

SUBJECTIVE TEST FOR XII

CHEMISTRY

Time allowed : 2 hrs.

Maximum marks : 50

General Instructions

- There are 20 questions in all. All questions are compulsory.
- The question paper has five sections: Section A, Section B, Section C, section D & section E
- Section-A has 7 multiple choice questions of one (1) mark each.
 - Section-B has 4 questions of two (2) marks each.
 - Section-C has 4 questions of three (3) marks each.
 - Section-D has 2 case study based questions of four (4) marks.
 - Section-E has 3 questions of five (5) marks each.
- There is no overall choice. However internal choice is provided. You have to attempt only one of the choices in such questions.
- Wherever necessary, neat and properly labeled diagrams should be drawn.

Section-A

- Total number of atoms in ring of pyranose is (1)
 - 5
 - 6
 - 7
 - 4
- A reaction is found to have the rate constant $2.0 \times 10^{-4} \text{ sec}^{-1}$. By what factor the rate is increased if initial concentration of reactant is tripled? (1)
 - 3 times
 - 9 times
 - 2 times
 - 27 times
- Which of the following ions will exhibit colour in aqueous solution? (1)
 - Ti^{3+} (Z = 22)
 - Lu^{3+} (Z = 71)
 - Sc^{3+} (Z = 21)
 - La^{3+} (Z = 57)
- $\text{RCOCl} \xrightarrow[\text{Pd/BaSO}_4]{\text{H}_2} \text{Product}$
Incorrect statement for the above reaction is that (1)
 - it is called Rosenmund's reduction
 - BaSO_4 acts as catalytic poison for the Pd catalyst
 - this reaction can be used to prepare all aldehydes
 - this reaction is partial reduction of acid chloride
- An example of a carbohydrate made up of two units of the different monosaccharides is (1)
 - sucrose
 - maltose
 - isomaltose
 - starch
- The reduction potential of a hydrogen electrode at pH = 1 is (1)
 - 0.519 V
 - 0.00 V
 - 0.591 V
 - 0.059 V

7. Acidified $K_2Cr_2O_7$ solutions turns green when Na_2SO_3 is added to it. This is due to the formation of (1)
- a. $CrSO_4$ b. $Cr_2(SO_4)_3$
 c. CrO_4^{2-} d. $Cr_2(SO_3)_3$

Section – B

8. Write chemical reaction to show that open chain structure of D-glucose contains the following
- (i) Straight chain (1)
 (ii) Five alcohol group (1)
9. Corrosion of copper, silver and rusting of iron are very common. Both cause enormous damage. Rusting of iron in particular results in the loss of the crores of rupees every year. Major accidents occur because of this.
- (i) What is the chemical formula of rust? (1)
 (ii) Suggest two ways to check rusting of iron so as to check national wastage of money. (1)

OR

State Raoult's law for a solution containing volatile liquids. Explain with suitable example the concept of maximum boiling azeotropes.

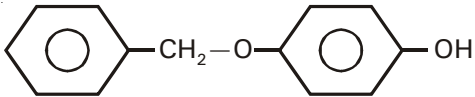
10. Arrange the following compounds in the decreasing order of the property indicated against each.
- (i) CH_3CH_2OH , CF_3CH_2OH , CCl_3OH (Acid strength) (1)
 (ii) 2-methylpropan-2-ol, butan-1-ol, butan-2-ol (**Reactivity towards sodium**). (1)
11. (i) K_2PtCl_6 is a well known compound whereas corresponding Nickel compound is not known. Why? (1)
 (ii) Why do transition elements show variable oxidation states? (1)

Section – C

12. How are the following conversions carried out? (3)
- (i) 2-chlorobutane to 2-butanol
 (ii) n-propylchloride to n-propylamine
 (iii) methyl bromide to acetic acid
13. A reactant has a half life of 10 minutes (3)
- (i) Calculate the rate constant for the first order reaction.
 (ii) What fraction of the reactant will be left after one hour ?
14. Name the reagents and write the chemical equations for the preparation of the following compounds by Williamson's synthesis. (3)
- (i) Ethoxybenzene
 (ii) 2-methyl-2-methoxy propane
 (iii) 1-methoxy propane

OR

Give the major products formed by heating the following ethers with conc. aq. HI.

- (i) $CH_3 - CH_2CH_2 - O - \overset{\overset{CH_3}{|}}{CH} - CH_3$
- (ii) 
- (iii) $CH_3CH_2OC(CH_3)_3$

15. (i) Give one chemical test to distinguish between the following pairs of compound (2)
- a. Methylamine and dimethylamine b. Methylamine and aniline
- (ii) Arrange the following in decreasing order of pK_b values: (1)
- $C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$ and $C_6H_5NH_2$

OR

Account for the following

- (i) Although amino group is ortho, para-directing in aromatic substitution reaction, aniline on nitration gives a substantial amount of m-nitroaniline
- (ii) Aniline does not undergo Friedel-Craft reaction
- (iii) Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis.

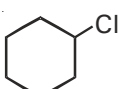
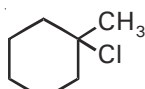
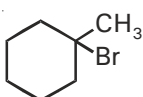
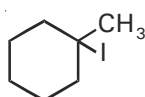
Section – D

Question 16 and 17 are Case Study Based Question. Each question has an internal choice and carries four (4) marks each.

16. A chemical reaction is the result of competition; it is a race that is won by the fastest runner. An alkyl halide with β -hydrogen atoms when reacted with a base or a nucleophile has competing routes substitution (S_N1 and S_N2) and elimination. Which route will be taken up depends upon the nature of alkyl halide, strength and size of base/nucleophile and reaction conditions. (4)
- (i) Heating together of sodium ethoxide and ethyl iodide will give
- a. Ethyl alcohol b. acetaldehyde
- c. diethyl ether d. acetic acid
- (ii) Tertiary butyl chloride preferably undergoes hydrolysis by
- a. S_N1 mechanism b. S_N2 mechanism
- c. S_N2 Ar mechanism d. β -elimination
- (iii) RX when treated with $R'R''NH$ produces 'A' via S_N reaction. A is
- a. RNH_2 b. $RNHR'$
- c. $RNR'R''$ d. RCN

OR

Which of the following is most reactive for S_N1 reaction?

- a.  b. 
- c.  d. 

- iv. 2-bromopentane is heated with alcoholic solution of potassium hydroxide to form Z as major product. Z is
- a. pent-1-ene b. pent-2-ene
- c. isobutylene d. pentanol
17. Many phenomena based on osmosis are observed in daily life. For example, raw mangoes shrivel into pickle when placed in brine. Blood cells collapse when suspended in saline water. Osmosis requires the presence of a semipermeable membrane which can be synthetic or of natural origin. The osmotic pressure of a solution is the excess pressure that must be applied to a solution to prevent osmosis.
- (i) The inorganic precipitate that can act as semipermeable membrane is (4)
- a. $CaSO_4$ b. BaC_2O_4
- c. $Ni_3(PO_4)_2$ d. $Cu_2[Fe(CN)_6]$

- (ii) Osmotic pressure of the solution was found to be 600 mm of Hg at 127°C when 20 g of a solute was dissolved in 821 ml of water. Then molecular weight of the solute is nearly
- | | |
|----------|----------|
| a. 1013 | b. 101.3 |
| c. 506.5 | d. 133.3 |

OR

If a thin slice of sugar beet is dipped in a concentrated solution of NaCl, then it will show

- | | |
|----------------|-----------------|
| a. exo-osmosis | b. endo-osmosis |
| c. hemolysis | d. no-osmosis |
- (iii) If osmotic pressure of a solution is 1 atm at 27°C, then at 327°C, the osmotic pressure is
- | | |
|------------|----------|
| a. 1 atm | b. 3 atm |
| c. 0.5 atm | d. 2 atm |
- (iv) Red blood cells are placed into pure water. Which of the following statements is true?
- water molecules flow out of the red blood cells, causing them to collapse.
 - water flows into the red blood cells, causing them to swell and burst.
 - the osmotic pressure of the cell contents increases, causing the cells to burst.
 - the osmotic pressure inside the cells equals the osmotic pressure outside.

Section – E

18. (i) Define molar conductivity of a solution and explain how molar conductivity changes with change in concentration of a solution for a weak and strong electrolyte. (2)
- (ii) How much electricity in terms of faraday is required to produce? (3)
- 20.0 g of Ca from molten CaCl_2 ?
 - 40.0 g of Al from molten Al_2O_3 ?
19. (i) What is the hybridisation of Co in $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$? (1)
- (ii) Write the IUPAC name of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ (1)
- (iii) Explain using crystal field theory that the hexaaquamanganese (II) ion contains five unpaired electrons while the hexacyanomanganese (II) ion contains only one unpaired electron. (1.5)
- (iv) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is strongly paramagnetic whereas $[\text{Fe}(\text{CN})_6]^{3-}$ is weakly paramagnetic. Explain. (1.5)
20. (i) Name the reagents in the following reactions: (3)
- Dehydration of propan-2-ol to propene
 - Benzyl alcohol to benzoic acid
 - Butan-2-one to butan-2-ol
- (ii) How will you bring about the following conversions (2)
- Ethanol to 3-hydroxybutanal
 - Benzaldehyde to Benzophenone

OR

- (i) Give chemical tests to distinguish between the following pairs of compounds: (3)
- Propanal and Propanone
 - Acetophenone and Benzophenone
 - Phenol and Benzoic acid
- (ii) How do you account for the fact that unlike phenol, 2,4-dinitrophenol and 2, 4,6-trinitrophenol are soluble in aqueous sodium carbonate solution? (2)
