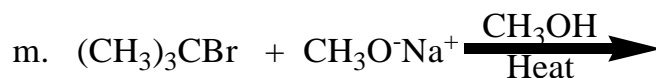
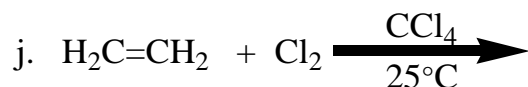
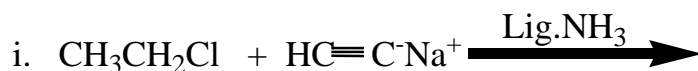
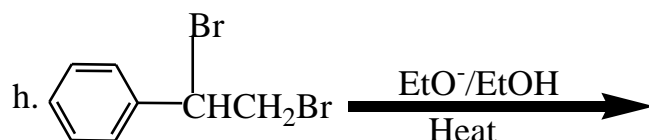
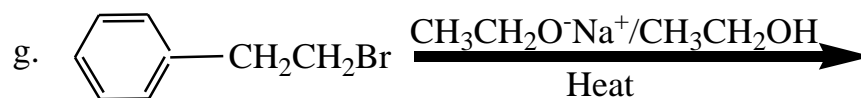
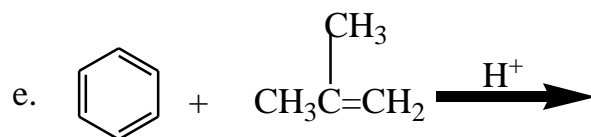
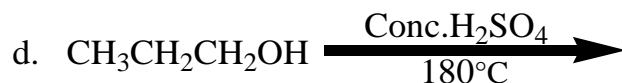
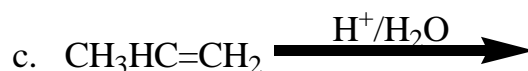
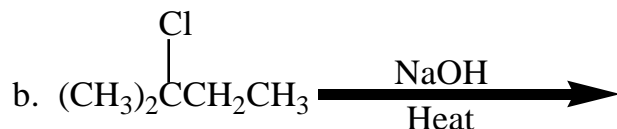
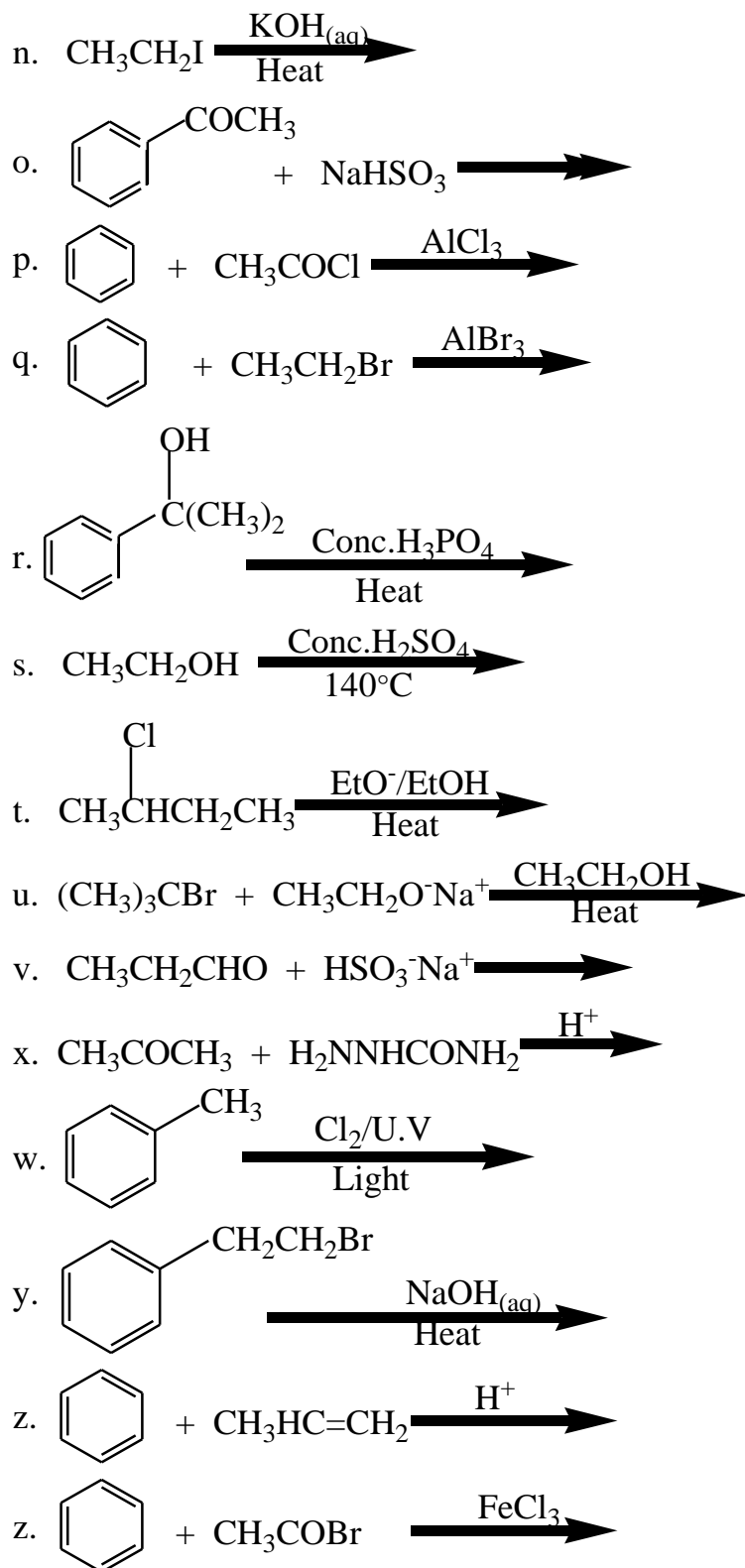


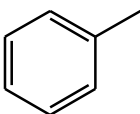


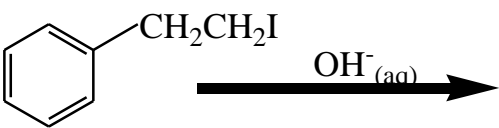
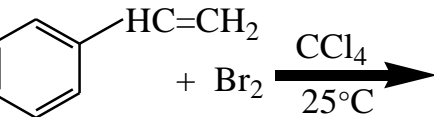

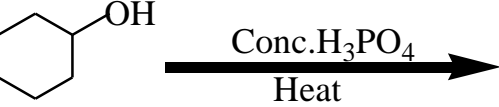
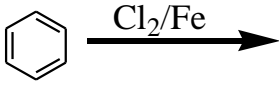
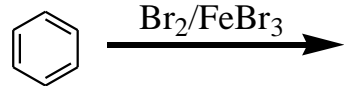
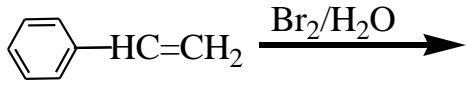
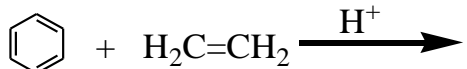
Name:.....

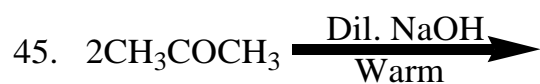
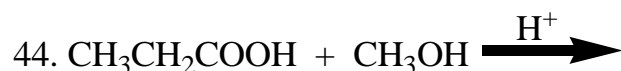
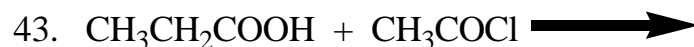
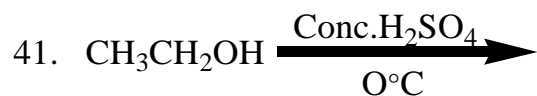
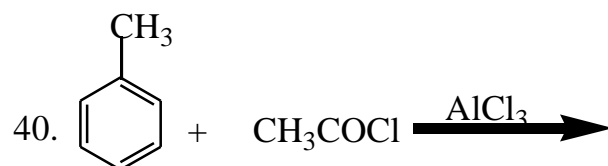
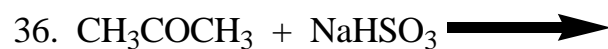
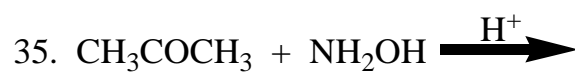
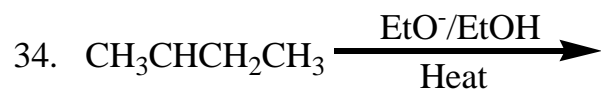
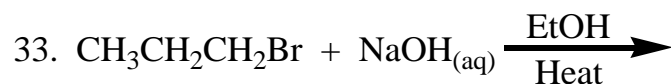
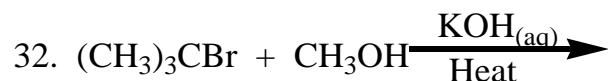
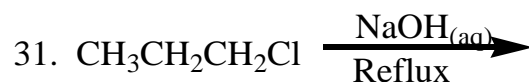
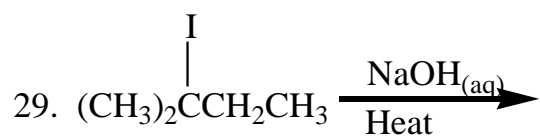
1. Complete the following equations and write the accepted mechanism for the reaction in each case.


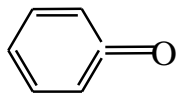
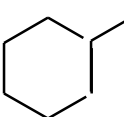
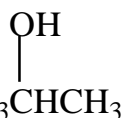
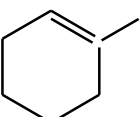
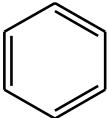
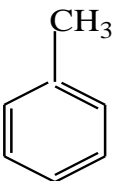
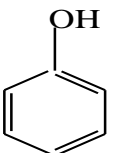


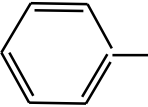

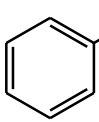
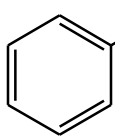


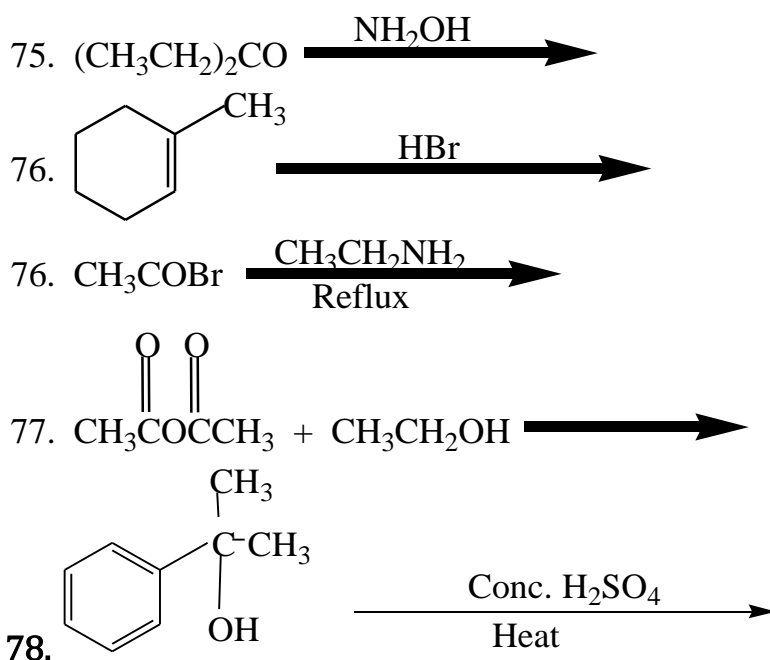
1. $\text{CH}_3\overset{\text{OH}}{\text{C}}\text{HCH}_3 \xrightarrow[\text{Heat}]{\text{Conc. H}_2\text{SO}_4}$
2. $(\text{CH}_3)_3\text{COH} \xrightarrow[\text{Heat}]{\text{Conc. H}_2\text{SO}_4(l)}$
3. $(\text{CH}_3)_3\text{CBr} \xrightarrow[\text{Heat}]{\text{C}_2\text{H}_5\text{O}^-\text{K}^+/\text{C}_2\text{H}_5\text{OH}}$
4. $\text{CH}_3\text{HC}=\text{CHCH}_3 \xrightarrow{\text{Conc. H}_2\text{SO}_4/\text{H}_2\text{O}}$
5. $\text{CH}_3\text{CHO} + \text{NaHSO}_3 \longrightarrow$
6. $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{CH}_3\text{CH}_2\text{O}^-\text{Na}^+ \xrightarrow[\text{Heat}]{\text{CH}_3\text{CH}_2\text{OH}}$
7.  + $\text{Br}_2 \xrightarrow{\text{Fe}_{(s)}/\text{Heat}}$
8.  + $\text{CH}_3\text{HC}=\text{CH}_2 \xrightarrow{\text{H}_2\text{SO}_4}$
9. $(\text{CH}_3)_3\text{C}=\text{O} + \text{C}_6\text{H}_5\text{NHNH}_2 \xrightarrow{\text{H}^+}$
10. $\text{CH}_3\text{CH}_2\text{CHO} + \text{C}_6\text{H}_5\text{NHNH}_2 \xrightarrow{\text{H}^+}$
11.  $\xrightarrow[\text{Heat}]{\text{OH}^-(aq)}$
12. $\text{CH}_3\text{CH}_2\text{CHO} + \text{NH}_2\text{NH}_2 \xrightarrow{\text{H}^+}$
13. $\text{CH}_3\overset{\text{OH}}{\text{C}}\text{HCH}_3 \xrightarrow[\text{Heat}]{\text{Conc. H}_2\text{SO}_4}$
14. $\text{CH}_3\text{HC}=\text{CHCH}_3 \xrightarrow{\text{Cl}_2/\text{H}_2\text{O}}$

15. $(\text{CH}_3)_2\text{C}=\text{CH}_2 + \text{I}_2 \xrightarrow[25^\circ\text{C}]{\text{CCl}_4}$
16.  $\xrightarrow{\text{OH}^-_{(\text{aq})}}$
17.  $+ \text{Br}_2 \xrightarrow[25^\circ\text{C}]{\text{CCl}_4}$
18.  $+ \text{CH}_3\text{COCl} \xrightarrow{\text{AlCl}_3}$
19.  $\xrightarrow[\text{Heat}]{\text{Conc. H}_3\text{PO}_4}$
20. $\text{CH}_3\text{COCH}_2\text{CH}_3 + \text{C}_6\text{H}_5\text{NHNH}_2 \xrightarrow{\text{H}^+}$
21.  $\xrightarrow{\text{Cl}_2/\text{Fe}}$
22.  $\xrightarrow{\text{Br}_2/\text{FeBr}_3}$
23. $\text{CH}_3\text{C}(\text{CH}_3)=\text{CHCH}_3 + \text{Conc. H}_2\text{SO}_4 \xrightarrow[\text{Warm}]{\text{H}_2\text{O}}$
24.  $\xrightarrow{\text{Br}_2/\text{H}_2\text{O}}$
25. $\text{CH}_3\text{BrCH}_2\text{Br} \xrightarrow[\text{Heat}]{\text{Excess KOH}_{(\text{aq})}/\text{EtOH}}$
26. $\text{CH}_3\text{HC}=\text{CH}_2 + \text{Cl}_2 \xrightarrow[25^\circ\text{C}]{\text{CCl}_4}$
27. $\text{CH}_3\text{HC}=\text{CH}_2 + \text{Br}_2 \xrightarrow{\text{H}_2\text{O}}$
28.  $+ \text{H}_2\text{C}=\text{CH}_2 \xrightarrow{\text{H}^+}$




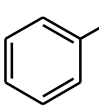
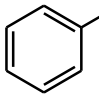
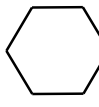
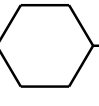
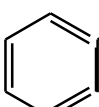
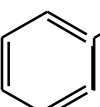
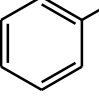
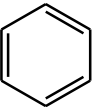
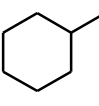
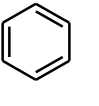
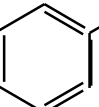
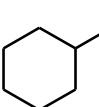
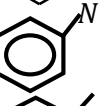
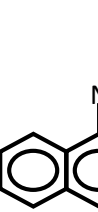
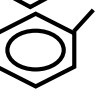

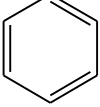
46.  + Conc.HNO₃ $\xrightarrow[55^{\circ}\text{C}]{\text{Conc.H}_2\text{SO}_4}$
47. CH₃CH₂CH₂OH $\xrightarrow[\text{Heat}]{\text{Conc.H}_3\text{PO}_4}$
48. CH₃COOCH₃ + H₂O $\xrightarrow{\text{OH}^-_{(\text{aq})}}$
49.  $\xrightarrow{\text{KCN/CH}_3\text{COOH}}$
50. CH₃COCH₃ + HCN_(aq) \longrightarrow
51. (CH₃)₃COH + Conc.HCl $\xrightarrow{\text{Anhyd.ZnCl}_2}$
52.  + CH₃COCl \longrightarrow
53. (CH₃)₃COH + HCl \longrightarrow
54.  $\xrightarrow[\text{Heat}]{\text{Conc.H}_3\text{PO}_4}$
55. CH₃CH₂HC=CH₂ $\xrightarrow[\text{Heat or Light}]{\text{HBr/ROOR}}$
56.  $\xrightarrow{\text{Cl}_2/\text{H}_2\text{O}}$
57.  + CH₃CH₂COCl $\xrightarrow[40^{\circ}\text{C}]{\text{AlCl}_3/\text{CS}_2}$
58.  + Conc.HNO₃ $\xrightarrow[\text{Heat}]{\text{Conc.H}_2\text{SO}_4}$
59.  + Conc.HNO₃ $\xrightarrow{\text{Conc.H}_2\text{SO}_4}$

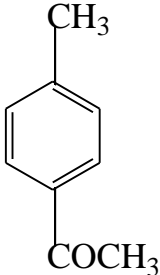
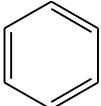
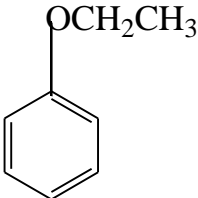
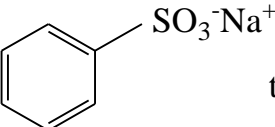
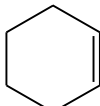
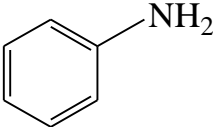
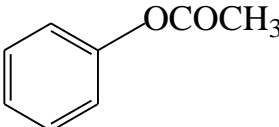
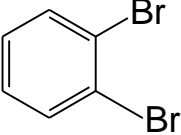
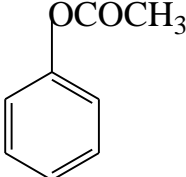
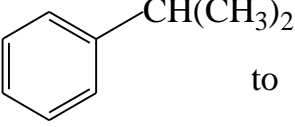
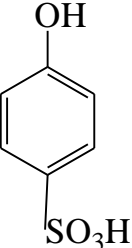
60. $\text{CH}_3\text{COCH}_3 \xrightarrow[\text{Dil. H}_2\text{SO}_4]{\text{NaCN/H}_2\text{O}}$
61.  + KCN \longrightarrow
62. $\text{CH}_3\text{COCl} +$  $\xrightarrow[50^\circ\text{C}]{\text{FeCl}_3}$
63. $\text{CH}_3\text{HC}=\text{CH}_2 \xrightarrow[\text{Cold}]{\text{MnO}^-_{(\text{aq})}/\text{OH}^-_{(\text{aq})}}$
64.  + $\text{CH}_3\text{C}\equiv\text{CH} \xrightarrow{\text{Na}_{(\text{s})}/\text{Liq. NH}_3}$
65. $\text{CH}_3\text{CHO} \xrightarrow[\text{H}^+/\text{H}_2\text{O}]{\text{CH}_3\text{CH}_2\text{MgCl/Ether}}$
66. $\text{CH}_3\text{COCH}_3 \xrightarrow[\text{H}^+/\text{H}_2\text{O}]{\text{CH}_3\text{CH}_2\text{MgCl/Ether}}$
67. $\text{CH}_3\overset{\text{OH}}{\text{CH}}\text{CH}_3 \xrightarrow[\text{Heat}]{\text{I}_2/\text{NaOH}}$
68. $\text{CH}_3\text{CH}_2\text{MgBr} + \text{CO}_{2(\text{s})} \xrightarrow{\text{H}^+/\text{H}_2\text{O}}$
69.  $\xrightarrow[\text{Heat}]{\text{NH}_2\text{OH}/\text{H}^+}$
70. $\text{H}_2\text{C}=\text{CH}_2 + \text{H}_2\text{O} \xrightarrow[60^\circ\text{C}]{\text{H}_2\text{SO}_4/\text{HgSO}_4}$
71. $\text{CH}_3\overset{\text{Br}}{\text{CH}}\overset{\text{Br}}{\text{CH}}\text{CH}_3 \xrightarrow[\text{Heat}]{\text{NH}_2\text{OH}/\text{H}^+}$
72. $\text{CH}_3\text{COCl} + \text{CH}_3\text{NH}_2 \longrightarrow$
73. $\text{CH}_3\text{CH}_2\text{COCl} + \text{NH}_3 \longrightarrow$
74. $\text{CH}_3\text{CH}_2\text{COCl} + \text{CH}_3\text{COO}^- \text{Ag}^+ \longrightarrow$

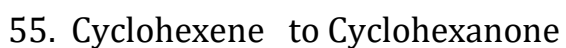
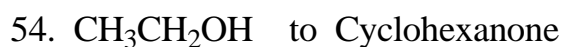
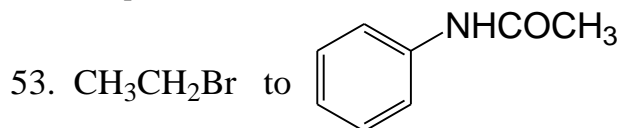
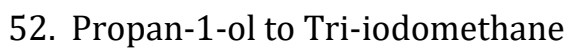
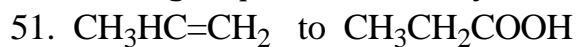
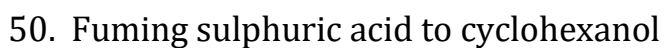
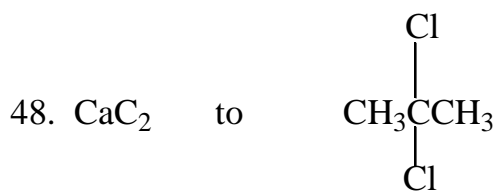
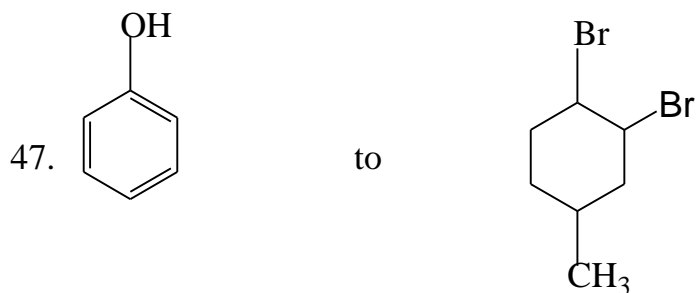
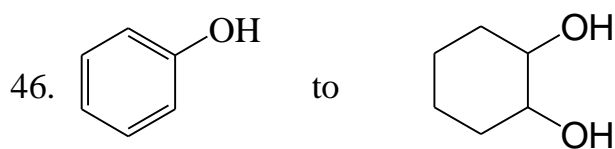
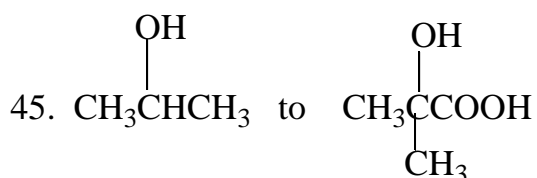
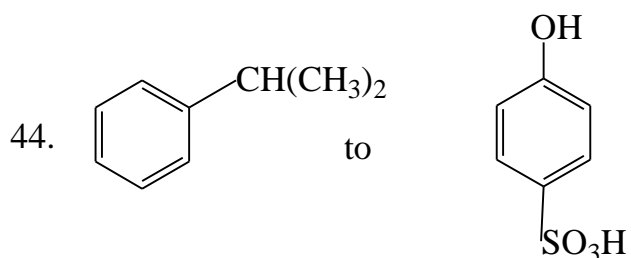


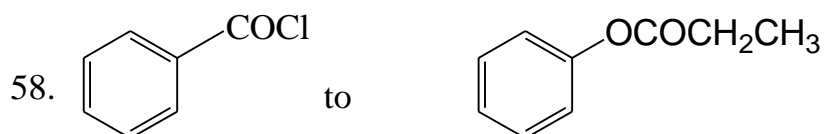
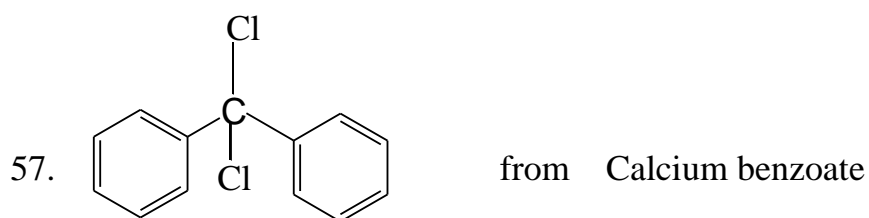
2. Show how the following conversion can be effected and in each case, indicate the reagents and conditions for the reactions.

1. $(\text{CH}_3)_3\text{CHOH}$ from ethene
2. $(\text{CH}_3)_3\text{CHOH}$ from $\text{CH}_3\text{CH}_2\text{Br}$
3. $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ from pentene
4. Phenol from 2-phenylpropane
5. Benzene from phenylmethanol
6. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ from propan-1-ol
7. Ethanoylchloride from ethane
8. Phenylbenzoate from phenylamine
9. Phenol from nitrobenzene
10. $\text{CH}_3\text{CH}_2\text{NH}_2$ from $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
11. $\text{CH}_3\text{CH}_2\text{OH}$ from $\text{CH}_3\text{CH}_2\text{COCl}$
12. $\text{CH}_3\text{CH}_2\text{COOH}$ from $\text{CH}_3\text{CH}_2\text{OH}$
13. CH_3COCH_3 from $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
14. But-2-yne from propene
15. Ethene from propan-2-ol
16. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ from ethane
17. Propene from acetic acid
18. $\text{CH}_3\text{CONHCH}_2\text{CH}_3$ from CH_3Br
19. Cyclohexene from aminobenzene
20. $\text{CH}_3\text{CH}_2\text{NH}_2$ from $\text{CH}_3\text{CH}_2\text{COOH}$
21. Phenylamine from benzoic acid
22. Phenylmethanol from benzene
23. $(\text{CH}_3)_2\text{C}=\text{NOH}$ from ethanol

25.  from Cyclohexene
26.  from 
27.  from Benzene
28.  from Benzene
29.  from 
30.  from 
31.  from 
32.  from Benzaldehyde
33.  from Cyclohexene
34.  to 
35.  to 
36. $(\text{CH}_3)_2\text{CHBr}$ to $(\text{CH}_3)_2\text{C} = \text{N} - \text{OH}$
37.  from CaCO_3

38. CaO to 
39.  to 
40.  to 
41.  to 
42. $\text{BrCH}_2\text{CH}_2\text{Br}$ to 
43. $\text{CH}_3\text{HC}=\text{CH}_2$ to 
44.  to 



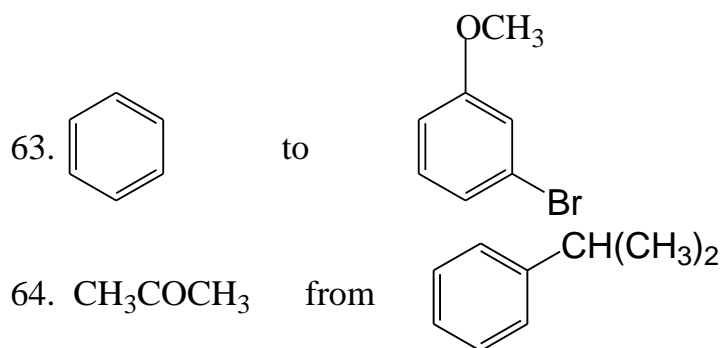


59. 2-methylpropene from 1,2-dibromopropane

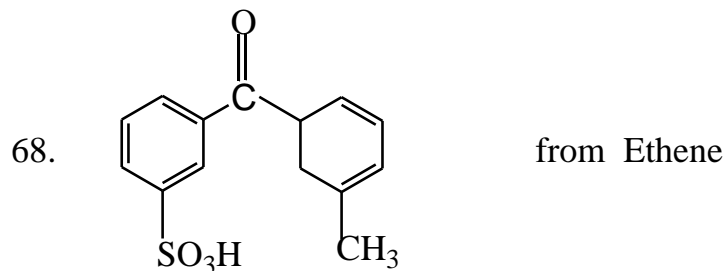
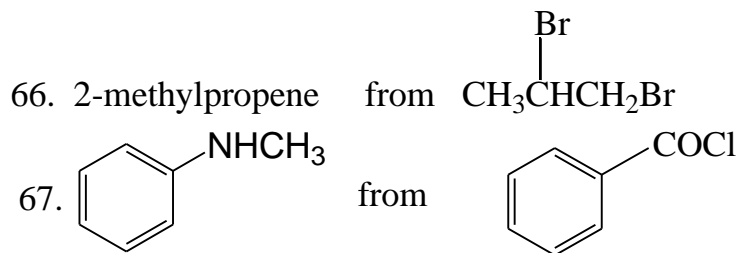
60. Cyclohexene from 2-phenylpropane

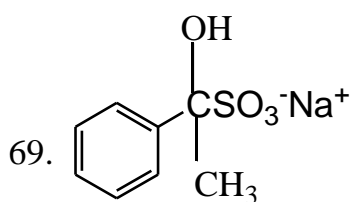
61. Ethyne to Benzaldehyde

62. Bromobenzene to Benzoic acid

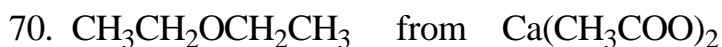


65. Nylon 6, 6 from phenol

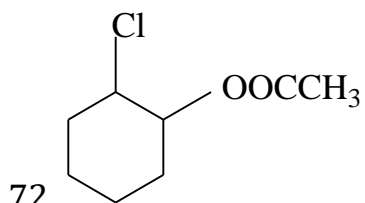




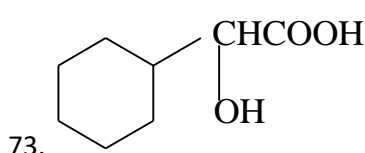
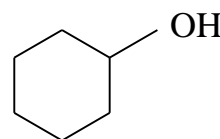
from Ethanol



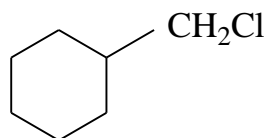
71. Nitrobenzene to Iodobenzene



from



from



3. Name the reagents used to distinguish between each of the followings and in each case, state what would be observed and write equations of reactions where possible.

Part A Inorganic branch of chemistry:

1) Br^- and I^-

Reagent: Lead (II) nitrate solution

Observation:

- ✓ Pale yellow precipitate is formed with bromide, Br^- ion.
- ✓ Bright yellow precipitate is formed with iodide, I^- ion.

2) Zn^{2+} and Al^{3+}

Reagent: Aqueous Ammonia solution

Observation:

- ✓ White precipitate soluble in excess aqueous ammonia solution forming a colourless solution with zinc, Zn^{2+} ion.
- ✓ White precipitate insoluble in excess aqueous ammonia solution is formed with Aluminium, Al^{3+} ion.

3) Fe^{3+} and Cr^{3+}

Reagent: Aqueous sodium hydroxide solution.

Observation:

- ✓ A brown precipitate insoluble in excess aqueous sodium hydroxide solution is formed with iron, Fe^{3+} ion.
- ✓ A green precipitate is soluble in excess aqueous sodium hydroxide solution is formed with chromium, Cr^{3+} ion.

4) Mg^{2+} and Ba^{2+}

Reagent: Dilute sulphuric acid.

Observation:

- ✓ No observable change occurs with magnesium, Mg^{2+} ion.
- ✓ A white precipitate is formed with barium, Ba^{2+} ion.

5) Fe^{3+} and Fe^{2+}

Reagent: Potassium hexacyanoferrate (II) solution.

Observation:

- ✓ Deep blue precipitate is formed with iron, Fe^{3+} ion.
- ✓ No observable change occurs with iron, Fe^{2+} ion.

6) Pb^{2+} and Zn^{2+}

Reagent: Potassium iodide solution.

Observation:

- ✓ Yellow precipitate is formed with lead (II), Pb^{2+} ion.
- ✓ Yellow solution is formed with zinc (II), Zn^{2+} ion.

7) FeO and NiO

Reagent: Dilute nitric acid followed by potassium hexacyanoferrate (III) solution

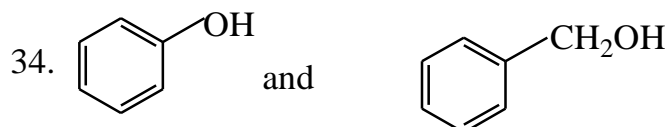
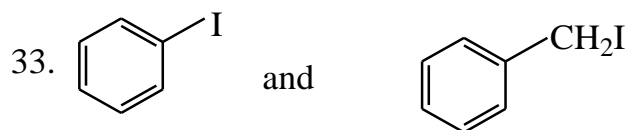
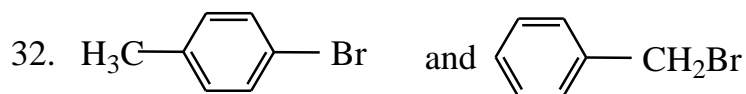
Observation:

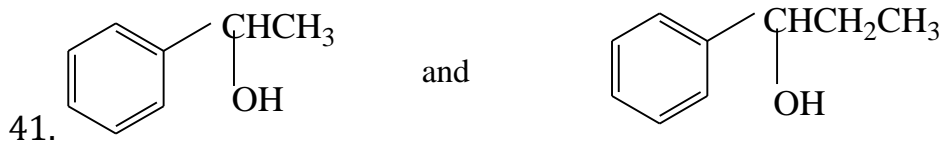
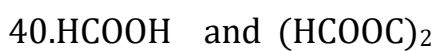
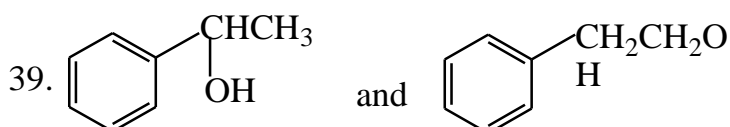
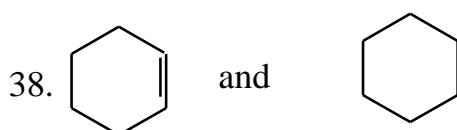
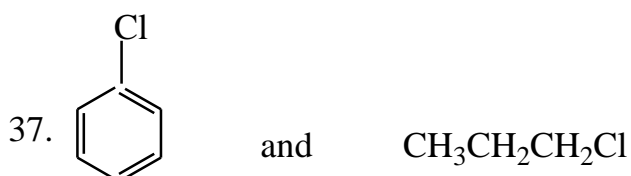
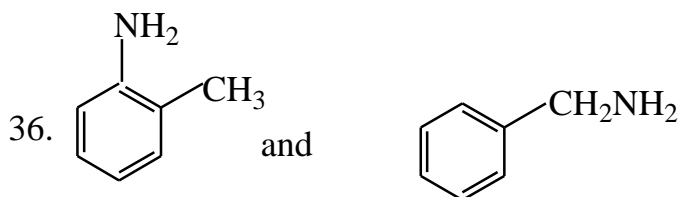
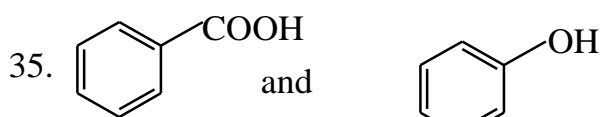
- ✓ Dark blue precipitate is formed with iron (II) oxide.
- ✓ No observable change occurs with nickel (II) oxide.

1. Ni^{2+} and Cr^{3+}
2. Ca^{2+} and Ba^{2+}
3. Ca^{2+} and Mg^{2+}
4. Al^{3+} and Pb^{2+}
5. Sn^{4+} and Sn^{2+}
6. Pb^{2+} and Ag^+
7. Mn^{2+} and Pb^{2+}
8. SO_4^{2-} and SO_3^{2-}
9. CO_3^{2-} and Cl^-
10. HCO_3^- and CO_3^{2-}
11. Cl^- and F^-
12. NO_3^- and NO_2^-
13. SO_3^{2-} and $\text{S}_2\text{O}_3^{2-}$
14. $\text{C}_2\text{O}_4^{2-}$ and HCO_3^-
15. Br^- and Cl^-

Part B Organic branch of chemistry:

16. HCOO^- and CH_3COO^-
17. $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}_3$
18. CH_3CHO and $\text{CH}_3\text{CH}_2\text{CHO}$
19. $\text{CH}_3\text{CH}_2\text{NH}_2$ and $\text{CH}_3\text{CH}_2\text{NHCH}_3$
20. $\text{CH}_3(\text{CH}_2)_3\text{OH}$ and $(\text{CH}_3)_3\text{COH}$
21. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ and $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$
22. $\text{CH}_3\text{CH}_2\text{CH}_2\text{I}$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
23. $\text{C}_6\text{H}_5\text{CHO}$ and $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$
24. $\text{CH}_3\text{CH}_2\text{COOH}$ and $\text{CH}_3\text{COOCH}_3$
25. $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$ and $\text{CH}_3\text{COCH}_2\text{CH}_3$
26. $\text{C}_6\text{H}_5\text{CHO}$ and $\text{C}_6\text{H}_5\text{CH}_2\text{COCH}_3$
27. CH_3OH and $\text{CH}_3\text{CH}_2\text{OH}$
28. HCOOH and CH_3COOH
29. CH_3CHO and $\text{CH}_3\text{CH}_2\text{CHO}$
30. Ethene and Ethyne
31. Propan-1-ol and 2-Methylpropan-2-ol





42.

4. Write the half-cell equations for the following conversions from 01 to 06 while 07 to 15 complete the half-cell equations.

1. $\text{S}_2\text{O}_8^{2-}$ to SO_4^{2-}
2. SO_3^{2-} to SO_4^{2-}
3. NO_2^- to NO_3^-
4. Mn^{2+} to MnO_2^-
5. MnO_2^- to MnO_4^{2-}
6. Mn^{2+} to MnO^{2-}
7. $\text{S}_2\text{O}_8^{2-}$ + I^-
8. Mn^{2+} + $\text{S}_2\text{O}_8^{2-}$
9. Sn^{2+} + $\text{S}_2\text{O}_8^{2-}$
10. Fe^{2+} + $\text{S}_2\text{O}_8^{2-}$
11. Cl^- + SO_3^{2-}
12. Fe^{3+} + SO_3^{2-}
13. $\text{Cr}_2\text{O}_7^{2-}$ + SO_3^{2-}
14. MnO_4^- + SO_3^{2-}
15. $\text{Cr}_2\text{O}_7^{2-}$ + NO_2^-

5. Write the names of the following compounds and state their oxidation states and coordination numbers.

Structres	Names	O.S	C.N
$[\text{Co}(\text{H}_2\text{O})_6]^{3+}$			
$[\text{Fe}(\text{CN})_6]^{3-}$			
$\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]2\text{H}_2\text{O}$			
$[\text{Fe}(\text{CO})_5]$			

Structures	Names	O.S	C.N
[Cu(NH ₃) ₄] ²⁺			
[Cr(H ₂ O) ₄ (NH ₃) ₂] ³⁺			
[Pt(NH ₃) ₂ NO ₂ Cl] ²⁺			
[Co(NH ₃) ₅ SO ₄]Br			
[Cu(NH ₃) ₄ (H ₂ O)]SO ₄			
[Cr(H ₂ O) ₆]Cl			
[Co(NH ₂ CH ₂ CH ₂ NH ₂) ₃]Cl ₃			
[Cu(CN) ₄] ³⁻			
[Cu(NH ₃) ₂ (H ₂ O) ₂] ²⁺			
[Co(NH ₃) ₆] ³⁺			
[SiF ₆] ²⁻			
[SnCl ₆] ²⁻			
H ₂ SiF ₆			
[Fe(CN) ₅ NO] ⁻			
[Pt(NH ₃)(NO ₂)Cl] ²⁺			
[CrCl ₂ (H ₂ O)] ⁺			
[Co(NH ₃) ₅ Br] ²⁺ SO ₄ ²⁻			
[Co(NH ₃) ₅ SO ₄] ⁺ Br ⁻			
[Ni(NH ₃) ₆] ²⁺			
[Ag(NH ₃) ₂] ⁺			
[Cu(H ₂ O) ₄] ²⁺			
Al ₄ ⁻			
[Fe(CN) ₆] ²⁺			
[Fe(CN) ₆] ⁴⁻			
[Zn(NH ₃) ₄] ²⁺			
[Zn(OH) ₄] ²⁻			
[Zn(CN) ₄] ²⁻			
[Zn(H ₂ O) ₆] ²⁺			
[Cu(H ₂ O) ₆] ²⁺			
[Cu(NH ₃) ₂] ⁺			
[CuCl ₄] ²⁻			
[NiCl ₄] ²⁻			
[Ni(H ₂ O) ₆] ²⁺			
[Co(H ₂ O) ₆] ²⁺			
[Co(CN) ₆] ³⁻			
Na ₃ [Co(NO ₂) ₆]			
K ₃ [Co(NO ₂) ₆]			
[CoCl ₄] ²⁻			
[Co(CN) ₆] ³⁻			
[Co(NH ₃) ₆] ²⁺			

END SUCCESS