This Question Paper contains 20 printed pages.
(Part - A & Part - B)

Sl.No.

052 (E)

(FEBRUARY-MARCH, 2025)
SCIENCE STREAM
(CLASS - XII)

Part - A : Time : 1 Hour / Marks : 50
Part - B : Time : 2 Hours / Marks : 50

પ્રશ્ન પેપરનો સેટ નંબર જેની સામેનું વર્તુળ OMR શીટમાં ઘટ્ટ કરવાનું રહે છે.
Set No. of Question Paper, circle against which is to be darken in OMR sheet.
10

(Part - A)

Time : 1 Hour] *[Maximum Marks : 50*

Instructions :

1) **There are 50 objective type (M.C.Q.) questions in Part - A and all questions are compulsory.**
2) **The questions are serially numbered from 1 to 50 and each carries 1 mark.**
3) **Read each question carefully, select proper alternative and answer in the O.M.R. sheet.**
4) **The OMR sheet is given for answering the questions. The answer of each question is represented by (A) O, (B) O, (C) O, (D) O. Darken the circle ● of the correct answer with ball-pen.**
5) **Rough work is to be done in the space provided for this purpose in the Test Booklet only.**
6) **Set No. of Question Paper printed on the upper-most right side of the Question Paper is to be written in the column provided in the OMR sheet.**
7) **Use of Simple Calculator and log table is allowed, if required.**
8) **Signs used in question Paper have usual meaning.**

1) Which of the following solution shows the positive deviation from the Raoult's law?

(A) $C_6H_5OH + C_6H_5NH_2$

(B) $CS_2 + CH_3COCH_3$

(C) $CHCl_3 + CH_3COCH_3$

(D) $C_2H_5Br + C_2H_5Cl$

Rough Work

Rough Work

2) Which of the following statement is incorrect for Daniell cell, when $E_{ext} > 1.1$ V

(A) Electron flow from Cu to Zn

(B) Electron flow from Zn to Cu

(C) Current flow from Zn to Cu

(D) Copper dissolves at Copper electrode

3) Given the standard electrode potentials :-

$K^+ / K = -2.93$ V

$Ag^+ / Ag = 0.80$ V

$Hg^{2+} / Hg = 0.79$ V

$Mg^{2+} / Mg = -2.37$ V

$Cr^{3+} / Cr = -0.74$ V

Which of the following is correct increasing order of their reducing power.

(A) $K < Mg < Cr < Hg < Ag$

(B) $K < Cr < Mg < Hg < Ag$

(C) $Ag < Hg < Cr < Mg < K$

(D) $Ag < Hg < Mg < Cr < K$

4) Select the correct Nernst Equation for the given cell -

$$Pt\left|H_{2(g)}\right|H^+_{(aq)}\left\|Br^-_{(aq)}\right|Br_{2(l)}\left|Pt\right.$$

(A) $E_{cell} = E^0_{cell} - \frac{0.059}{2}\log[H^+][Br^-]$

(B) $E_{cell} = E^0_{cell} - 0.059 \log\frac{[H^+]}{[Br^-]}$

(C) $E_{cell} = E^0_{cell} - \frac{0.059}{2}\log\frac{[H^+]^2}{[Br^-]^2}$

(D) $E_{cell} = E^0_{cell} - 0.059 \log[H^+][Br^-]$

Rough Work

5) The conductivity of 0.40M solution of KCl at 298K is 0.0248 Scm^{-1}. Its Molar conductivity is _____ $Scm^2 mol^{-1}$.

(A) 62

(B) 96

(C) 124

(D) 48

6) What is the quantity of electricity in Faraday required to reduce 1.5 Mol of $Cr_2O_7^{2-}$ to Cr^{3+}?

(A) 3

(B) 9

(C) 6

(D) 12

7) During the Electrolysis of aqueous Sodium Chloride solution, the products obtained are respectively :-

(A) H_2, Cl_2

(B) O_2, H_2

(C) H_2, O_2

(D) Cl_2, H_2

8) What is the unit of rate constant for Hydrogenation of Ethene.

(A) S^{-1}

(B) $mol^{-1} L S^{-1}$

(C) $mol L^{-1} S^{-1}$

(D) $mol L^{-2} S^{-1}$

Rough W

9) A reaction is First order in A and second order in B. When the concentration of both A and B are doubled. The rate will be increased _____ times.

(A) 4

(B) 8

(C) 6

(D) 2

10) For a First order reaction, what is the value of slope in plot of $\log\frac{[R]_0}{[R]} \rightarrow$ time.

(A) $-\frac{K}{2.303}$

(B) $-\frac{2.303}{K}$

(C) $\frac{K}{2.303}$

(D) $\frac{2.303}{K}$

11) For a given reaction :-

$KClO_3 + 6FeSO_4 + 3H_2SO_4 \rightarrow KCl + 3Fe_2(SO_4)_3 + 3H_2O$

The order of reaction is _____.

(A) First

(B) Second

(C) Zero

(D) Pseudo First Order Reaction

Rough Work

12) Among the following which relation is correct.

(A) Activation Energy = Threshold Energy + Energy Possessed by Reacting Molecules

(B) Activation Energy = Threshold Energy – Energy Possessed by Reacting Molecules

(C) Activation Energy = Threshold Energy × Energy Possessed by Reacting Molecules

(D) Threshold Energy = Activation Energy ÷ Energy Possessed by Reacting Molecules

13) What is the value of magnetic moment of divalent ion having atomic number 30 in aqueous solution.

(A) 0 BM

(B) 2.84 BM

(C) 1.73 BM

(D) 5.92 BM

14) Which compound is manufactured by using $TiCl_4$ with $Al(CH_3)_3$

(A) Ethanol

(B) Polyethylene

(C) Ethanal

(D) Hydrogenation of fat

15) Bronze is the Alloy of _____ metals.

(A) Cu + Zn

(B) Cu + Sb

(C) Cu + Sn

(D) Cr + Sn

Rough W

16) Which of the following element has highest third ionization Enthalpy.

[V = 23, Cr = 24, Mn = 25, Fe = 26]

(A) Cr

(B) Fe

(C) Mn

(D) V

17) How many total number of ions will be obtained by ionisation of Iron (III) - Hexacyanido Ferrate (II) in aqueous medium.

(A) 2

(B) 7

(C) 5

(D) 3

18) EDTA is used in treatment of _____ poisoning.

(A) Pb

(B) Pt

(C) Ag

(D) Cu

19) Which of the following isomerism is present in $[Co(NH_3)_5(NO_2)]Cl_2$

(A) Co-ordination

(B) Linkage

(C) Solvate

(D) All of the above

Rough

20) Among the following select the most stable complex

(A) $[Fe(H_2O)_6]^{3+}$

(B) $[Fe(OX)_3]^{3-}$

(C) $[Fe(NH_3)_6]^{3+}$

(D) $[FeCl_6]^{3-}$

21) The Primary and Secondary valency of the central metal ion in $K[Co(OX)_2(NH_3)_2]$ complex is ____ and _____ respectively.

(A) 3, 4

(B) 4, 3

(C) 6, 3

(D) 3, 6

22) Which polyhalogen compound is used in production of the Freon Refrigerant R - 22

(A) $CHCl_3$

(B) CH_3Cl

(C) CHI_3

(D) CH_2Cl_2

23) For the following compounds, what is the correct increasing order of reactivity towards S_N2 displacement.

(I) 2-Bromo 2-Methyl butane

(II) 1-Bromo Pentane

(III) 2-Bromo Pentane

(A) II < III < I

(B) II < I < III

(C) I < III < II

(D) I < II < III

24) Total number of all the possible monochloro structural isomers expected to be formed on free radical Monochlorination of 2-Methyl butane

(A) 2

(B) 5

(C) 3

(D) 4

25) Which one is the correct IUPAC name of Phenyl isopentyl ether.

(A) 3 - Methyl butoxy benzene

(B) 2 - Methyl butoxy benzene

(C) 4 - Phenoxy 2-Methyl butane

(D) 1 - Phenoxy - 3 - Methyl butane

Rough

26) In C_6H_5-OH, the bond angle in C–O–H and hybridization of carbon atom is _____ and _____ respectively.

(A) 109°, SP^3

(B) 108.9°, SP^3

(C) 109°, SP^2

(D) 111.7°, SP^2

27) Identify the correct products of the following reaction.

$(CH_3)_3C-OC_2H_5 \xrightarrow{HI}$

(A) $(CH_3)_3C-OH + C_2H_5I$

(B) $(CH_3)_2CH-I + C_2H_5OH$

(C) $(CH_3)_2CH-OH + C_2H_5I$

(D) $(CH_3)_3C-I + C_2H_5OH$

28) By which of the following method ortho and para Nitro phenol isomers can be separated?

(A) Precipitation

(B) Sublimation

(C) Crystalization

(D) Steam distillation

29) Which one of the following has the highest pK_a value?

(A) m - Nitro phenol

(B) p - Nitro phenol

(C) o - Cresol

(D) Phenol

30) What is number of Hydrogen atom in Cinnamaldehyde? 1

(A) 8

(B) 9

(C) 7

(D) 5

31) Identify the product in the following reaction.

$$CH_3 - C \equiv C - H \xrightarrow{Hg^{2+}, H_2SO_4}$$

(A) Propanal

(B) Propanone

(C) Propene

(D) Propan-2-ol

32) $\begin{matrix} R \\ \\ H \end{matrix} \!\!\rangle C = O + Y \rightarrow$ Final product is Aldoxime

Identify the Y in the reaction.

(A) NH_3

(B) $NH_2 - NH_2$

(C) $R - NH_2$

(D) $NH_2 - OH$

33) Which one of the following compound undergoes Cannizzaro Reaction.

(A) Acetone

(B) Methanal

(C) Ethanal

(D) Formic Acid

34) What is the product in given reaction.

Cyclohexene $\xrightarrow[\Delta]{KMnO_4 - H_2SO_4}$

(A) Succinic Acid

(B) Malonic Acid

(C) Adipic Acid

(D) Oxalic Acid

35) Esters of Benzoic Acids are used in _____.

(A) Food - Preservative

(B) Perfumery

(C) Nylon - 6,6

(D) Vinegar

36) In which of the following compound Zwitter ion is Formed?

(A) Sulphanilic Acid

(B) Salicylic Acid

(C) Picric Acid

(D) Glutaric Acid

37) Which of the following gives propanamine product by Hoffmann Bromamide reaction?

(A) $HCONH_2$

(B) $CH_3CH_2CONH_2$

(C) CH_3CONH_2

(D) $CH_3CH_2CH_2CONH_2$

38) What is the correct order of basic strength of Ethyl substituted amines in aqueous solution?

(A) $3° > 1° > 2°$

(B) $2° > 3° > 1°$

(C) $1° > 3° > 2°$

(D) $2° > 1° > 3°$

39) Among the following which one is Gattermann - Reagent.

(A) $CuCl / HCl$

(B) $Cu / NaNO_2$

(C) $CO + HCl$

(D) $Cu_{(powder)} / HCl$

40) What is the IUPAC name of CH_3CN?

(A) Aceto Nitrile

(B) Ethane Nitrile

(C) Methyl Cyanide

(D) Ethyl Nitrile

Rough W

41) Benzene diazonium Fluoroborate is water _____ and _____ at room temperature.

(A) Soluble, Stable

(B) Insoluble, Stable

(C) Insoluble, Unstable

(D) Soluble, Unstable

42) Which one of the following natural occuring amino acid is not optically Active? https://www.gujaratboardonline.com

(A) Alanine

(B) Serine

(C) Glycine

(D) Glutamine

43) Which of the following two Hormones together regulate the Glucose level in the blood?

(A) Insulin, Glucagon

(B) Glucagon, Androgen

(C) Insulin, Androgen

(D) Androgen, Estrogen

44) By which linkage, Nucleotides are Joined together between 5′ and 3′ carbon atoms of pentose sugar.

(A) Poly peptide

(B) Phosphodiester

(C) Glycosidic

(D) Polyamide

Rough W

45) Cellulose is Polysaccharide composed only of _____ units.

(A) α - D - Glucose

(B) β - D - Glucose

(C) α - D - Fructose

(D) β - D - Fructose

46) _____ PPM of Flouride ion causes the tooth to become mottled.

(A) 1

(B) 1.5

(C) 2

(D) 2.5

47) At 298 K, which of the following gas has lowest solubility in the liquid.

Gas	Ar	CO_2	Methane	Vinyle Chloride
KH/K bar	40.3	1.67	0.413	0.611

(A) Methane

(B) CO_2

(C) Vinyle Chloride

(D) Ar

48) What is the maximum molarity of CuS in aqueous solution. If the solubility product of CuS is 6×10^{-16}.

(A) 3×10^{-8} M

(B) 12×10^{-8} M

(C) 2.45×10^{-8} M

(D) 1.5×10^{-8} M

49) Based on solute - solvent interaction, what is the suitable increasing order of solubility of the following in n-octane.

(I) Cyclohexane

(II) KCl

(III) CH_3OH

(IV) CH_3CN

(A) I < IV < III < II

(B) II < IV < III < I

(C) I < III < IV < II

(D) II < III < IV < I

50) 400 cm^3 of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57×10^{-3} bar. The molar mass of protein is _____ $gmol^{-1}$.

(A) 30519

(B) 51538

(C) 61038

(D) 40519

052 (E)

(FEBRUARY-MARCH, 2025)
SCIENCE STREAM
(CLASS - XII)

(Part - B)

Time : 2 Hours] *[Maximum Marks : 50*

Instructions :

1) **Write in a clear legible handwriting.**
2) **There are three sections in Part - B of the question paper and total 1 to 27 questions are there.**
3) **All the questions are compulsory. Internal options are given.**
4) **The numbers at right side represent the marks of the question.**
5) **Start new section on new page.**
6) **Maintain sequence.**
7) **Use of Simple Calculator and log table is allowed, if required.**
8) **For diagram/Chart based questions, separate questions are given for visually impaired students. Only they have to attend them.**

SECTION - A

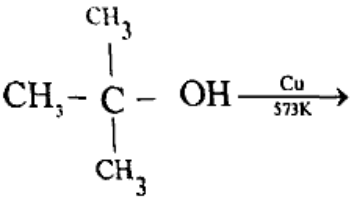
■ **Answer any 8 questions from given question number 1 to 12. (Each of 2 marks)** **[16]**

1) Write Faraday's laws of Electrolysis.
2) Explain that for First order reaction Half-life time ($t_{½}$) is independent of intial concentration $[R]_0$.
3) Give two examples of disproportionation reaction in aqueous solution. (only equations)
4) Scandium (Z = 21) is a transition element but Zn (Z = 30) is not. Explain it.
5) Write the IUPAC name of the following coordination compounds.
   (i) $[Ag(NH_3)_2][Ag(CN)_2]$
   (ii) $[Pt(NH_3)_2Cl(NO_2)]$
6) Draw the structure of optical isomers of $[Cr(NH_3)_2Cl_2(en)]^+$

(Only for Blind Students)

6) What do you mean by Homoleptic and Heteroleptic complexes.
7) Convert Ethanol to Ethyl Fluoride in two steps.
8) A Hydrocarbon C_5H_{10} does not react with Chlorine in dark but gives a single Monochloro compound C_5H_9Cl in bright sunlight. Identify the hydrocarbon by giving Reactions.

9) Complete the following reaction.

(i) 

(ii) $CH_3-CH=CH-CH_2OH \xrightarrow{PCC}$

10) How will you get But-2-enal from Ethanal. (Only reactions)

11) Mention the reactions of D-Glucose with (i) Bromine water and (ii) HNO_3

12) Mention only the name of diseases which caused by deficiency of Vitamine - B_6, Vitamine - B_{12}, Thiamine and Ascorbic Acid.

SECTION - B

■ **Answer any 6 questions from the following Q.No. 13 to 21 in detail.** **[18]**
(3-Marks for each question)

13) Define Freezing point and Derive the formula related with ΔT_f, K_f and molar Mass.

14) The Cell in which the following reaction occurs :

$$2Fe^{3+}_{(aq)} + 2I^-_{(aq)} \rightarrow 2Fe^{2+}_{(aq)} + I_{2(s)}$$

At 298 K $\begin{bmatrix} E^0_{Fe^{3+}/Fe^{2+}} = 0.77\,V \\ E^0_{I_2/I^-} = 0.54\,V \end{bmatrix}$

Calculate the standard Gibb's energy and the equilibrium constant of the cell reaction.

15) The First order rate constant for the decomposition of Ethyl Iodide by reaction $C_2H_5I_{(g)} \rightarrow C_2H_{4(g)} + HI_{(g)}$ at 600K is $1.60 \times 10^{-5}\ S^{-1}$. Its energy of Activation is 209 KJ/mol. Calculate the rate constant of the reaction at 700 K.

16) State only Ionic reactions [In Acidic Medium] when $KMnO_4$ reacts with
(i) I^- (ii) Fe^{2+}
(iii) S^{2-}

17) Write the equations for the preparation of 1-Iodobutane from
(i) Butan-1-ol (ii) 1-Chlorobutane
(iii) But-1-ene

18) Explain Reimer - Tiemann Reaction.

19) Write only reactions when Cyclohexanecarbaldehyde reacts with
(i) PhMgBr (ii) Tollen's Reagent
(iii) Zinc amalgam with dilute HCl

20) How will you convert Aniline to 4-Bromo Aniline. Explain it by giving equations.

21) Describe a method for the identification of 1°, 2° and 3° amines. Also write chemical equations of the reaction involved.

SECTION - C

■ **Answer any 4 questions from given question number 22 to 27.** **[16]**
(Each of 4 marks)

22) Calculate the depression in the freezing point of water when 20 g of $CH_3CH_2CHClCOOH$ is added to 500 g of water.
$K_a = 1.4 \times 10^{-3}$, $K_f = 1.86$ Kkg mol^{-1}
(Atomic mass C = 12 u, H = 1u, O = 16u, Cl = 35.5u)

23) Write only Reactions which occurs on Anode and Cathode of Fuel Cell and Mercury Cell.

24) The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume.
$SO_2Cl_{2(g)} \rightarrow SO_{2(g)} + Cl_{2(g)}$
Calculate the rate of the reaction when total pressure is 0.65 atm.

Experiment	Time / S^{-1}	Total Pressure (atm)
1	0	0.5
2	100	0.6

25) Explain on the basis of valence bond theory that $[Ni(CN)_4]^{2-}$ ion with square planar structure is diamagnetic and $[NiCl_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.

26) Write the names of reagent and equation for the preparation of the following Ether by Williamson's synthesis.
(i) 1 - propoxy propane
(ii) Ethoxy benzene
(iii) 2-Methoxy-2-Methyl propane
(iv) 1-Methoxy ethane

27) An organic compound (A) with the molecular formula C_8H_8O forms an Orange - red precipitate with 2, 4 - DNP reagent and gives yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollen's or Fehling's reagent, nor does it decolourise bromine water or Baeyer's reagent. On drastic oxidation with chromic acid, it gives a carboxylic Acid (B) having molecular formula $C_7H_6O_2$. Identify the compounds (A) and (B) and explain the reactions involved.

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