INDIAN SCHOOL SOHAR
FIRST TERM EXAM - 2014
CHEMISTRY

STD: XII | Marks: 70
Date: 28-09-14 | Time: 3Hrs

Instructions:

1. **All questions are compulsory.**
2. **Question nos. 1-5 are very short answer questions and carry one mark each.**
3. **Question nos. 6-10 are short answer questions and carry two marks each.**
4. **Question nos. 11-22 are also short answer questions and carry three marks each.**
5. **Question no. 23 is value based question and carry four marks.**
6. **Question nos. 24-26 are long answer questions and carry five marks each.**
7. **Use log tables if necessary. Calculators are not allowed.**

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1. Draw the structure of the compound 4-chloropentan-2-one.

2. Which form of sulphur is stable above 369K. What is this temperature called?

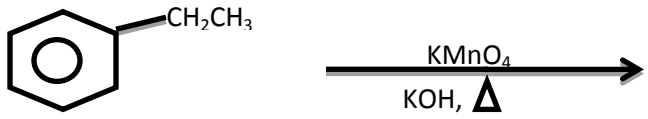
3. Write the mechanism for the hydration of ethene to yield ethanol.

4. Arrange the following in the increasing order of their basic strength:
   $C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$ and CH_3NH_2

5. Calculate the magnetic moment of a trivalent ion in aqueous solution if Z=26.

6. Explain the fact that in aryl alkyl ethers i) the alkoxy group activates the benzene ring towards electrophilic substitution and ii) it directs the incoming substituents to ortho and para positions in benzene ring.

7. Complete the following chemical reactions:

   i) 

   ii) $C_6H_5CONH_2 \xrightarrow{H_3O^+,\ \Delta}$

OR

A compound X (C_2H_4O) on oxidation gives Y ($C_2H_4O_2$). X undergoes haloform reaction. On treatment with HCN, X forms a product Z which on hydrolysis gives 2-hydroxy propanoic acid. Identify compounds X,Y and Z . Write all the reactions.

8. Account for the following:
   a) Aniline does not undergo Friedel-Crafts reaction
   b) Gabriel Phthalimide synthesis cannot be used for the preparation of aromatic amines.

9. Considering the parameters such as bond dissociation enthalpy, hydration enthalpy and electron gain enthalpy, compare the oxidizing powers of F_2 and Cl_2.

10. Complete the following chemical equations for reactions in aqueous media:

a) $Cr_2O_7^{2-} + H^+ + Fe^{2+} \rightarrow$

c) $MnO_4^- + Fe^{2+} + H^+ \rightarrow$

11. Give equations of the following reactions:

a) Oxidation of propan-1-ol with alkaline $KMnO_4$ solution.

b) Bromine in CS_2 with phenol

c) Treating phenol with chloroform in presence of aqueous NaOH.

OR

Explain why?

a) O-nitrophenol is more acidic than m-nitrophenol.

b) Bromination of phenol takes place in the absence of a Lewis acid.

c) Aryl alkyl ether reacts with hydrogen halides to give phenol and alkyl halide.

12. How will you bring about the following conversions?

a) Propanone to propene b) Ethanol to 3-hydroxybutanal c) Toluene to aniline

13. Account for the following:

a) H_2S is less acidic than H_2Te

b) All the five P-Cl bonds are not equivalent in PCl_5.

c) NO_2 exists as a dimer.

14.a) What happens when pressure larger than osmotic pressure is applied to the solution side? What is this process called?

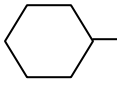
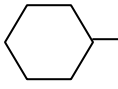
b) At 300K, 36g of glucose present in a litre of its solution has an osmotic pressure of 5bar. If the osmotic pressure of the solution is 1.5bar at the same temperature, what would be its concentration?

15.a) What is the effect of temperature on rate constant?

b) The rate of a reaction quadruples when the temperature changes from 300 K to 320K. Calculate the energy of activation of the reaction. ($R = 8.314 JK^{-1}mol^{-1}$)

16. Three electrolytic cells A, B,C containing $ZnSO_4$, $AgNO_3$ and $CuSO_4$ respectively are connected in series. A steady current of 1.5A was passed through them until 1.45g of silver deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited? (1F=96500coulombs)

17.a) Which compound in each of the following pairs will undergo S_N2 reaction faster and why?

i) CH_3Br or CH_3I ii)  Cl or  CH_2Cl

b) p-Dichlorobenzene has higher melting point and solubility than o- and m-isomers. Why?

18. State Kohlrausch law of independent migration of ions. Mention any two of its applications.

19. Non ideal solutions exhibit either positive or negative deviations from Raoult's law. What are these deviations and how are they caused?

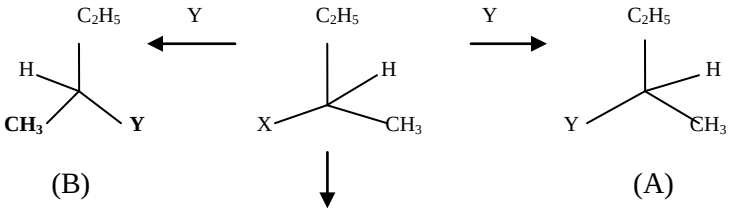
20. Write the structures of A, B and C in the following reactions:

a) $CH_3Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow{HNO_2,\ 273K} C$

b) $CH_3COOH \xrightarrow{NH_3} A \xrightarrow{Br_2/\ KOH} B \xrightarrow{CHCl_3 + NaOH} C$

21. What is lanthanoid contraction? How does it affect the atomic size of elements of 5d series? Why is it less than actinoid contraction?

22. Consider the three types of replacement of group X by group Y as shown here:



(B) (A)

(A) + (B)

This can result in giving compound A or B or both. What is the process called if

a) (A) is the only compound obtained.
b) (B) is the only compound obtained
c) (A) and (B) are formed in equal proportions.

23. Alcohol poisoning has claimed several lives. At times, alcoholics drink ethanol denatured with methanol.
a) What is meant by denaturation of alcohol?
b) Explain why methanol is harmful?
c) If you come across a case of alcoholic poisoning in your neighbourhood then what would you do as a responsible citizen?

24. a) Illustrate the following with an example:
i) Hell- Volhard- Zelinsky reaction ii) Rosenmund reduction iii) Cannizzaro reaction.
b) How will you prepare the following compounds from benzene?
i) m-nitrobenzoic acid ii) p-nitrobenzaldehyde

OR

a) Give reasons for the following:
i) Ethanal is more reactive than acetone towards nucleophilic addition reactions.
ii) $(CH_3)_3C$-CHO does not undergo aldol condensation.
iii) Carboxylic acids are higher boiling liquids than alcohols.
b) Give a simple chemical test to distinguish between
i) Acetophenone and benzophenone ii) benzaldehyde and ethanal.

25.a) Account for the following:

i) NH_3 is basic but BiH_3 is only feebly basic.

ii) Fluorine forms only one oxoacid HOF.

iii) In spite of nearly the same electronegativity, oxygen forms hydrogen bonding while chlorine does not.

b) Write complete balanced equation for the following reactions:

i) $O_3 + I^- + H_2O \longrightarrow$

ii) $P_4 + NaOH + H_2O \longrightarrow$

OR

a) Draw the structure for the following oxoacids:

i) H_3PO_2 ii) $H_2S_2O_8$ iii) $HClO_3$

b) Write balanced equations for the following reactions:

i) NaCl is heated with sulphuric acid in the presence of MnO_2.

ii) Gold is dissolved in aquaregia.

26. a) How is $KMnO_4$ obtained from pyrulosite ore? Explain giving the reactions.

b) Explain the following properties of transition metals:

i) Catalytic properties ii) Tendency to form colored ions

iii) formation of interstitial compounds.

OR

a) State reasons for the following observations:

i) The enthalpies of atomisation of transition elements are quite high.

ii) E^o for Mn^{3+}/Mn^{2+} couple is more positive than Fe^{3+}/Fe^{2+}. (Z for Mn=25,Fe=26)

iii) Cr^{2+} is reducing while Mn^{3+} is oxidizing though both have d^4 configuration.

iv) Eu^{2+} is a strong reductant while Ce^{4+} is a strong oxidant.

v) Zn, Cd and Hg are not transition elements.

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