SAINIK SCHOOL NALANDA
WINTER VACATION ASSIGNMENT 2024-2025
CHEMISTRY (FROM CLASSES VII TO XII)

Class -VII

Make a project on of Soil test, by the help of china rose solution
Make a project on chemical Changes of every day life, (use, poster, paper Cutting.)
30 MCQ on physical and chemical change

Class-VIII

Make a project on fire extinguisher. (Use diagram poster)
Make a project on biosphere, and national park.
30-MCQs on Combustion and flame.

Class-IX

Make a project on laws of chemical combination (Use diagrams and flowchart).
Make project on Atomic Model.
Write 30 MCQs on - Atoms and molecules.

Class-X

Make a propect on chemical reaction of Metal in everyday life.
Make a project on metallurgical operation (Extraction of metal).
Write 30 MCQs of Metal and Non-metal (CBSE-MCQ).

WINTER BREAK ASSIGNMENT 2024-25
CHEMISTRY XI (043)

1. Thermodynamics is not concerned about.
    (a) energy changes involved in a chemical reaction.
    (b) the extent to which a chemical reaction proceeds.
    (c) the rate at which a reaction proceeds.
    (d) the feasibility of chemical reaction.

2. Which of the following statements is correct?
    (a) The presence of reacting species in a covered beaker is an example of open system.
    (b) There is an exchange of energy as well as matter between the system and the surroundings in a closed system.
    (c) The presence of reactants in a closed vessel made up of copper is an example of a closed system.
    (d) The presence of reactants in a thermos flask or any other closed insulated vessel is an example of a closed system.

3. The state of gas can be described by quoting the relationship between
    (a) pressure, volume, temperature
    (b) temperature, amount, pressure
    (c) amount, volume, temperature
    (d) pressure, volume, temperature, amount.

4. The volume of gas is reduced to half from its original volume. The specific heat will.
    (a) reduce to half (b) be doubled
    (c) remain constant (d) increase four times.

5. During complete combustion of one mole of butane, 2658 kJ of heat is released. The thermochemical reaction for above change is

    (i) $2C_4H_{10}(g) + 13O_2(g) \longrightarrow 8CO_2(g) + 10H_2O(l)\ \Delta_c H = -2658.0\ \text{kJ mol}^{-1}$

    (ii) $C_4H_{10}(g) + \dfrac{13}{2}O_2(g) \longrightarrow 4CO_2(g) + 5H_2O(g)\ \Delta_c H = -1329.0\ \text{kJ mol}^{-1}$

    (iii) $C_4H_{10}(g) + \dfrac{13}{2}O_2(g) \longrightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = -2658.0\ \text{kJ mol}^{-1}$

    (iv) $C_4H_{10}(g) + \dfrac{13}{2}O_2(g) \longrightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = +2658.0\ \text{kJ mol}^{-1}$

6. The enthalpies of elements in their standard states are taken as zero. The enthalpy of formation of a compound
    (a) is always negative
    (b) is always positive
    (c) may be positive or negative
    (d) is never negative

7. Enthalpy of sublimation of a substance is equal to
   (a) enthalpy of fusion + enthalpy of vapourisation
   (b) enthalpy of fusion
   (c) enthalpy of vapourisation
   (d) twice the enthalpy of vapourisation.
8. Which of the following is not correct?
   (a) ΔG is zero for a reversible reaction.
   (b) ΔG is positive for a spontaneous reaction
   (c) ΔG is negative tor a spontaneous reaction
   (d) ΔG is positive for a non-spontaneous reaction.
9. More than One Correct Answer Type
    Thermodynamics mainly deals with
   (a) interrelation of various forms of energy and their transformation front one from to another.
   (b) energy changes in the processes which depend only on initial and final states of the microscopic system containing a few molecules.
   (c) how and at what rate these energy transformations are carried out.
   (d) the system in equilibrium state or moving from one equilibrium state to another equilibrium state.
10. In an exothermic reaction, heat is evolved, and system loses heat to the surroundings. For such system
    (a) q_P will be negative
    (b) $\Delta_V H$ will be negative
    (c) q_p will be positive
    (d) $\Delta_V H$ will be positive.
11. Identify the state functions and path functions out of the following: enthalpy, entropy, heat, temperature, work, free energy.
12. The molar enthalpy of vapourisation of acetone is less than that of water. Why?
13. Predict the change in internal energy for an isolated system at constant volume.
14. Although heat is a path function but heat absorbed by the system under certain specific conditions is independent of path. What are those conditions? Explain.
15. Expansion of a gas in vacuum is called free expansion. Calculate the work done and the change in internal energy when 1 litre of ideal gas expands isothermally into vacuum until its total volume is 5 litre.
16. Heat capacity (C_P) is an extensive property but specific heat (c) is an intensive property. What will be the relation between C_p and c for 1 mol of water?
17. The difference between C_p and C_v can be derived using the empirical relation H = U + pV. Calculate the difference between C_p and C_v for 10 moles of an ideal gas.

18. Choose the correct answer:

A thermodynamic state junction is a quantity

(i) used to determine heat changes

(ii) whose value is independent of path   (iii) used to determine pressure volume work

(iv) whose value depends on temperature only.

19. For the process to occur under adiabatic conditions, the correct condition is:

(i) $\Delta T = 0$ (ii) $\Delta p = 0$

(iii) $q = 0$ (iv) $w = 0$

20. The enthalpies of all elements in their standard states are : '

(i) unity (ii) zero

(iii) < 0 (iv) different for each element

$\Delta U^{\ominus}$ of combustion of methane is $- X$ kJ mol^{-1}. The value of $\Delta H^{\ominus}$ is

(i) $= \Delta U^{\ominus}$ (ii) $> \Delta U^{\ominus}$

(iii) $< \Delta U^{\ominus}$ (iv) 0

21. The enthalpy of combustion of methane, graphite and dihydrogen at 298 K are -890.3 KJ mol^{-1}, – 393.5 KJ mol^{-1} and – 285.8 KJ mol^{-1} respectively. Enthalpy of formation of CHJg) will be

(i) – 74.8 KJ mol^{-1} (ii) – 52.27 KJ mol^{-1}

(iii) + 74.8 KJ mol^{-1} (iv) + 52.26 KJ mol^{-1}

22. A reaction, A + B—>C + D + q is found to have a positive entropy change. The reaction will be

(i) possible at high temperature (ii) possible only at low temperature

(iii) not possible at any temperature (iv) possible at any temperature

23. In a process, 701] of heat is absorbed by a system and 394 J of work is done by the system. What is the change in internal energy for the process?

24. The reaction of cyanamide,$NH_2CN(s)$ with dioxygen was carried out in a bomb calorimeter and ΔU was found to be -742,7 KJ^{-1} mol^{-1} at 298 K. Calculate the enthalpy change for the reaction at 298 K.NH_2CN (S) + 3/2O_2(g) —>N_2(g) + CO_2(g) + H_2O(Z).

25. Calculate the number of kj of heat necessary to raise the temperature of 60 g of aluminium from 35°C to 55°C. Molar heat capacity of Al is 24 J mol^{-1} K^{-1}.

26. Calculate the enthalpy change on freezing of 1.0 mol of water at 10.0°C to ice at – 10.0°C. A, H = 6.03 KJ mot1 at 0°C. Cp [H20(l)J = 75.3 J mol^{-1} K^{-1}; Cp [H20(s)J = 36.8 J mol^{-1} K^{-1}.

27. Enthalpy of combustion of carbon to carbon dioxide is – 393.5 J mol^{-1} · Calculate the heat released upon formation of 35.2 g of CO_2 from carbon and oxygen gas.

28. Calculate the enthalpy of the reaction:

N_2O_4(g) + 3CO(g) ———>N_2O(g) + 3CO_2(g)

Given that; $\Delta_fH^-CO(g) = -110$ kj mot^{-1}; $\Delta_fHCO_2(g) = -393$ kj mol^{-1}

$\Delta_fHN_2O(g) = 81$ kj mot^{-1}; $\Delta_fN_2O_4(g) = 9.7$ kj mol^{-1}

29. Given: $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$; $\Delta_r H^- = -92.4$ kj mot^{-1} What is the standard enthalpy of formation of NH_3 gas?

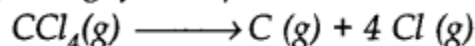30. Calculate the standard enthalpy of formation of CH_3OH. from the following data:

(i) $CH_3OH(l) + 3/2\ O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$; $\Delta_rH^- = -726$ kj mol^{-1}

(ii) $C(s) + O_2(g) \longrightarrow CO_2(g)$; $\Delta_cH^- = -393$ kj mol^{-1}

(iii) $H_2(g) + 1/2O_2(g) \longrightarrow H_2O(l)$; $\Delta_fH^- = -286$ kj mol^{-1}

31.

Calculate the enthalpy change for the process

$$CCl_4(g) \longrightarrow C(g) + 4\ Cl(g)$$

and calculate bond enthalpy of C – Cl in $CCl_4(g)$

Given: $\Delta_{vap}H^\ominus(CCl_4) = 30.5\ kJ\ mol^{-1}$; $\Delta_fH^\ominus(CCl_4) = -135.5\ kJ\ mol^{-1}$

$\Delta_aH^\ominus(C) = 715.0\ kJ\ mol^{-1}$ *where $\Delta_aH^\ominus$ is enthalpy of atomisation*

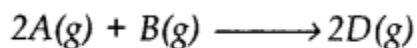$\Delta_aH^\ominus(Cl_2) = 242\ kJ\ mol^{-1}$.

32. For a reaction at 298 K

$2A + B \longrightarrow C$

$\Delta H = 40Q$ kj mot1 and $\Delta S = 0.2$ kj Kr^{-1} mol^{-1}.

At what temperature will the reaction become spontaneous considering ΔH and ΔS to be constant over the temperature range?

33. For an isolated system $\Delta U = 0$; what will be ΔS?

34. For the reaction; $2Cl(g) \longrightarrow Cl_2(g)$; what will be the signs of ΔH and ΔS?

For the reaction

$$2A(g) + B(g) \longrightarrow 2D(g)$$

$$\Delta U^\ominus = -10.5\ kJ\ and\ \Delta S^\ominus = -44.1\ Jk^{-1}$$

Calculate $\Delta G^\ominus$ for the reaction, and predict whether the reaction may occur spontaneously.

35. If $\Delta U = 0$ how are q and w related to each other?

36. When is bond energy equal to bond dissociation energy?

37. What is the enthalpy of formation of the most stable form of an element in its standard state?

38. Out of diamond and graphite, which has greater entropy?

39. At what temperature entropy of a substance is zero?

40. From thermodynamic point of view, to which system the animals and plants belong?

41. Predict the sign of ΔS for the following reaction heat

$CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$

42. State Hess's law.

43. What is the enthalpy change for an adiabatic process?

44. What do you mean by entropy?

45. Give a relation between entropy change and heat absorbed or evolved for a reversible reaction occurring at temperature T.

46. What is the condition for spontaneity in terms of free energy change?

47. What is an adiabatic process?

48. What is free energy in terms of thermodynamics?
49. Define extensive properties.
50. How are internal energy change, free energy change and entropy change are related to one another?
51. How is entropy of a substance related to temperature?
    Define intensive properties.
52. What is Gibbs Helmholtz equation?
53. What are the units of entropy?
54. Prepare your fair copy from U-1 to U-5 those who haven't prepare till now. (VVI)

WINTER BREAK ASSIGNMENT 2024-25
CHEMISTRY XII (043)

10.1. Name the following halides according to the IUPAC system and classify them as alkyl, allyl, benzyl (primary, secondary, tertiary), vinyl, or aryl halides:
(i)$(CH_3)2CHCH(Cl)CH_3$
(ii) $CH_3CH_2CH(CH_3)CH(C_2H_5)Cl$
(iii) $CH_3CH_2C(CH_3)_2CH_2I$
(iv)$(CH_3)3CCH_2CH(Br)C6H_5$
(v)$CH_3CH(CH_3)CH(Br)CH_3$
(vi)$CH_3C(C2H_5)_2CH2Br$
(vii)$CH_3C(Cl)(C_2H_5)CH_2CH_3$
(viii)$CH_3CH=C(Cl)CH_2CH(CH_3)_2$
(ix)$CH_3CH=CHC(Br)(CH_3)_2$
(x)$P-ClC_6H_4CH_2CH(CH_3)_2$
(xi)$m-ClCH_2C_6H_4CH_2C(CH_3)_3$
(xii)$o-Br -C_6H_4CH (CH_3)CH_2CH_3$

10.2. Give the IUPAC names of the following compounds:
(i) $CH_3CH(Cl)CH (Br)CH_3$ (ii) $CHF_2CBrClF$ (iii) $ClCH_2C=CCH_2Br$ (iv) $(CCl_3)_3CCl$
(v)$CH_3C(p-ClC_6H_4)_2CH(Br)CH_3$ (vi)$(CH_3)_3CCH=C(Cl)C_6H_4I -p$
10.3. Write the structures of the following organic halogen compounds:
(i)2-Chloro-3-methylpentane
(ii)p-Bromochlorobenzene
(iii)l-Chloro-4-ethylcyclohexane
(iv)2r (2-Chlorophenyl) -1- iodooctane
(v)2-Bromobutane
(vi)4-tert-Butyl-3-iodoheptane
(vii)1-Bromo-4-sec-butyl-2-methylbenzene
(viii)1,4-Dibromobut-2-ene

10.4. Which one of the following has the highest dipole moment?
(i)CH_3Cl_2 (ii) $CHCl_3$ (iii) CCl_4

10.5. 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.

10.6. Write the isomers of the compound having formula C_4H_9Br.

10.7. Write the equations for the preparation of 1-iodoobutanefrom (i)1-butanol (ii)1-chlorobutane (iii) but-l-ene.

10.8. What are ambident nucleophiles ? Explain with an example.

10.9. Which compound in each of the following-pairs . will react faster in SN2 reaction with -OH? (i)CH_3Br or CH_3I
(ii)$(CH_3)_3CCl$ or CH_3Cl.

10.10. Predict all the alkenes that would be formed by dehydrohalogenation of the following halides with sodium ethoxide in ethanol and identify the major alkene:
(l) 1-Bromo-l-methylcyclohexane
(ii) 2-Chloro-2-methylbutane.
(iii) 2,2,3-Trimethyl-3-bromopentane.

10.11. How will you bring about the following conversions?
(l) Ethanol to but-l-yne.
(ii) Ethane to bromoethene
(iii) Propene to 1-nitropropane
(iv) Toluene to benzyl alcohol
(v) Propene to propyne
(vi) Ethanol to ethyl fluoride
(vii) Bromomethane to propanone
(viii) But-l-ene to but-2-ene
(ix) 1-Chlorobutane to n-octane
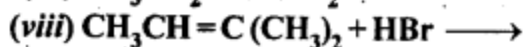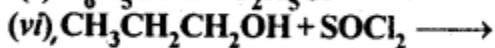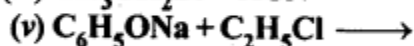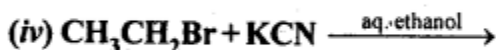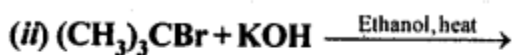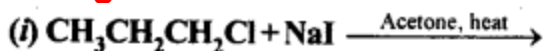**(x) Benzene to biphenyl**

10.12. Explain why
(i) the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?
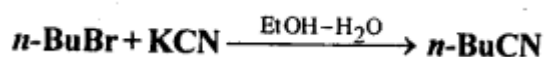**(ii) alkyl halides, though polar, are immiscible with water?**

(iii) Grignard reagents should be prepared under anhydrous conditions?

10.13. Give the uses of freon 12, DDT, carbon tetrachloride, and iodoform.

10.14. Write the structure of the major organic product in each of the following reactions:

(i) $CH_3CH_2CH_2Cl + NaI \xrightarrow{\text{Acetone, heat}}$

(ii) $(CH_3)_3CBr + KOH \xrightarrow{\text{Ethanol, heat}}$

(iii) $CH_3CH(Br)CH_2CH_3 + NaOH \xrightarrow{\text{Water}}$

(iv) $CH_3CH_2Br + KCN \xrightarrow{\text{aq. ethanol}}$

(v) $C_6H_5ONa + C_2H_5Cl \longrightarrow$

(vi), $CH_3CH_2CH_2OH + SOCl_2 \longrightarrow$

(vii) $CH_3CH_2CH=CH_2 + HBr \xrightarrow{\text{Peroxide}}$

(viii) $CH_3CH=C(CH_3)_2 + HBr \longrightarrow$

10.15. Write the mechanism of the following reaction:

$n\text{-BuBr} + KCN \xrightarrow{\text{EtOH}-H_2O} n\text{-BuCN}$

10.16. Arrange the compounds of each set in order of reactivity towards S_N2 displacement:
(i) 2-Bromo-2-methyibutane, 1-Bromopentane, 2-Bromopentane.
(ii) l-Bromo-3-methylbutane, 2-Bromo-2-methylbutane, 3-Bromo-2-methylbutane.
(iii) 1-Bromobutane, l-Bromo-2,2-dimethylpropane, l-Bromo-2-methylbutane, l-Bromo-3-methyl butane.

10.17. Out of $C_6H_5CH_2Cl$ and $C_6H_5CHClC_6H_5$ which is more easily hydrolysed by aqueous KOH.
10.18. p-dichlorobenzene has higher m.p. and lesser solubility than those of o-and m-isomers. Discuss. (C.B.S.E. Delhi 2013)
10.19. How the following conversions can be carried out:
(i) Propene to propan-l-ol (ii) Ethanol to but-l-yne
(iii) l-Bromopropane to 2-bromopropane (iv) Toluene to benzyl alcohol
(v)Benzene to 4-bromonitrobenzene (vi) Benzyl alcohol to 2-phenylethanoic acid
(vii)Ethanol to propanenitrile (viii) Aniline to chlorobenzene

(ix)2-Chlorobutane to 3,4-dimethylhexane (x) 2-Methyl-1 -propene to 2-chk>ro-2-methylpropane.
(xi)Ethyl chloride to propanoic acid (xii) But-1-ene to n-butyliodide
(xiii)2-Chlropropane to 1-propanol (xiv) Isopropyl alcohol to iodoform
(xv)Chlorobenzene to p-nitrophenol (xvi) 2-Bromopropane to 1-bromopropane
(xvii)Chloroethane to butane , (xviii) Benzene to diphenyl
(xix) tert-Butyl bromide to isobutyl bromide (xx) Aniline to phenylisocyanide.

10.20. The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in presence of alcoholic KOH, alkenes are major products. Explain. (Pb. Board 2009, Haryana Board 2013)
10.21. Primary alkyl halide C_4H_9Br (a) reacted with alcoholic KOH to give compound (b) Compound (b) is reacted, with HBr to give (c) which is an isomer of (a). When (a) is reacted with sodium metal it give compound (d), C_8H_{18} which is different from the compound formed when n-butyl bromide is reacted with sodium. Give the structural formula of (a) and write the equations for all the reactions..

10.22. What happens when .
(i) n-butyi chloride is treated with alcoholic KOH.
(ii) bromobenzene is treated with Mg in the presence of dry ether.
(iii) chlorobenzene is subjected to hydrolysis.
(iv) ethyl chloride is treated with aqueous. KOH.
(v) methyl bromide is treated with sodium in the presence of dry ether,
(vi) methyl chloride is treated with KCN.

10.23. Prepare your fair copy from U-1 to U-5 those who haven't prepare till now. (VVI)
10.24 Write structures of the following compounds:
(i) 2-Chloro-3-methylpentane
(ii) 1-Chloro-4-ethylcydohexane
(iii) 4-tert. Butyl-3-iodoheptane
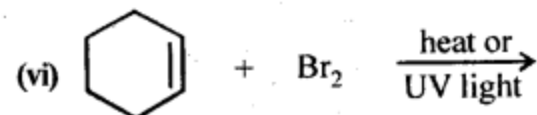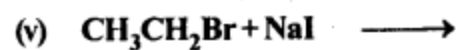(iv) 1,4-Dibromobut-2-ene
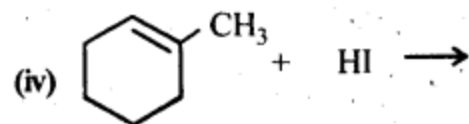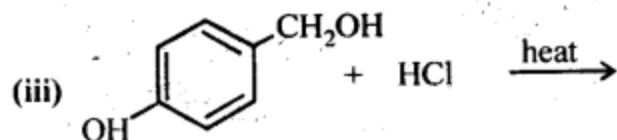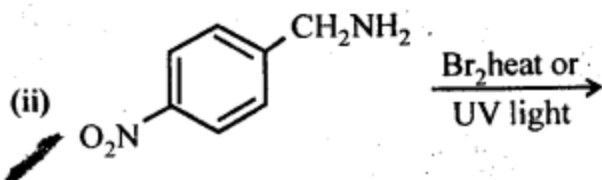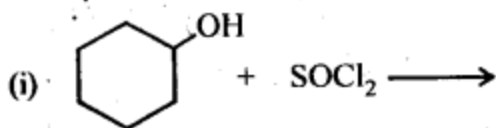(v) 1-Bromo-4-sec. butyl-2-methylbenzene.

10.25. Why is sulphuric acid not used during the reaction of alcohols with KI?
10.26. Write structures of different dihalogen derivatives of propane.

10.27. Among the isomeric alkanes of molecular formula C₅H₁₂, identify the one that on photochemical chlorination yields
(i) A single monochloride.
(ii) Three isomeric monochlorides.
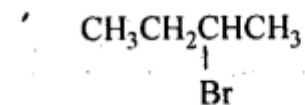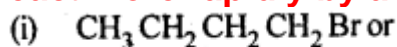**(iii) Four isomeric monochlorides.**

10.28. Draw the structures of major monohalo products in each of the following reactions:

(i)

    + SOCl₂ ⟶

(ii)

$\xrightarrow[\text{UV light}]{\text{Br}_2\text{heat or}}$

(iii)

+ HCl $\xrightarrow{\text{heat}}$

(iv)

+ HI ⟶

(v) CH₃CH₂Br + NaI ⟶
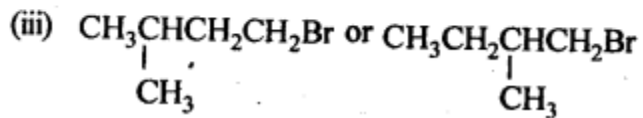
(vi)

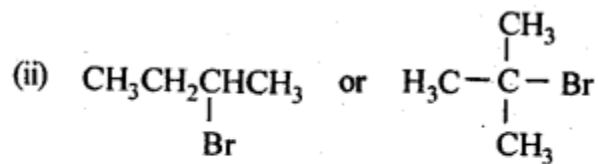+ Br₂ $\xrightarrow[\text{UV light}]{\text{heat or}}$

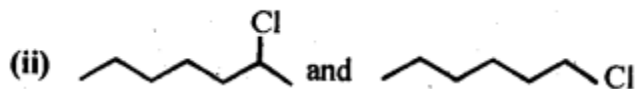**10.29. Arrange each set of compounds in order of increasing boiling points :**
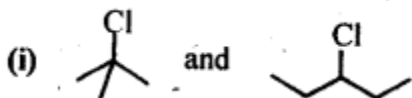**(i) Bromomethane, bromoform, chloromethane, dibromomethane**
(ii) 1- Chloropropane, isopropylchloride, 1- chlorobutane.
10.30. Which alkyl halide from the following pairs would you expect to react more rapidly by an Sₙ2 mechanism? Explain your answer.
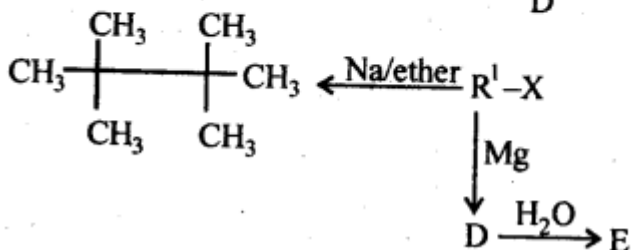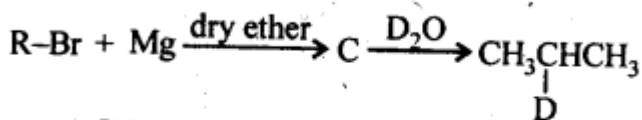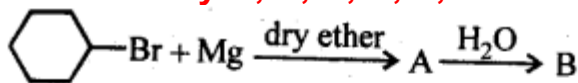(i)   CH₃ CH₂ CH₂ CH₂ Br or

    CH₃CH₂CHCH₃
           |
        Br

(ii) $CH_3CH_2CHCH_3$ or $H_3C-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}}-Br$
            $\overset{|}{Br}$

(iii) $CH_3\overset{\overset{\displaystyle .}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{CH}}CH_2CH_2Br$ or $CH_3CH_2\overset{|}{\underset{\underset{\displaystyle CH_3}{|}}{CH}}CH_2Br$

10.31. In the following pairs of halogen compounds, which compound undergoes faster S_N1 reaction?

(i)   and

(ii)   and

10.32. Identify A, B, C, D, E, R and R¹ in the following:

$$\text{—Br} + Mg \xrightarrow{\text{dry ether}} A \xrightarrow{H_2O} B$$

$$R-Br + Mg \xrightarrow{\text{dry ether}} C \xrightarrow{D_2O} CH_3\overset{\overset{}{}}{\underset{\underset{\displaystyle D}{|}}{C}}HCH_3$$

$$CH_3-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}}-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}}-CH_3 \xleftarrow{\text{Na/ether}} R^1-X$$

$$\downarrow Mg$$

$$D \xrightarrow{H_2O} E$$

10.33. 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.