# D.A.V. PUBLIC SCHOOL C.G. ZONE
## CHEMISTRY
## CLASS- XII

Maximum Marks: 70                                                    Time allowed : 3hours

**General Instructions:**
 Read the following instructions carefully.
(a) There are 33 questions in this question paper with internal choice.
 (b) SECTION A consists of 16 multiple -choice questions carrying 1 mark each.
 (c) SECTION B consists of 5 short answer questions carrying 2 marks each.
 (d) SECTION C consists of 7 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 3 long answer questions carrying 5 marks each.
(g) All questions are compulsory.
(h) Use of log tables and calculators is not allowed.

## SECTION A

1. Chlorobenzen reacts with $CI_2$ in the presence of $FeCI_3$ giving ortho and para chloro compounds. The reaction is

    a) Nucleophilic substitution reaction

    b) Nucleophilic addition reaction

    c) Eletrophilic addition reaction

    d) Electrophilic substitution reaction

2. The colour of $K_2Cr_2O_7$ in basic medium is

    a) orange

    b) yellow

    c) red

    d) green

3. Which of the following is affected by catalyst?

    a) $\Delta H$

    b) $\Delta S$

    c) $\Delta G$

    d) $E_a$

4. The order of basic strength of amines in aqueous solution is

    a) $(CH_3)_3N>(CH_3)_2NH>CH_3NH_2>NH_3$

    b) $CH_3Nh_2>(CH_3)_2NH>(CH3)_3N>NH_3$

    c) $NH_3>(CH_3)N>(CH_3)_2NH>CH_3NH_2$

    d) $(CH_3)_2NH>CH_3NH_2>(CH_3)_3N>NH_3$

5. An unkown gas 'X' is dissolved in water at 2.5 bar pressure and has mole fraction 0.04 in solution. The mole fraction of 'X' gas when the pressue of gas is doubled at the same temperature is

    a) 0.08

b) 0.04

c) 0.05

d) 0.92

6. Which of the following group increases the acidic character of phenol?

   a) ---$CH_3O$

   b) --$CH_3$

   c) --$NO_2$

   d) All of these

7. Which one amongst the following have lowest $pK_b$?

   a) Benzy 1 amine

   b) Aniline

   c) p-Toluidine

   d) p-nitro aniline

8. The spin only magnetic moment of the complex$[Co(NH_3)_5Cl_2]$ in BM is

   a) 1.7

   b) 0.0

   c) 3.8

   d) 4.9

9. Which of the following alcohols will not undergo oxidation easily?

   (a) Butanol

   (b) Butan-2-ol

   (c) 2-methyl butan-2-ol

   (d) 3-methyl butan-2-ol

10. Rate constant 'k' for a certain reaction is $2.3 \times 10^{-5}$ L mol$^{-1}$s-$^1$ Order of reaction is

    (a) 0

    (b) 1

    (c)2

    (d)3

11. Propanamide on reaction with bromine in aqueous NaOH gives:

    (a) Propanamine

    (b) Ethanamine

    (c) N-Methylethanamine

    (d) Propanenitrile

12. Ambidentate ligands like $NO_2^-$ and $SCN^-$ are:

    (a) unidentate

    (b) didentate

(c) polydentate

(d) has variable denticity

Choose the correct answer out of the following choices.

(a) Both A and R are true and R is 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.

13. Assertion (A): Anisole, on raction with HBr gives phenol    and $CH_3Br$.

           Reason (R): Phenoxide ion is more stable than phenyl        cation.

14. Assertion (A): Cyclohexanone undergoes Aldol      condensation.

           Reason(R): Benzaldehyde undergoes Connizzaro's   reaction.

15. Assertion(A): Actinoids show large number of oxidation     states as compared to lanthanoids.

           Reason(R): All lanthanoids are radioactive in nature.

16. Assertion(A): Monobromination, of Aniline can by  acetylation.

           Reason(R) Acetylation decreases the activating effect of     amino group.


## SECTION-B


17. A first order reaction takes 77.78 minutes for 50% completion. Calculate the time required for 30% completion of this reaction. ($log10=1$, $log7=0.8450$)

18. (a) What is the basic structural difference between glucose          and fructose?

(b)Write the products obtained after hydrolysis of sucrose.

19. Answer the following:

(a) Among the following compounds, which one is more easily hydrolyesed and why?

$CH_3CHCICH_3$ or $CH_3CH_2CH_2Ch_2CI$.

(b) Which of these will react faster in $S_N2$ displacement and why?

1- Bromopentance or  2- Bromopentane

<div align="center">OR</div>

Suggest a possible rason for the following observation:

(a) The order reactivity of haloalkanes is RI>RCI>Rbr.

(b) Neopenty1 chloride $(CH_3)_3CCH_2CI$ does not follow $S_N2$ mechanism, although primary halide.

20. Name the following coordination compounds and draw their structures:

(a) $[CO\ CI_2(en)_2]CI$

(b) $[Pt(NH_3)_2CI(NO_2)]$ (At no. Co=27, Pt-78)

21. Calculate the time to deposit 1.17g of Ni at cathode when a current of 5A was passed through the solution of $Ni(NO_3)_2$ (Molar mass of Ni= 58.5g $mol^{-1}$, 1F=96500 C $mol^{-1}$)

## SECTION-C

22. (a) For the reaction $2N_2O_5(g) \longrightarrow 4NO_2(g)+O_2(g)$, the rate of formation of $NO_2(g)$ is $2.8 \times 10^{-3}$ $Ms^{-1}$ Calculate the rate of disappearance of $N_2O_5(g)$.

(b) A first order reaction has a rate constant $1.0 \times 10^{-3} s^{-1}$. How long will it take 6g of this reactant to reduce to 3g? [log2=0.3010]

23. (a) How do you convert the following?

Ethanal to propanone

(b) How will you bring about the following conversions in not more than two steps?

(c) Name the reactionin which aldehydes and ketones are reduced to hydrocarbons using Zn(Hg) and conc. HCI.

24. Give reasons for the following:

(a) p-nitophenol is more acidic than p-methylphenol.

(b) Bond length of C-O bond in phenol is shorter than that in methanol.

(c) $(CH_3)_3C-Br$ on reaction with sodium methoxide $(Na^+{}^-OCH_3)$ gives alkene as the main product and not an ether.

25. (a) Write the hybridisatio, shape and magnetic character of $[CoF6]^{3-}$ [Atomic number of Co=27]

(b) Write the formula of pentaammine chlorido cobalt(III)  chloride.

26. A solution is prepared by dissolving 10 g of non-volatile solute in 200g of water. It has vapour pressure of 31.84 mm Hg at 308K. Calculate the molar mass of the solute.(Vapour pressure of pure water at 308 K=32mm Hg)

27. Give reason for of the following observation:

(a) Measurement of osmotic pressure method is preferred   for the determination of molar masses of macromoleculed such as proteins and polymers.

(b) Aquatic animals are more comfortable in cold water   than is warm water.

(c) Elevation of boiling point of 1MKCl solution is nearly   double than that of 1 M sugar solution .

28. Give reason for the following:

(a) Ethyl iodide undergoes $S_N2$ reaction faster than ethyl bromide.

(b) ($\pm$) 2- Butanol is optically inactive

(c) C-X bond length is halobenzene is smaller than

C-X bond length in $CH_3$-X.

## SECTION-D

29. Oxidation of aldehydes and ketones (Popoff's Rule)

Aldehydes differ from ketones in their oxidation reactions.

Aldehydes are easily oxidised to carboxylic acids on treatment with common oxidising agents like $HNO_3$, $KMnO_4$, $K_2Cr_2O_7$ etc. Even mild oxidising agents mainly Tollen's regents, Fehling's solution, Benedict reagents, also oxidise aldehydes.

Ktones are diffucult to oxidese . The are oxidised by strong oxidising agents at elevated temperature. Their oxidation involves C-C cleavage to form mixture of carboxylic acids. The oxidation of ketones is governed by Popoff' rule. 'In unsymmetrical ketones, on oxidation of ketones to carboxylic acids, C=O gropus is retained by smaller alky1 group' is Popoff's rule.

Ketones do not ract with Tollen's reagent and Fehling's solutions. Methy1 ketones give yellow precipitate of iodoform with $I_2$ and NaOH. Ketones can be oxidised by haloform reaction if they have one methyl group.

Answer the following questions:

(a) Why is it difficult to axidise ketone as compared to aldehyde?

<center>OR</center>

What happens when 2-menthyI-pent-3en-2one reacts with sodium hypochlorite?Write chemical reaction involved?

(b) A compound 'A' $C_5H_{10}O$ does not give silver mirror with Tollen's reagent, it gives iodoform test with $I_2$/NaOH. Write possible structures of compounds.

(c) What happens when:

(1) Pentan-2-one is oxidised with $K_2Cr_2O_7$/$H_2SO_4$(conc.) on heatig.

(2) Acetophenone is oxidised on heating with $K_2Cr_2O_7$/$H_2SO_4$(conc).

30. Amines are basic in nature. Aliphatic amines are storonger bases than $NH_3$. Electron releasing groups increase the basic charater of amines where as electron withdraswing group decrease the basic character of amines. The following table gives $pK_b$ values of amines in aqueous phase.

$pK_b$ Values of amines in Aqueous phase.

| Name of amine | $pK_b$ |
| --- | --- |
| Methanamine | 3.38 |
| N-Methylmethanamine | 3.27 |
| N,N-Dimethylmethanamine | 4.22 |
| Ethanamine | 3.29 |
| N-Ethylethanamine | 3.00 |
| N,N-Diethylethanamine | 3.25 |
| Benzenamine | 9.38 |
| Phenylmethanamine | 4.70 |
| N-Methylaniline | 9.30 |
| N,N-Dimethylaniline | 8.92 |

Observe the table carefully and answer the question and answer the questions given below:

(a) Which of amines given in table is strongest base, why?

(b) Arrange the following in increasing order of basic character in aqueous solution on the basic of table given above

Benzenamine, Phenyl methanamine, N-Methyl aniline, N,N-Dimethyl aniline.

(c) Explain why?

(1) Methyl amine gives reddish brown ppt with $FeCL_3$ in aqueous solution

(2) P-nitro aniline is less basic than p-toluidine.

<p style="text-align:center">OR</p>

(c) What happens when:

(1) Aniline reacts with conc. $H_2SO_4$ and heated at 453 K.

(2) Triethyl amine reacts with $NHO_2$

Write chemical reations involved.

<h3 style="text-align:center">SECTION-E</h3>

31. (a) Calculate e.m.f of following cell at 298K Fe(s) $Fe^{2+}$(0.01M) $H^+$(1M) $H_2$(g) (1bar) Pt(s)

[Given: $E^0_{cell}$=0.44V]

(b) Using the $E^0$ values of A and B, predict which is better for coating the surface of iron[$E^0(Fe^{2+}/Fe)$ =-0.44V] to prevent corrosion and why?

Given:$E^0(A^{2+}/A)$= -2.37V;$E^0(B^{2+}/B)$=-0.14V]

<p style="text-align:center">Or</p>

(a) What type of battery is lead storange battery? Write the overall reaction occurring in lead storage battery.

(b) In the button cells widely used in watches and other devices the following reaction takes place:

$Zn(s)+Ag_2O(s)+H_2O(i)$       $Zn^{+2}(aq)+2Ag(s)+2OH^-(aq)$

Determine $E^0$=($Zn^{2+}$/Zn)= -0.76V,$E^0$=($Ag^+$/Ag)=+0.80V]

32. Attempt any five of the following:

     (a) What is meant oligosaccharides? Give an example.

     (b) What happens on denaturation proteins?

     (c) What are vitamins?

     (d) Write reaction of glucose with HI.

     (e) Write reaction of glucose with conc. $HNO_3$.

     (f) Which bonds hold(s) two peptide chains in  - pleated     structure proteins?

     (g) Which type of protein have - helical structure?

33. (a) Write one difference between transition elements and p-bloc elements with reference to variability of oxidation states.

(b) Why do transition metals exhibit higher enthalpies of atomization?

(c) Name an elemt of lanthanoid series which is well known to shown +4 oxidation state. Is it a strong oxidising agent or reducing agent?

(d) What is lanthanoid contraction? Write its one consequence.

(e) Write the ionic equation showing the oxidation of Fe(II) salt by acidified dichromate solution.

Or

(a) Account for the following:

(1) Manganese shows maximum number of oxidation states in 3d series.

(2) $E^0$ value for $Mn^{+3}/Mn^{2+}$ couple is much more positive than that for $Cr^{3+}/Cr^{2+}$.

(b) Write the chemical equation for the preparation of $KMnO_4$ from $MnO_2$. Why does purple colour of acidified permanganate solution decolourise when it oxidises $Fe^{2+}$ to $Fe^{3+}$?