

--	--	--	--	--

Time : 2½ Hours

CHEMISTRY

Subject Code

H	7	0	3
---	---	---	---

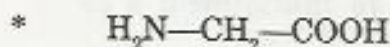
Total No. of Questions : 5 (Printed Pages : 15)

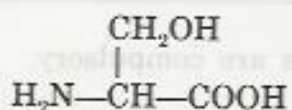
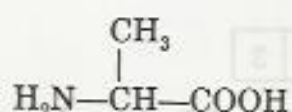
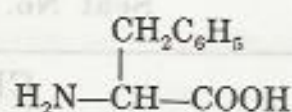
Maximum Marks : 55

- INSTRUCTIONS :**
- All questions are compulsory.
 - Answer each main question on a fresh page.
 - There is no overall choice, however internal choice has been provided in *two* sub-questions of 4 marks, and *two* sub-questions of 2 marks.
 - Figures to the right indicate full marks allotted to each question.
 - Use of calculator is not permitted, however logarithm table will be provided on request.
 - Multiple choice questions should be attempted only once.

1. (A) Select the *correct* alternative from those given below the statement and rewrite the completed statement : 1

The optically inactive amino acid is





(B) In a face centred cubic lattice, atom A occupies the corner positions and atom B occupies the face centre positions. If one atom of B is missing from one of the face centred positions, write the formula of the compound. 1

(C) Name the following : 2

- (i) The disaccharide which on hydrolysis gives the monosaccharides β -D-glucose and β -D galactose.
- (ii) The water insoluble component of the polysaccharide starch.
- (iii) The fat soluble vitamin that is obtained from sunlight.
- (iv) The nitrogen containing base that is present in RNA but not in DNA.

- (D) Draw a neat labelled diagram to show the defect present in solids that have a large difference in the size of constituent ions and the density of the solid remains unchanged.

On applying a magnetic field to a substance the magnetic moment of the domains are oriented as follows :



Identify the magnetic property exhibited by this substance and name the substance which exhibits this magnetic property. 2

- (E) Answer the following : 2

- (i) Brompheniramine is effectively used as a chemical drug. Name the class to which this drug belongs.
- (ii) Name the first popular artificial sweetening agent that is about 550 times as sweet as cane sugar.
- (iii) Name the process when glyceryl ester of fatty acid is heated with aqueous NaOH solution.
- (iv) Name the chemical substance which acts as an antiseptic as well as a disinfectant at varying concentrations.

(F) With respect to metallurgy, answer the following : 3

(i) Draw a neat labelled diagram to show magnetic separation method used for the concentration of ore.

(ii) Explain the role of limestone that is added during the extraction of iron from its ore. Also name the purest form of commercial iron.

(iii) Write balanced chemical equations for the refining of Ni by Mond process.

2. (A) Select the *correct* alternative from those given below the statement and rewrite the completed statement : 1

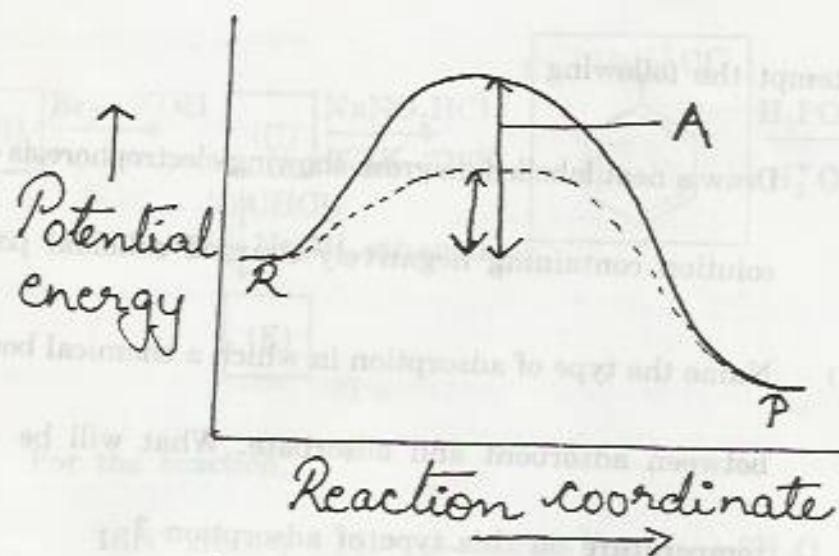
Among the following colloids, the multimolecular colloid is

- * Starch
- * Sulphur
- * Synthetic rubber
- * Detergent

(B) For the reaction, 1



Observe the figure given below and answer the following questions :



(i) Is the reaction accompanied by release of heat energy or absorption of heat energy ?

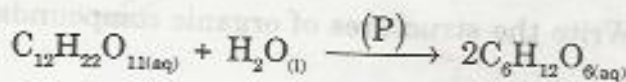
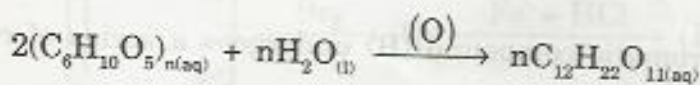
(ii) What does the label A in the figure indicate ?

(C) Attempt the following :

2

(i) Draw a neat labelled diagram showing Tyndall effect in colloidal solutions.

(ii) Name the enzymes (O) and (P) that catalyse the following reactions :



Or

(C) Attempt the following :

2

- (i) Draw a neat labelled diagram showing electrophoresis of a colloidal solution containing negatively charged colloidal particles.
- (ii) Name the type of adsorption in which a chemical bond is formed between adsorbent and adsorbate. What will be the effect of temperature on this type of adsorption ?

(D) Answer the following questions :

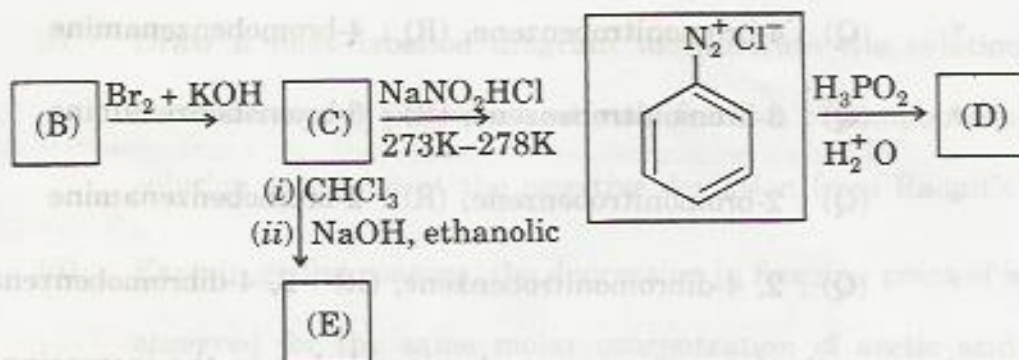
2

- (i) Name the monomer used in the preparation of Neoprene.
- (ii) On the basis of magnitude of intermolecular forces of attraction, name the class to which the polymer Nylon-6,6 belongs.
- (iii) Name the monomer besides 3-hydroxybutanoic acid which is used to prepare the polymer PHBV.
- (iv) Name the catalyst used during the polymerisation of ethene to produce high density polythene.

(E) An aromatic compound (B) undergoes a series of reactions as shown below. Write the structures of organic compounds (B), (C), (D) and (E)

in the following chemical reactions :

2



(F) For the reaction,

3



Write the relation

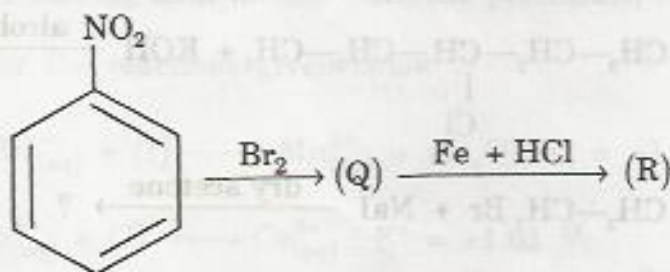
between the rate of disappearance of permanganate ion and rate of appearance of iodine.

Thermal decomposition of a compound is of first order. 50% of the compound is decomposed in 120 minutes. How long will it take for 90% of the compound to decompose ?

3. (A) Select the *correct* alternative from those given below the statement and rewrite the completed statement :

1

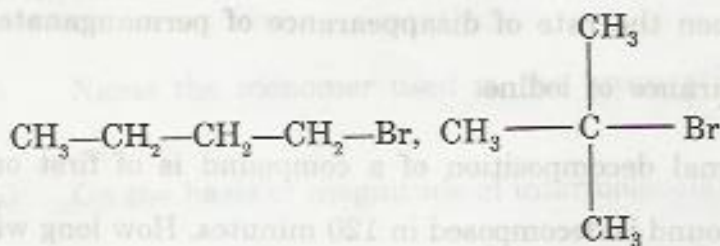
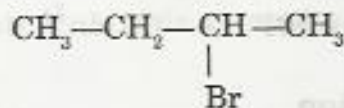
In the reactions



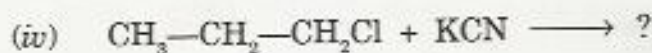
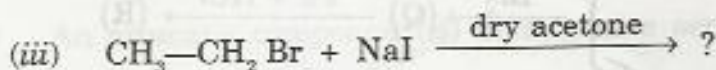
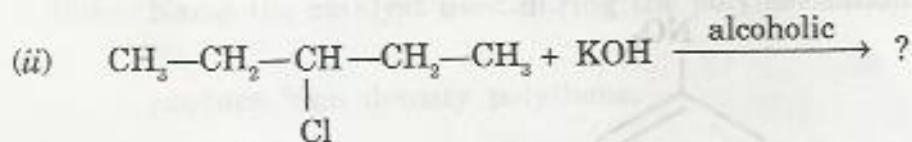
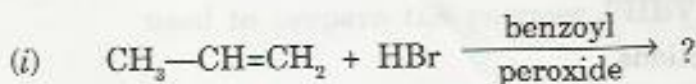
The products (Q) and (R) are

- * (Q) : 4-bromonitrobenzene, (R) : 4-bromobenzenamine
- * (Q) : 3-bromonitrobenzene, (R) : 3-bromobenzenamine
- * (Q) : 2-bromonitrobenzene, (R) : 2-bromobenzenamine
- * (Q) : 2, 4-dibromonitrobenzene, (R) : 2, 4-dibromobenzenamine

(B) Arrange the isomeric compounds given below in the increasing order of their boiling points. 1



(C) Write the structure of the major product formed in the following chemical equations : 2



(D) Do as directed : (A) 2

(i) Draw a neat labelled diagram to illustrate the relationship between vapour pressure and mole fraction of components in a solution to represent the negative deviation from Raoult's law.

(ii) Explain giving reasons, the depression in freezing point of water observed for the same molar concentration of acetic acid and trifluoroacetic acid increases in the order, acetic acid < trifluoroacetic acid.

(E) 20 mg of K^+ ions are present in 1000 ml of aqueous solution. Density of the solution is 0.8 g ml^{-1} . Calculate the concentration of K^+ ions in ppm. 2

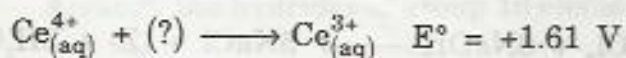
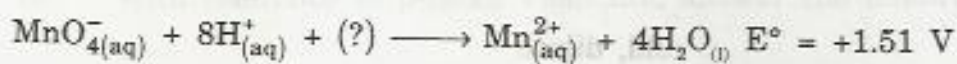
Or

(E) Calculate the boiling point of an aqueous solution containing 10.50 g of $MgBr_2$ in 200 g of water. (Atomic mass : $Mg = 24$, $Br = 80$)

(K_b for $H_2O = 0.52 \text{ K kg mol}^{-1}$). 2

(F) Draw a neat labelled diagram of a Leclanche cell. 3

Using the following data for the electrode potentials, calculate ΔG° in kJ mol^{-1} for the reactions given below :



(Given : $F = 96500 \text{ C}$)

4. (A) Select the *correct* alternative from those given below the statement and rewrite the completed statement : 1

The electronic configurations for Terbium atom and Terbium (IV) ion are

* $[\text{Xe}]4f^7 5d^2 6s^2$ and $[\text{Xe}]4f^7$

* $[\text{Xe}]4f^9 6s^2$ and $[\text{Xe}]4f^9 6s^2$

* $[\text{Xe}]4f^7$ and $[\text{Xe}]4f^9 6s^2$

* $[\text{Xe}]4f^9 6s^2$ and $[\text{Xe}]4f^7$

(B) State Kohlrausch law of independent migration of ions. 1

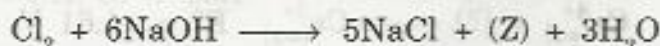
(C) Attempt the following : 2

(i) Draw the structure of XeOF_4 .

(ii) Complete the following chemical equations by identifying the products (Y) and (Z).



cold, dilute



hot, conc

(D) Account for the following :

3

- (i) Write the ionic equation to show the disproportionation of K_2MnO_4 in acidic solution.
- (ii) Transition metals form coloured complexes.
- (iii) Transition metals exhibit catalytic properties.

(E) With reference to p-Block elements, answer the following :

4

- (i) Arrange the hydrides of group 15 elements in the decreasing order of their basicity.
- (ii) Write balanced chemical equation to indicate what happens when white phosphorus is heated with concentrated NaOH solution ?
- (iii) Write the trends in oxidation states of group 15 elements.
- (iv) Write the formulae of Hypophosphorous acid and Orthophosphoric acid.

Or

(E) With reference to p-Block elements, answer the following :

4

- (i) Arrange the hydrides of group 16 elements in the increasing order of their acidic character.

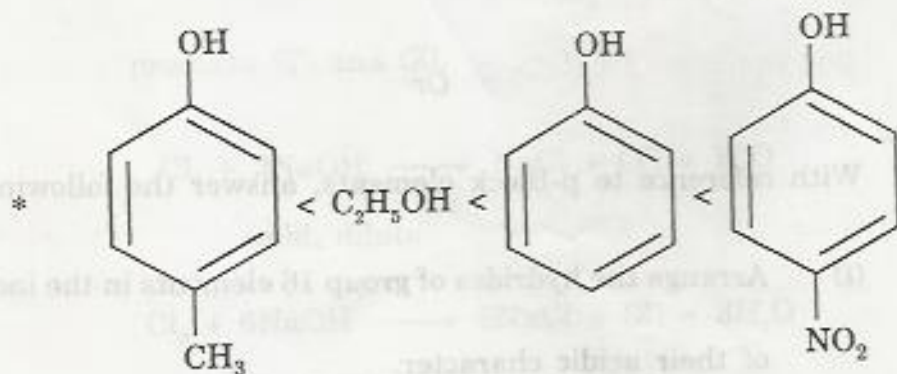
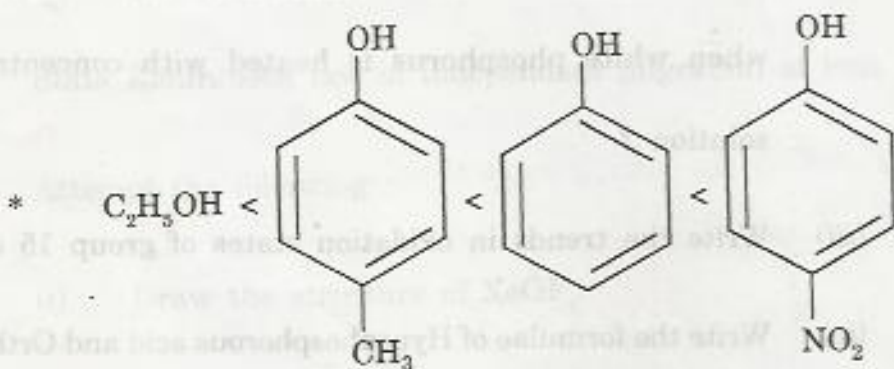
(ii) Write balanced chemical equation to indicate what happens when sulphuric acid is added to the non-metal carbon.

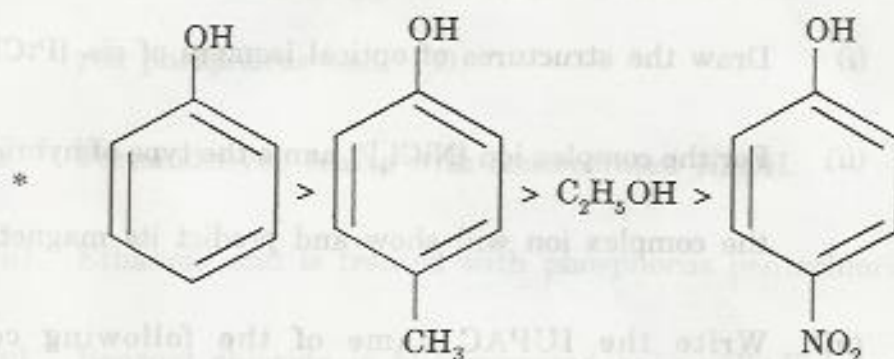
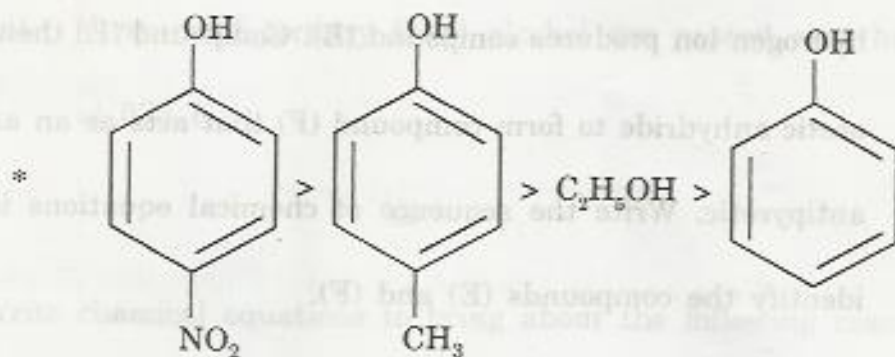
(iii) Write the trends in oxidation states of group 16 elements.

(iv) Write the formulae of sulphurous acid and peroxodisulphuric acid.

5. (A) Select the *correct* alternative from those given below the statement and rewrite the completed statement : 1

The *correct* order of acidic strength among the given aromatic compounds is





- (B) An organic compound (G) having molecular formula $C_5H_{10}O$ reacts with NaOI to form iodoform but does not give silver mirror with Tollen's reagent. From the list of organic compounds given below, identify the compounds (G).

1

Pentan-3-one, pentanal and pentan-2-one.

- (C) An aromatic compound having molecular formula C_6H_6O which is acidic in nature, on reaction with NaOH followed by addition of CO_2 and

hydrogen ion produces compound (E). Compound (E) then reacts with acetic anhydride to form compound (F) that acts as an analgesic and antipyretic. Write the sequence of chemical equations involved and identify the compounds (E) and (F). 2

(D) Write respect to coordination complexes answer the following : 3

- (i) Draw the structures of optical isomers of $\text{cis-}[\text{PtCl}_2(\text{en})_2]^{2+}$.
- (ii) For the complex ion $[\text{NiCl}_4]^{2-}$ name the type of hybridisation that the complex ion will show and predict its magnetic property.
- (iii) Write the IUPAC name of the following coordination compound :



(E) Write chemical equations to bring about the following reactions : 4

- (i) Toluene is heated with alkaline KMnO_4 followed by acidic hydrolysis.
- (ii) Propanone reacts with dilute alkali, $\text{Ba}(\text{OH})_2$ and then readily loses H_2O on heating.
- (iii) Ethanoic acid is treated with thionyl chloride.

- (iv) Vapours of tertiary butyl alcohol are passed over heated Cu at 573 K.

Or

Write chemical equations to bring about the following reactions : 4

- (i) Propionic acid reacts with Br_2 in presence of small amount of red phosphorus and H_2O .
- (ii) Formaldehyde reacts with concentrated NaOH .
- (iii) Ethanoic acid is treated with phosphorus pentachloride.
- (iv) Benzoyl chloride is hydrogenated over palladium on barium sulphate.