PERIODIC TEST 1 (APRIL, 2023)

SUBJECT- CHEMISTRY
GRADE- XII SCIENCE

TIME: 90 MIN. **M.M. - 40**

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

a) There are 21 questions in this question paper with internal choice.

b) SECTION-A consists of 12 one word questions carrying 1 mark each.

c) SECTION-B consists of 3 very short answer questions carrying 2 marks each.

d) SECTION-C consists of 3 short answer questions carrying 3 marks each.

e) SECTION-D consists of 2 case- based questions carrying 4 marks each.

f) SECTION-E consists of 1 long answer question carrying 5 marks.

g) All questions are compulsory.

h) Use of log tables and calculators is not allowed.

SECTION-A

The following questions are one word questions. Each question carries 1 mark. There is no internal choice in this section.

Q1. Draw the structures of major monohalo products in following reaction:

Q2. IUPAC name of $CH_3CH_2C(Br) = CH—Cl$ is……

Q3. Which of the units is useful in relating concentration of solution with its vapour pressure?

Q4. How much oxygen is dissolved in 100 mL water at 298 K if partial pressure of oxygen is 0.5 atm and K = 1.4 × 10-3 mol/L/atm?

Q5. The negative part of the addendum (the molecule to be added) adds on the carbon atom of the double bond containing the least number of hydrogen atoms. This rule is known as……..

Q6. 1 M, 2.5 litre NaOH solution is mixed with another 0.5 M, 3 litre NaOH solution. Then find out the molarity of resultant solution.

Q7. Give an correct example for a non-ideal solution**?**

Q8. Classify the following compounds as primary, secondary and tertiary halides.

(i) 1-Bromobut-2-ene

(ii) 4-Bromopent-2-ene

(iiii) 2-Bromo-2-methylpropane

Q9. For carrying reverse osmosis for desalination of water the material used for making semipermeable membrane is……..

Q10. What is lucas reagent?

Q11. Given below are two statements labeled as Assertion(A) and Reason(R) Select the most appropriate answer from the options given below:

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Assertion: Vinyl chloride is less active than alkyl chloride

Reason: Stability of alkyl halide decreases as the strength of C-X and decreases.

Q12. Assertion: Sodium chloride used to clear snow on the roads.

Reason: Sodium chloride depresses the freezing point of water.

SECTION-B

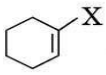
The following questions are very short answer type and carry 2 marks each.

Q12. Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cells in a solution containing

(i) 1.2% sodium chloride solution?

(ii) 0.4% sodium chloride solution?

Q13. (a)Why is chloroform kept in dark coloured bottles?

(b) Out of  and  , which is an example of allylic/vinylic halide?

Q14. Differentiate between molarity and molality in a solution. What is the effect of temperature change on molarity and molality in a solution?

SECTION-C

This section contains 3 questions with internal choice in one question.

The following questions are short answer type and carry 3 marks each.

Q15. What is meant by positive deviations from Raoult's law? Give an example. What is the sign of $\Delta_{mix}H$ for positive deviation?

Q16. Explain why aryl halides are less reactive towards nucleophilic substitution reaction.

Q17. Some ethylene glycol, $HOCH_2CH_2OH$, is added to your car's cooling system along with 5 kg of water. If the freezing point of water-glycol solution

is -15.0°C, what is the boiling point of the solution? (K_b = 0.52 K kg mol^{-1} and K_f = 1.86 K kg mol^{-1} for water)

Or

A 10% solution (by mass) of sucrose in water has freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water, if freezing point of pure water is 273.15 K (Given: Molar mass of sucrose = 342 g mol molar mass of glucose = 180 g mol^{-1})

SECTION-D

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

Q18. The concentration of a solute is very important in studying chemical reactions because it determines how often molecules collide in solution and thus indirectly determine the rate of reaction and the condition at equilibrium. There are several ways to express the amount of solute present in a solution. The concentration of a solution is a measure of the amount of solute that has been dissolved in a given amount of solvent or solution. Concentration can he expressed in terms of molarity, molality, parts per million, massbpercentage, volume percentage,etc.

(i) A solution is prepared using aqueous KI which is turned out to be 20% w/w. Density of Kl is 1.202 g/ml. The molality of the given solution and mole fraction of solute are respectively.

Or

(i) The molarity (in mol L-1) of the given solution will be…….

(ii) Which of the units of concentration is temperature dependent?

(iii) Write two differences between ideal solutions and non-ideal solutions.

Q19. Nucleophilic substitution reactions are of two types; substitution nucleophilic bimolecular (SN2) and substitution nucleophilic unimolecular (SN1) depending on molecules taking part in determining the rate of reaction. Reactivity of alkyl halide towards SN1 and SN2 reactions depends on various factors such as steric hindrance, stability of intermediate or transition state and polarity of solvent. SN2 reaction mechanisms is favoured mostly by primary alkyl halide then secondary and then tertiary. This order is reversed in case of SN1 reactions.

(i) Tertiary alkyl halides are practically inert to substitution by SN2 mechanism. Give reason.

Or

Give the correct order of decreasing SN2 reactivity.

(ii) By which mechanism the isopropyl chloride undergoes hydrolysis?

(iii) Which compound in the following couple will react faster in SN2 displacement and why?

(a) 1-bromopentane or 2-bromopentane

SECTION-E

The following question is long answer type and carry 5 marks. Questions have an internal choice also.

Q20. Give reasons for the following:

(a) The presence of –NO2 group at ortho or para position increases the reactivity of haloarenes towards nucleophilic substitution reactions.

(b) p-dichlorobenzene has a higher melting point than that of ortho or meta isomer.

(c) Thionyl chloride method is preferred for preparing alkyl chloride from alcohols.

(d) (±)2-Butanol is optically inactive.

(e) C-X bond length in halobenzene is smaller than C-X bond length in □□□ –X?

Or

How can the following conversions be carried out:

(i)  $CH_2OH \xrightarrow{PCl_5}$

(ii)  $CH_2 - CH = CH_2 + HBr \longrightarrow$

(iii) Aniline to bromobenzene

(iv) Chlorobenzene to 2-chloroacetophenone

(v) Chloroethane to butane