

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

Sl.No.

052 (E)
(MARCH, 2023)
SCIENCE STREAM
(CLASS - XII)

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.

01

Part - A : Time : 1 Hour / Marks : 50

Part - B : Time : 2 Hours / Marks : 50

(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.

1) Sodium metal crystallises in bcc structure. How many unit cell are present in 9.2 g crystal of sodium metal? [Atomic Mass : Na = 23 gmol⁻¹]

- (A) 6.022×10^{24}
(B) 1.20×10^{23}
(C) 2.4×10^{23}
(D) 3.2×10^{24}

Rough Work

- 2) In Al_2O_3 , crystal oxides ions are arranged in ccp structure. How much part of octahedral void is occupied by Al^{3+} ions?
- (A) $\frac{2}{3}$
- (B) $\frac{1}{3}$
- (C) $\frac{1}{2}$
- (D) $\frac{1}{4}$
- 3) Which oxide behave like metallic or insulator depending on temperature?
- (A) SiO_2 (B) CrO_2
- (C) TiO_3 (D) MgO
- 4) For unit cell of BaSO_4 crystal which option for axial angles is correct?
- (A) $\alpha = \beta = \gamma = 90^\circ$
- (B) $\alpha = \beta = 90^\circ, \gamma = 120^\circ$
- (C) $\alpha = \gamma = 90^\circ, \beta \neq 90^\circ$
- (D) $\alpha = \beta = \gamma \neq 90^\circ$
- 5) Elevation in boiling point of the aqueous solution of 0.01 M BaCl_2 compare to 0.01M urea is _____.
- (A) approximately twice
- (B) equal
- (C) approximately three times
- (D) approximately half

- 6) If the solubility product of CuS is 9×10^{-16} , then what will be maximum molarity of CuS in aqueous solution?
- (A) $6 \times 10^{-12} \text{ M}$
(B) $5 \times 10^{-7} \text{ M}$
(C) $3 \times 10^{-8} \text{ M}$
(D) $2 \times 10^{-10} \text{ M}$
- 7) Which mixture shows negative deviation from Raoult's law?
- (A) phenol and aniline
(B) carbon disulphide and acetone
(C) hexane and heptane
(D) ethanol and acetone
- 8) Which species is obtained at anode on electrolysis of aqueous solution containing higher concentration of H_2SO_4 ?
- (A) SO_2 (B) SO_3^{2-}
(C) $\text{S}_2\text{O}_8^{2-}$ (D) $\text{S}_2\text{O}_3^{2-}$
- 9) Which substance is used as cathode in mercury cell?
- (A) $\text{HgO} + \text{C}$
(B) $\text{ZnO} + \text{Pt}$
(C) $\text{HgO} + \text{KOH}$
(D) $\text{ZnO} + \text{NaOH}$

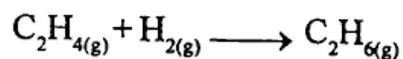
10) If $E^\circ \text{Fe}^{3+}/\text{Fe} = x\text{V}$, $E^\circ \text{Fe}^{2+}/\text{Fe} = y\text{V}$ then what will be the value of $E^\circ \text{Fe}^{3+}/\text{Fe}^{2+}$?

- (A) $x - y$ (B) $3x + 2y$
 (C) $2x + y$ (D) $3x - 2y$

11) In which of the following condition reduction potential of hydrogen half cell will be negative?

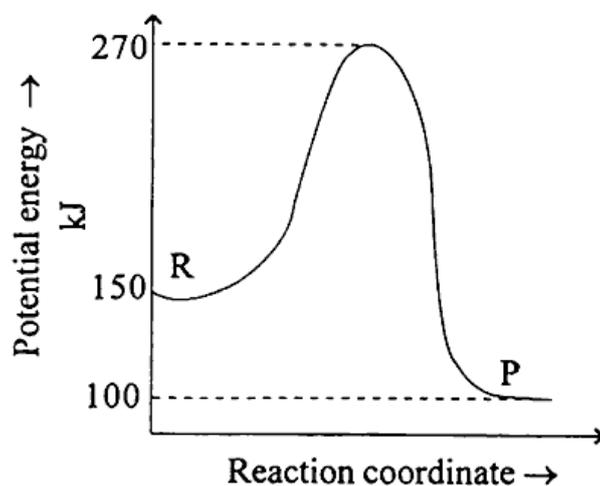
- (A) $P_{\text{H}_2} = 2 \text{ atm}$ and $[\text{H}^+] = 2\text{M}$
 (B) $P_{\text{H}_2} = 2 \text{ atm}$ and $[\text{H}^+] = 1\text{M}$
 (C) $P_{\text{H}_2} = 1 \text{ atm}$ and $[\text{H}^+] = 1\text{M}$
 (D) $P_{\text{H}_2} = 1 \text{ atm}$ and $[\text{H}^+] = 2\text{M}$

12) What will be the unit of rate constant for following reaction?



- (A) $\text{mol L}^{-1} \text{S}^{-1}$ (B) S^{-1}
 (C) $\text{mol}^{-1} \text{L S}^{-1}$ (D) $\text{mol}^{-2} \text{L}^2 \text{S}^{-1}$

13) For $\text{R} \rightarrow \text{P}$ reaction, following graph is given.



What will be enthalpy change for the given reaction?

- (A) 120 kJ (B) 50 kJ
 (C) -50 kJ (D) 170 kJ

14) Time taken to complete zero order reaction is _____.

(A) $\frac{[R]_0}{k}$

(B) $\frac{2k}{[R]_0}$

(C) $\frac{[R]_0}{2k}$

(D) $\frac{k}{[R]_0}$

15) Which pair of emulsions can be diluted by water?

- (A) butter and cream
- (B) milk and cream
- (C) cream and vanishing cream
- (D) milk and vanishing cream

16) At equilibrium state in process of adsorption _____.

- (A) $\Delta H = T \Delta S$
- (B) $\Delta H > T \Delta S$
- (C) $\Delta H > 0$
- (D) $\Delta H < T \Delta S$

17) _____ is the example of colloid in which dispersed phase is liquid and dispersion medium is gas.

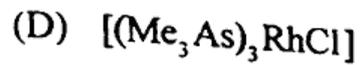
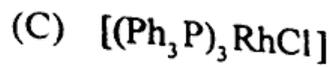
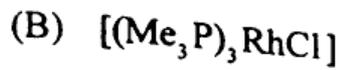
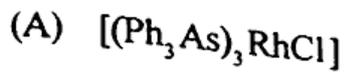
- (A) cell fluids
- (B) fog
- (C) smoke
- (D) froth

- 18) Which substance is used as collector in froth floatation process?
- (A) cresol
 - (B) aniline
 - (C) fatty acid
 - (D) phenol
- 19) For which concentrated ore calcination process is not useful?
- (A) $\text{CaCO}_3 \cdot \text{MgCO}_3$
 - (B) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$
 - (C) ZnCO_3
 - (D) PbS
- 20) German silver is a mixture of which metals?
- (A) Cu, Zn, Ni
 - (B) Fe, Cu, Sn
 - (C) Ag, Cu, Ni
 - (D) Zn, Ni
- 21) How many lone pair of electron is present on Xe in XeO_3 ?
- (A) 3
 - (B) 2
 - (C) 1
 - (D) 0

- 22) Which order for thermal stability of the following compounds is correct?
- (A) $H_2Te > H_2Se > H_2S > H_2O$
(B) $H_2O > H_2S > H_2Se > H_2Te$
(C) $H_2S > H_2Se > H_2Te > H_2O$
(D) $H_2Te > H_2Se > H_2O > H_2S$
- 23) Which gas is used in Holme's signal?
- (A) PH_3 (B) NO_2
(C) H_2S (D) SO_2
- 24) $C + H_2SO_4$ (Conc.) \longrightarrow $X + Y + H_2O$ Identify X and Y.
- (A) $X = CO, Y = H_2S$
(B) $X = CO_2, Y = H_2S$
(C) $X = CO, Y = SO_3$
(D) $X = CO_2, Y = SO_2$
- 25) The shape of manganate ion is _____.
- (A) square planar
(B) tetrahedral
(C) pyramidal
(D) square pyramidal

- 26) Which compound has magnetic moment equal to 4.90 BM?
- (A) MnSO_4
- (B) NiSO_4
- (C) FeSO_4
- (D) $\text{Cr}_2(\text{SO}_4)_3$
- 27) Which oxidation state is common for lanthanoid elements?
- (A) + 2
- (B) + 3
- (C) + 4
- (D) + 5
- 28) Number of possible isomers for $[\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^-$ are _____.
- (A) 3
- (B) 4
- (C) 2
- (D) 6

29) Which is correct formula of Wilkinson catalyst?



30) How many monochloro structural isomers expected to be formed on free radical monochlorination of iso-pentane?

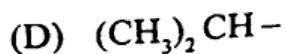
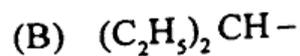
(A) 3

(B) 4

(C) 2

(D) 5

31) $\text{R}' - \text{X} \xrightarrow{\text{Na/ether}} 2,3 - \text{dimethylbutane}$. Identify R'



- 32) Which compound has highest reactivity towards SN^2 reaction?
- (A) 1-Bromo-2,2-dimethylpropane
 - (B) 1-Bromo-2-methylbutane
 - (C) 1-Bromobutane
 - (D) 1-Bromo-3-methylbutane
- 33) By which reaction Freon 12 is prepared from CCl_4 ?
- (A) Swarts reaction
 - (B) Fitting reaction
 - (C) Wurtz reaction
 - (D) Finkelstein reaction
- 34) Which compound will give yellow precipitate on reaction with sodium hypoiodite?
- (A) n-Butyl alcohol
 - (B) tert-Butyl alcohol
 - (C) isobutyl alcohol
 - (D) sec-Butyl alcohol

35) Salicylaldehyde on heating with zinc dust give _____ organic product.

- (A) Benzyl alcohol
- (B) Benzaldehyde
- (C) Benzoic acid
- (D) Benzene

36) Which compound has highest value of pKa?

- (A) o-nitrophenol
- (B) phenol
- (C) p-cresol
- (D) m-nitrophenol

37) Which reagent is useful in the conversion of ethanenitrile to ethanal?

- (A) DIBAL-H
- (B) PCC
- (C) Anhydrous CrO_3
- (D) LiAlH_4

38) How many π -electrons are present in phthalimide?

- (A) 5
- (B) 12
- (C) 6
- (D) 10

39) Which salt is insoluble in water?

- (A) $\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^-$
- (B) $\text{C}_6\text{H}_5\text{N}_2^+\text{BF}_4^-$
- (C) $\text{C}_6\text{H}_5\text{N}_2^+\text{Br}^-$
- (D) $\text{C}_6\text{H}_5\text{N}_2^+\text{HSO}_4^-$

40) Which compound will not give ethanamine on reduction?

- (A) Ethanenitrile
- (B) Ethanamide
- (C) Ethanoyl chloride
- (D) Nitroethane

- 41) Which gas is evolved during the reaction of methyl amine with HNO_2 ?
- (A) N_2
- (B) NH_3
- (C) H_2
- (D) NO_2
- 42) Which reagent is used to distinguish aniline and benzylamine?
- (A) CH_3COCl /pyridine
- (B) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$
- (C) CHCl_3 +KOH
- (D) $\text{Br}_2/\text{H}_2\text{O}$
- 43) Thyroxine produced in the thyroid gland is an iodinated derivative of _____ amino acid.
- (A) glutamine
- (B) cysteine
- (C) tyrosine
- (D) histidine

44) Which one acts as non reducing sugar?

- (A) sucrose
- (B) lactose
- (C) glucose
- (D) maltose

45) Which polysaccharide is highly branched?

- (A) cellulose
- (B) glycogen
- (C) amylose
- (D) amylopectin

46) Which vitamin must be supplied regularly in diet?

- (A) Vitamin E
- (B) Vitamin K
- (C) Vitamin D
- (D) Vitamin C

- 47) _____ is polyester type biodegradable polymer.
- (A) Dacrone
(B) PHBV
(C) Nylon-2-nylon-6
(D) Glyptal
- 48) Which polymer can not be obtained from diene monomer?
- (A) Novolac
(B) Neoprene
(C) Buna-N
(D) Buna-S
- 49) Polymer used in making unbreakable laminated sheets has _____ repeating structural unit.
- (A) $\{ \text{NH} - \text{CO} - \text{NH} - \text{CH}_2 \}$
(B) $\{ \text{NH} - \text{CONH} - (\text{CH}_2)_3 - \text{NH} \}$
(C) $\{ \text{NH} - \text{CH}_2 - \text{CONH} - \text{CH}_2 - \text{CO} \}$
(D) $\{ \text{OCH}_2 - \text{CH}_2 - \text{CONH} - \text{CH}_2 \}$
- 50) Which drug act as antihistamine?
- (A) phenelzine
(B) veronal
(C) paracetamol
(D) brompheniramine

052 (E)
(MARCH, 2023)
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 18 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.
-

SECTION - A

- Answer the following Q.No. 1 to 8 in brief. 2 Marks for each question. [16]

- 1) How catalyst increases the rate of reaction? Explain it by graph.
- 2) Explain the method for refining impure Copper.

OR

How is leaching carried out in case of low grade Copper Ores?

- 3) Explain the nature of bonding in metal carbonyls.
- 4) Write down chemical equations to prepare following substances from 1-Chloropropane.
 - i) Propene.
 - ii) Propan-1-ol.
- 5) Write down chemical equations to prepare orange and yellow dye from diazonium salt.

- 6) Write down structural difference between DNA and RNA. [Any two points]

OR

What is the effect of denaturation on the structure of proteins?

- 7) Due to which reasons vulcanisation of natural rubber is necessary?
8) Why do soaps not work in hard water?

SECTION - B

- Answer the following Q.No. 9 to 14 in detail. 3 Marks for each question.

[18]

- 9) Write down distinction between crystalline and amorphous solids on the basis of the following properties.

- Melting point,
- Cleavage property and
- Order in arrangement of constituent particles.

- 10) The following data were obtained during the first order thermal decomposition of $N_2O_{5(g)}$ at constant volume : $2N_2O_{5(g)} \rightarrow 2N_2O_{4(g)} + O_{2(g)}$

S.No.	Time (s)	Total Pressure (atm)
1	0	0.5
2	100	0.512

Calculate the rate constant.

- 11) Explain shape selective catalysis by zeolite.
12) What is aqua regia? Write down balanced chemical equations of its reaction with Au and Pt.

OR

For identification of which ion brown ring test is carried out? Write down chemical equations involved in this test.

- 13) Give reason :

- Transition elements exhibit higher enthalpies of atomisation.
- In aqueous solution, Cr^{2+} is stronger reducing agent than Fe^{2+} .
- The second ionisation enthalpy of Cu is higher than Zn.

14) Explain dehydration reaction of alcohol to form alkene.

OR

Explain different Friedel-Crafts reactions of anisole.

SECTION - C

■ Answer the following Q.No. 15 to 18 in detail. 4 Marks for each question.

<https://www.gujaratboardonline.com>

[16]

15) Vapour pressure of Chloroform (CHCl_3) and dichloromethane (CH_2Cl_2) at 298 K are 200 mm Hg and 415 mm Hg respectively.

- Calculate the vapour pressure of the solution prepared by mixing 50 g of CHCl_3 and 30 g of CH_2Cl_2 at 298 K.
- Calculate mole fractions of each component in vapour phase.

[Atomic mass : H = 1, C = 12, Cl = 35.5]

OR

Calculate the depression in the freezing point of water when 10 g of $\text{CH}_3\text{CH}_2\text{CHClCOOH}$ is added to 250 g of water.

$K_a = 1.4 \times 10^{-3}$, $K_f = 1.86 \text{ K kg mol}^{-1}$

[Atomic mass : H = 1, C = 12, O = 16, Cl = 35.5]

- Λ_m° for NaCl, HCl and NaAc are 126.4, 425.9 and 91.0 $\text{Scm}^2\text{mol}^{-1}$ respectively. Conductivity of 0.00241 M acetic acid is $7.896 \times 10^{-5} \text{ S cm}^{-1}$. Calculate molar conductivity and dissociation constant of acetic acid.
- $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ contains five unpaired electrons, while $[\text{Mn}(\text{CN})_6]^{4-}$ contains only one unpaired electron. Explain using crystal field theory.
- An organic compound with the molecular formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2,4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation it gives 1,2-benzenedicarboxylic acid. Identify the compound and write down its above chemical reactions.

