution. Such solutions deviate from Raoult's law. The vapour pressure of such a solution is either higher (exhibits positive deviation) or lower (exhibits negative deviation) than that predicted by Raoult's law. For such solutions

(i) The inter molecular attractive force between A
 $A \neq B \dots\dots B \neq A \dots\dots B$

(ii) $\Delta_{\text{mix}} H \neq 0$

(iii) $\Delta_{\text{mix}} V \neq 0$

Examples—(i) Chloroform & acetone (ii) Ethanol & Cyclohexane.

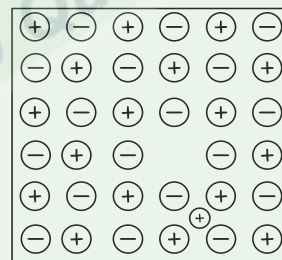
12. What are isotonic solutions?

Ans.—Two solutions having same osmotic pressure at a given temperature are called isotonic solutions. Isotonic solutions have equal molar concentration.

When such solutions are separated by semi permeable membrane no osmosis occurs between them. For example, the osmotic pressure associated with the fluid inside the blood cell is equivalent to that of 0.9% (mass/volume) sodium chloride solution, called normal saline solution and it is safe to inject intravenously.

13. What is Frenkel defect? Explain with example.

Ans.—**Frenkel Defect**: This defect is shown by ionic solids. The smaller ion (usually cation) is dislocated from its normal site to an interstitial site.



It creates a vacancy defect at its original site and an interstitial defect at its new location. Frenkel defect is also called dislocation defect. It does not change the density of the solid. Frenkel defect is shown by ionic substance in which there is a large difference in the size of ions, for example, ZnS , AgCl , AgBr and AgI due to small size of Zn^{2+} and Ag^+ ions.

14. What are network solids? Give an example.

Ans.—Network solids are crystalline solids of non-metals result from the formation of covalent bonds between adjacent atoms throughout the crystal. They are also called giant molecules or macromolecules or covalent solids.

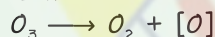
Examples: SiO_2 (quartz), SiC , $\text{C}_{(\text{diamond})}$, AlN , $\text{C}_{(\text{graphite})}$.

15. Helium is also mixed with oxygen in the respiratory devices of sea divers under the sea. Give reason.

Ans.—Sea divers (Scuba divers) must cope with high concentrations of dissolved gases while breathing air at high pressure underwater. Increased pressure increases the solubility of atmospheric gases in blood. When the divers come towards surface, the pressure gradually decreases. This releases the dissolved gases and leads to the formation of bubbles of nitrogen in the blood. This blocks capillaries and creates a medical condition known as bends, which are painful and dangerous to life. To avoid bends, as well as, the toxic effects of high concentrations of nitrogen in the blood, the tanks used by scuba divers are filled with air diluted with helium (11.7% helium, 56.2% nitrogen and 32.1% oxygen).

16. Explain the bleaching property of ozone.

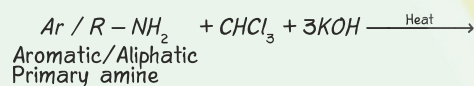
Ans.—Ozone is thermodynamically unstable with respect to oxygen. Due to the ease with which it liberates atoms of nascent oxygen ($\text{O}_3 \rightarrow \text{O}_2 + [\text{O}]$), it acts as a powerful oxidizing agent. The bleaching property of ozone is due to oxidizing property of ozone.



Colored substance + $[\text{O}] \rightarrow$ Colorless substance.

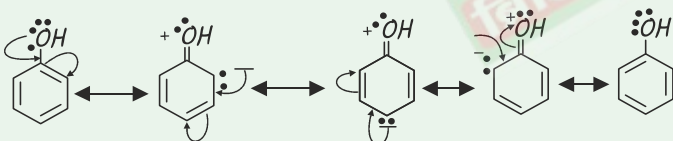
17. What is carbylamine reaction?

Ans.—**Carbylamine reaction:** Aliphatic and aromatic primary amines on heating with chloroform and ethanolic potassium hydroxide form isocyanides or carbylamines which are foul smelling substances. Secondary and tertiary amines do not show this reaction. This reaction is known as carbylamines reaction or isocyanide test and is used as a test for primary amines.



18. Explain with mechanism that $-\text{OH}$ group in phenol is ortho-and para-director.

Ans.—Phenol is a resonance hybrid of the following five structures.

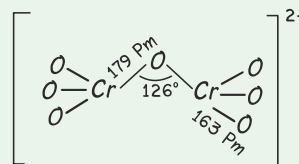


It is clear from the above resonating structures that the electron density is more on *o*- and *p*-positions. It is due to +M effect of $-\text{OH}$ gr. Hence, the substitution takes place

mainly at these positions. However, it may be noted that $-I$ effect of $-\text{OH}$ group also operates due to which the electron density on ortho and para positions of the benzene ring is slightly reduced. But the overall electron density increases at these positions of the ring due to resonance.

19. Write the structure of dichromate ion.

Ans.—The structure of dichromate ion is shown as



Dichromate ion

The dichromate ion consists of two tetrahedra sharing one corner with $\text{Cr}-\text{O}-\text{Cr}$ bond angle of 126° .

20. Give examples of two bidentate ligands.

Ans.—(i) $\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$ (ethane-1,2-diamine)

(ii) $\text{C}_2\text{O}_4^{2-}$ (oxalate)

Long Answer Type Questions

Question Nos. 21 to 26 are long answer type Questions.

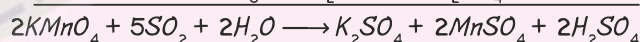
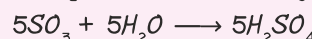
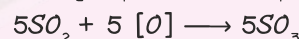
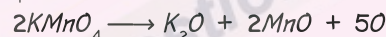
Answer any 3 questions. Each question carries 5 marks : $3 \times 5 = 15$

21. How does SO_2 react with the acidic solution of the following?

(i) KMnO_4

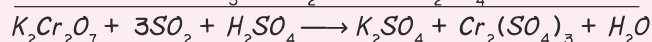
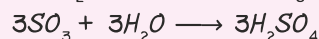
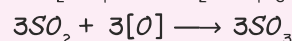
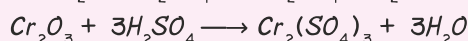
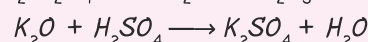
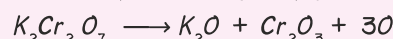
(ii) $\text{K}_2\text{Cr}_2\text{O}_7$

Ans.—(i) SO_2 is oxidized to SO_3 and Mn^{7+} is reduced to Mn^{2+} . The violet colour of KMnO_4 disappears due to the formation of potassium sulphate (K_2SO_4) and manganese sulphate (MnSO_4).



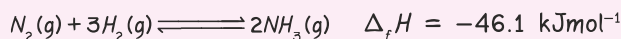
(ii) SO_2 is oxidized to SO_3 and Cr^{6+} is reduced to Cr^{3+} .

The orange colour of $\text{K}_2\text{Cr}_2\text{O}_7$ turns to green due to the formation of chromic sulphate $[\text{Cr}_2(\text{SO}_4)_3]$.



22. Write the principle of manufacture of ammonia by Haber's process. How does it react with CuSO_4 solution?

Ans.—Manufacture of ammonia by Haber process —Chemical principle involved—On a large scale, ammonia is manufactured by the reaction between N_2 and H_2 . The method involves the direct combination of dinitrogen and dihydrogen according to the following reaction.



Physical Principle—From equation it is revealed that :

- (i) Reaction is reversible
- (ii) Reaction is exothermic
- (iii) There is decrease in volume in the reaction.

In accordance with Le-Chatelier's principle high pressure, low temperature and presence of catalyst would favour the formation of ammonia in good yield.

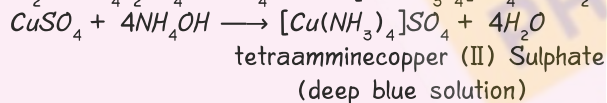
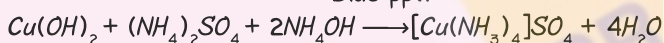
(i) Since reaction is reversible ammonia should be removed from reaction chamber as soon as it is formed.

(ii) At low temperature, although the yield of ammonia is more yet the reaction is very slow. In order to speed up the reaction, a catalyst is used.

(iii) Since, there is decrease in volume in the reaction. High pressure is needed for good yield of ammonia. The optimum conditions for the maximum production of ammonia are : pressure— 2.0×10^7 Pa (200 atm), temperature — 700K, catalyst—Iron oxide with small amounts of K_2O and Al_2O_3 .

Earlier, iron was used as a catalyst with molybdenum as a promoter.

Reaction of ammonia with CuSO_4 solution—When ammonia is passed into CuSO_4 solution, a blue precipitate of $\text{Cu}(\text{OH})_2$ is first obtained which dissolves in excess of ammonia by forming deep blue solution of complex tetraamminecopper (II) Sulphate.



23. How would you distinguish among Primary, Secondary and Tertiary alcohols?

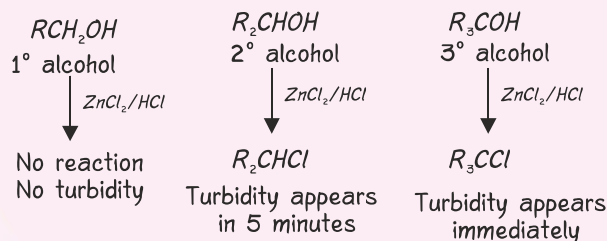
Ans.—Primary, secondary and tertiary alcohols can be distinguished by (i) Lucas test (ii) Victor Meyer's test (iii) Catalytic dehydrogenation (iv) Oxidation.

(i) **Lucas test**: This test is based upon the difference in reactivity of primary (1°), secondary (2°) and tertiary (3°) alcohols with Lucas reagent (equimolar mixture of Conc. HCl + anhydrous ZnCl_2) at room temperature. Solution becomes turbid due to the formation of alkyl chlorides.

In case of tertiary alcohols, turbidity appears immediately.

In case of secondary alcohols, turbidity appears in 5 minutes.

In case of primary alcohols, no turbidity appears at room temperature.

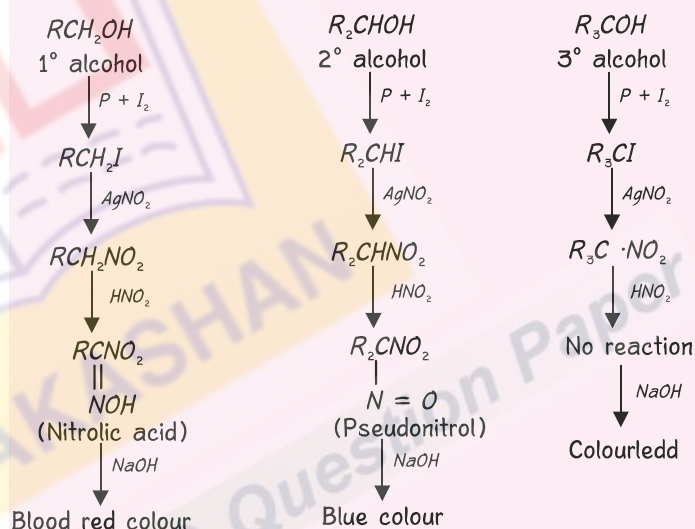


(ii) **Victor Meyer's test** : It is the based test. This test involves the following steps- Alcohol is treated with conc. HI or red P_4 and I_2 to form the corresponding alkyl iodide which on treatment with AgNO_2 forms corresponding nitroalkanes which is treated with nitrous acid ($\text{NaNO}_2 + \text{H}_2\text{SO}_4$) and then the solution is made alkaline by adding excess of caustic soda.

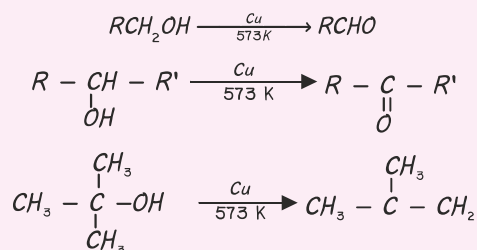
In case of primary alcohols, blood red colour appears.

In case of secondary alcohols, blue colour appears.

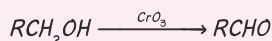
In case of tertiary alcohols, solution remains colourless.



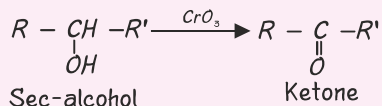
(iii) **Catalytic dehydrogenation**: When the vapours of a primary or a secondary alcohol are passed over heated copper at 573 K, dehydrogenation takes place and an aldehyde or a ketone is formed while tertiary alcohols undergo dehydration.



(iv) **Oxidation** : Primary alcohols are oxidised to aldehydes by chromic anhydride (CrO_3).



Secondary alcohols are oxidised to ketones by chromic anhydride (CrO_3)



Tertiary alcohols do not undergo oxidation reaction.

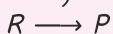
24. What do you understand by rate of a reaction? Discuss the factors on which rate of a reaction depends.

Ans.—The rate of a reaction or the speed of a reaction can be defined as the change in concentration of a reactant or product in unit time. it can be expressed in terms of:

(i) the rate of decrease in concentration of any one of the reactants, or

(ii) the rate of increase in concentration of any one of the products.

Consider a hypothetical reaction, assuming that the volume of the system remains constant.



One mole of the reactant R produces one mole of the product P . If $[\text{R}]_1$ and $[\text{P}]_1$ are the concentrations of R and P respectively at time t_1 and $[\text{R}]_2$ and $[\text{P}]_2$ are their concentrations at time t_2 then,

$$\Delta t = t_2 - t_1$$

$$\Delta[\text{R}] = [\text{R}]_2 - [\text{R}]_1$$

$$\Delta[\text{P}] = [\text{P}]_2 - [\text{P}]_1$$

The square brackets in the above expressions are used to express molar concentration.

Rate of disappearance of

$$R = \frac{\text{Decrease in concentration of R}}{\text{Time taken}} = -\frac{\Delta[\text{R}]}{\Delta t} \quad \dots (i)$$

Rate of appearance of

$$P = \frac{\text{Increase in concentration of P}}{\text{Time taken}} = -\frac{\Delta[\text{P}]}{\Delta t} \quad \dots (ii)$$

Since, $\Delta[\text{R}]$ is a negative quantity (as concentration of reactants is decreasing), it is multiplied with -1 to make the rate of the reaction a positive quantity.

Equations (i) and (ii) given above represent the average rate of a reaction, r_{av} .

Factors on which rate of a reaction depends:

(i) **Concentration of the reactants** : The rate of a chemical reaction at a given temperature may depend on the concentration of one or more reactants and products. As the Concentration increases, the rate of reaction increases.

(ii) **Temperature** : Most of the chemical reactions are accelerated by increase in temperature.

For example, in decomposition of N_2O_5 , the time taken for half of the original amount of material to decompose is 12 min at 50°C , 5 h at 25°C and 10 days at 0°C .

(iii) **Presence of catalyst**: A catalyst is a substance which increases the rate of a reaction without itself undergoing any permanent chemical change.

(iv) **Physical state of the reactants and surface area**: Higher the surface area, greater is the rate of a reaction.

25. What is Emulsion? How many types of it are there? Give an example of each type.

Ans.—Emulsions are liquid-liquid colloidal systems, i.e., the dispersion of finely divided droplets in another liquid. The dispersed phase and dispersion medium are liquid. If a mixture of two immiscible or partially miscible liquids is shaken, a coarse dispersion of one liquid in the other is obtained which is called emulsion. Generally, one of the two liquids is water.

There are two types of emulsions.

Oil dispersed in water (O/W type)—The dispersed phase is oil. It is present in small amount. water acts as dispersion medium. It is present in large amount. For example—

(i) Milk liquid fat is dispersed in water.

(ii) Vanishing cream—Stearic acid, an alkali a polyol are dispersed in water.

Water dispersed in oil (W/O type)—The dispersed phase is water. It is present in small amount. Oil acts as dispersion medium. It is present in large amount. For example—

(i) **Butter**—It is the dispersion of droplets of particles of an aqueous solution in the fat. It contains higher levels of saturated fat.

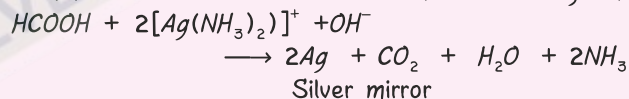
(ii) **Margarine**—Vegetable oils are dispersed in water. It contains unsaturated fats that serve as good fats in the body.

26. What happens when—

(a) Formic acid reacts with ammonical silver nitrate solution?

(b) Aniline reacts with chloroform and NaOH ?

Ans.—(i) When formic acid reacts with ammonical silver nitrate solution, white silver mirror is obtained since formic acid reduces ammonical silver nitrate solution (Tollen's reagent)



(ii) When aniline reacts with chloroform and NaOH then obnoxious smell is obtained due to the formation of phenyl isocyanide (carbonyl amine).

