

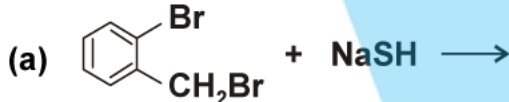
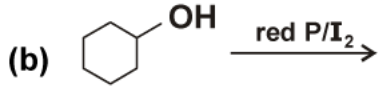
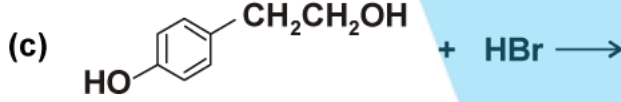


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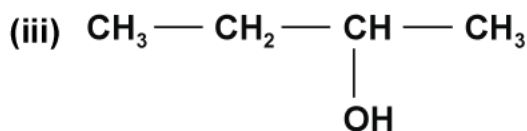
Time : 6 hr

Total Marks = 91

Date: 25/10/2017

- Q1. Draw the structures of optical isomers of :** **3**
- (a) $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3\ominus}$ (b) $[\text{PtCl}_2(\text{en})_2]^{2\oplus}$ (c) $[\text{Cr}(\text{NH}_3)_2\text{Cl}_2(\text{en})]^\oplus$
- Q2. Draw the structures of** **3**
- (a) *mer*-triamminetrichloridocobalt (III)
(b) *fac*-triaquatrininitrito-N-cobalt (III)
(c) *cis*-dichloridotetracyanachromate (III)
- Q3. Name the following coordination entities and draw the structures of their stereoisomers:** **3**
- (a) $[\text{Co}(\text{en})_2\text{Cl}_2]^\oplus$ (b) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$ (Atomic numbers Co = 27)
- Q4. Write the following:** **3**
- (a) Ionisation isomer of $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$
(b) Linkage isomer of $[\text{Co}(\text{NH}_3)_5\text{ONO}]\text{Cl}_2$
(c) Coordination isomer of $[\text{Cu}(\text{NH}_3)_4][\text{PtCl}_4]$
- Q5. Write the structure of the major organic product in each of the following reactions:** **3**
- (a)  + NaSH \longrightarrow
- (b)  $\xrightarrow{\text{red P/I}_2}$
- (c)  + HBr \longrightarrow
- Q6. Predict all the alkenes that would be formed by dehydrohalogenation of the following halides with sodium ethoxide in ethanol and identify major alkene.** **3**
- (a) 2-Chloro-2-methylbutane (b) 3-Bromopent-1-ene
(c) 2,2,3-Trimethyl-3-bromopentane
- Q7. Arrange the following compounds in increasing order of $\text{S}_{\text{N}}1$ reactivity.** **3**
- (a) (i) $\text{ClCH}_2\text{CH}=\text{CHCH}_2\text{CH}_3$ (ii) $\text{CH}_3\text{C}(\text{Cl})=\text{CHCH}_2\text{CH}_3$
(iii) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{Cl}$ (iv) $\text{CH}_3\text{CH}=\text{CHCH}_2(\text{Cl})\text{CH}_3$
- (b) (i) $\text{CH}_3\text{CH}_2\text{Br}$ (ii) $\text{CH}_2=\text{CHCH}(\text{Br})\text{CH}_3$
(iii) $\text{CH}_2=\text{CHBr}$ (iv) $\text{CH}_3\text{CH}(\text{Br})\text{CH}_3$
- (c) (i) $(\text{CH}_3)_3\text{CCl}$ (ii) $\text{C}_6\text{H}_5\text{C}(\text{CH}_3)_2\text{Cl}$
(iii) $(\text{CH}_3)_2\text{CHCl}$ (iv) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$

Q8. Arrange the following according to given trend. 3



Reactivity towards HCl.



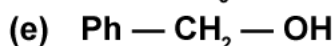
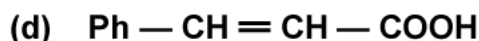
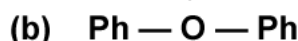
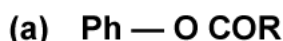
Reactivity with sodium ethoxide towards elimination reaction.



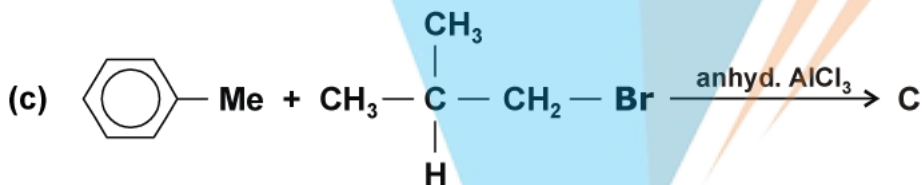
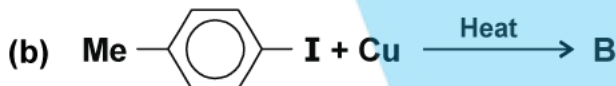
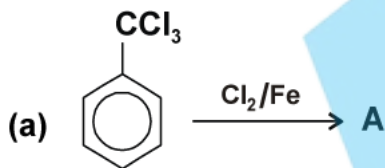
Reactivity towards $\text{C}_2\text{H}_5\text{OH}$.

Q9. Describe laboratory preparation of chloroform. Why is it stored in dark coloured bottles? Give four main uses of chloroform. 3

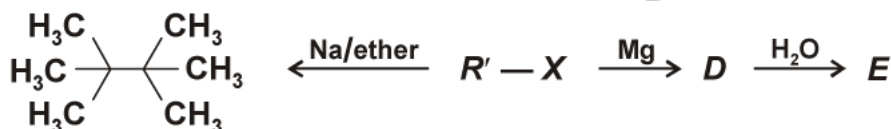
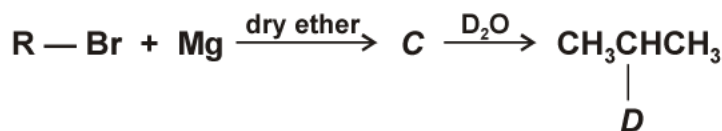
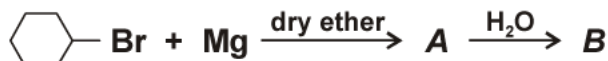
Q10. Give principle product on bromination with $\text{Br}_2 / \text{FeBr}_3$ of the following 3



Q11. Complete the following giving structures of the principal organic products: 3



Q12. Identify A, B, C, D, E, R and R' in the following: 3

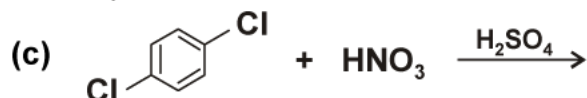
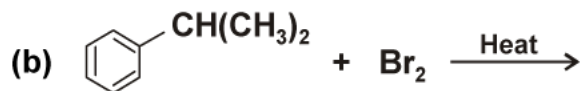
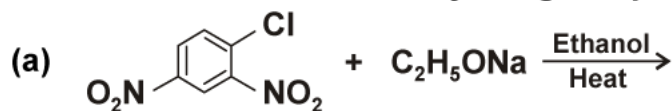


Q13. Primary alkyl halide (A) $\text{C}_4\text{H}_9\text{Br}$ reacted with alcoholic KOH to give compound (B). Compound (B) is reacted with HBr to give (C) which is an isomer of (A). When (A) was reacted with sodium metal it gave a compound (D) C_8H_{18} which is different from the compound formed when *n*-butyl bromide was reacted with sodium. Give the structural formula of (A) and write the equations for all the reactions. 3

Q14. A sweet smelling organic compound A is slowly oxidised by air in presence of light to a highly poisonous gas. On warming with silver powder, it forms a gaseous substance B, which is also produced by the action of calcium carbide on water. Identify A and B and write the chemical equations of the reactions involved. 3

Q15. (a) How will you carry out the following conversions in not more than two steps: 3
 (i) Benzyl alcohol to phenylethanitrile (ii) But-1-ene to But-2-ene
 (b) Wurtz reaction fails in case of *tert*-alkyl halides. Explain.

Q16. Write the structure of the major organic product in each of the following reactions: 3



Q17. How will you convert 3

(a) Isopropylalcohol to iodoform (b) Propene to But-2-yne

Q18. How will you convert 3

(a) Ethene to bromoethene (b) Propene to propyne
 (c) Aniline to phenyl isocyanide

Q19. How will you convert 3

(a) 1-Bromopropane to 2-Bromopropane (b) Toluene to benzylalcohol
 (c) Benzene to 4-Bromonitro benzene

Q20. How will you convert 3

(a) Ethylchloride to propanamide (b) Isopropylalcohol to 3-Methylbut-1-ene
 (c) Toluene to 1,2-diphenylethane

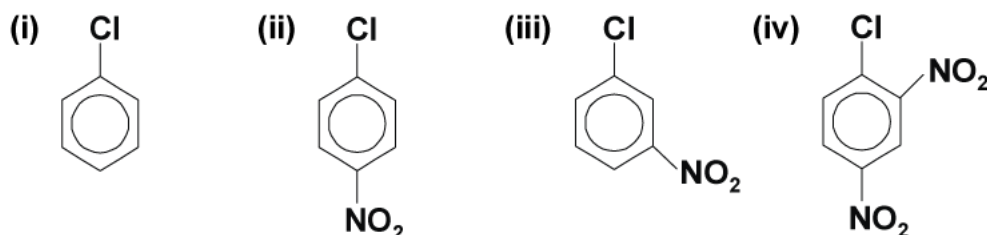
Q21. How will you convert 3

(a) *p*-Nitroethyl benzene to 1-(*p*-nitrophenyl) ethanol.
 (b) Cyclohexene to cyclohexylcyclohexane or dicyclohexyl
 (c) Cyclohexyl.bromide to dextrariumcyclohexane

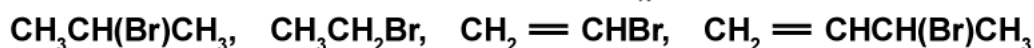
Q22. How will you to convert 3

(a) Ethylchloride to But-2-yne. (b) Allyl bromide to Hex-1-en-4-yne

Q23. (a) Arrange the following according to reactivity towards nucleophilic substitution reaction. 3



(b) Answer the following in order of their expected S_N1 reactivity:



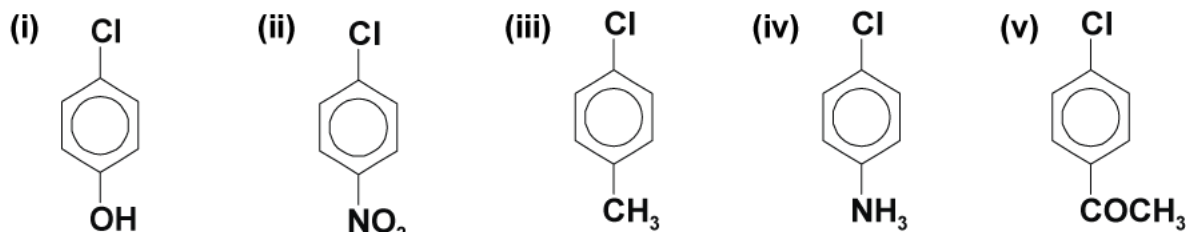
(c) *tert*-butyl chloride reacts with aqueous NaOH by S_N1 mechanism while *n*-butyl chloride reacts by S_N2 mechanism, Why?

Q24. Give reagents inorganic or organic, needed to convert benzyl bromide into (a) benzyl acetate (b) (nitromethyl) benzene (c) *tri-n*-butylbenzylammonium bromide. 3

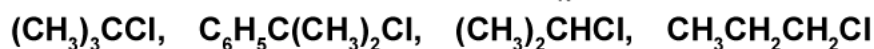
Q25. How will you carry out the following conversions in not more than two steps: 3

- (a) Toluene to benzyl alcohol (b) Ethanol to ethyl fluoride
(c) Benzene to biphenyl

Q26. (a) Arrange the following according to reactivity towards nucleophilic substitution reaction. 3

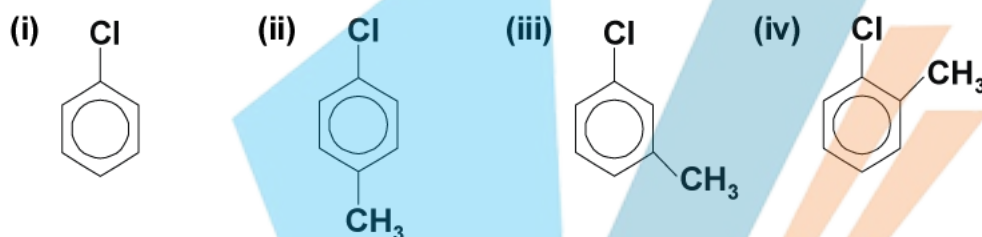


(b) Answer the following in order of their expected S_N1 reactivity:

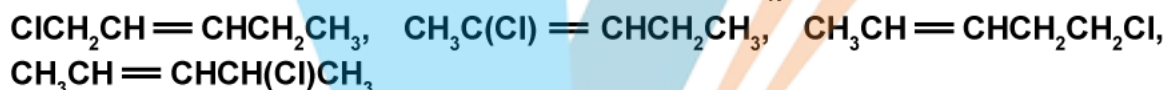


(c) Point out the difference between racemic modification and meso compound.

Q27. (a) Arrange the following according to reactivity towards nucleophilic substitution reaction. 3



(b) Answer the following in order of their expected S_N1 reactivity:



(c) How will you carry out the following conversions in not more than two steps:
1-chlorobutane to *n*-octane

Q28. Write down the IUPAC name for each of the following complexes and indicate the oxidation state, electronic configuration and coordination number. Also give stereochemistry and magnetic moment of the complex : 5

- (a) $K[Cr(H_2O)_2(C_2O_4)_2] \cdot 3H_2O$ (b) $CrCl_3(py)_3$ (c) $K_4[Mn(CN)_6]$
(d) $[Co(NH_3)_5Cl]Cl_2$ (e) $Cs[FeCl_4]$

Q29. (a) What is ligand? Give an example of bidentate ligand. 5

(b) Explain as to how the two complex of nickel, $[Ni(CN)_4]^{2-}$ and $Ni(CO)_4$, have different structure, but do not differ in their magnetic behaviour ($Ni = 28$)