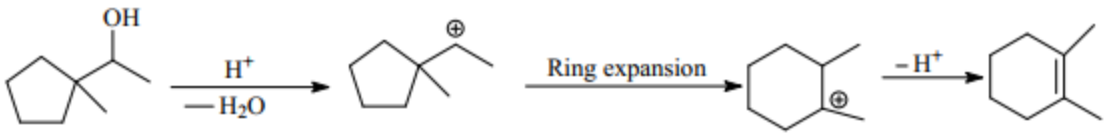
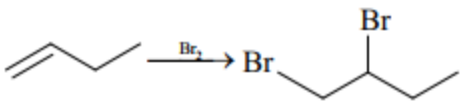
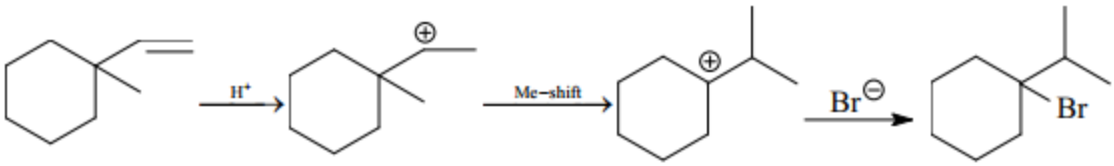
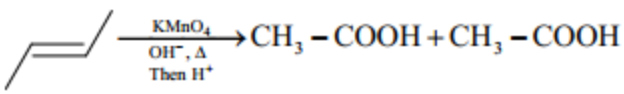
CHAPTER - 11
HYDROCARBONS

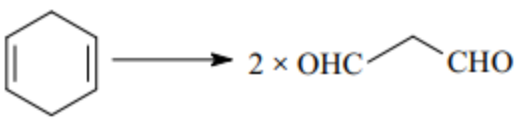
PART I - (JEEMAIN LEVEL)

1. 1 Reaction (1) gives methane
   Reaction (2) gives ethane
   Reaction (3) gives ethane
2. 3 Initiation involves homolysis of Cl_2 to form chlorine free radicals
3. 4 $KMnO_4$ can oxidise isopentane
4. 3 Isomerisation using $AlCl_3$/HCl
5. 4 Aromatisation gives benzene and its homologues
6. 3 

7. 1 

8. 2 Lindlar's reduction of alkynes produces cis-alkenes
9. 4 

10. 3 

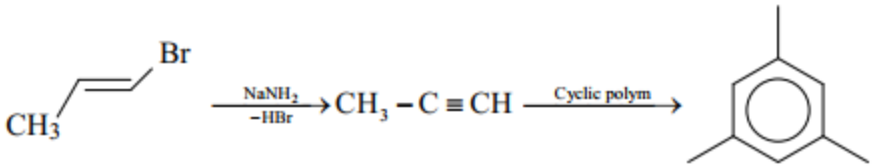
11. 4 

$CH_2 = CH - CH = CH - CH_3 \longrightarrow HCHO + CHO - CHO + CH_3 - CHO$

$(CH_3)_2 C = CH - CH = CH_2 \longrightarrow (CH_3)_2 CO + CHO - CHO + HCHO$

$CH_3 - CH = CH_2 \longrightarrow CH_3 - CHO + HCHO$

12. 4



13. 3

(I) Prop-1-ene:

$$H_3C-CH=CH_2 \xrightarrow[[O]]{KMnO_4,H^+} H_3C-\overset{O}{\overset{\|}{C}}-OH + CO_2 + H_2O$$

Prop-1-ene — Acetic acid

(II) 2-Methylbut-2-ene:

$$H_3-\overset{CH_3}{\overset{|}{C}}=CH-CH_3 \xrightarrow[[O]]{KMnO_4,H^+} H_3C-\overset{CH_3}{\overset{|}{C}}=O + H_3C-\overset{O}{\overset{\|}{C}}-OH$$

2-Methylbut-2-ene — Acetone — Acetic acid

(III) 2-Methylpropene:

$$CH_3-\overset{CH_3}{\overset{|}{C}}=CH_2 \xrightarrow[[O]]{KMnO_4} CH_3-\overset{O}{\overset{\|}{C}}-CH_3 + CO_2 + H_2O$$

2-Methylpropane — Acetone

(IV) But-2-ene

$$CH_3-CH=CH-CH_3 \xrightarrow[KMnO_4/H^+]{[O]} 2CH_3-\overset{O}{\overset{\|}{C}}-OH$$

But-2-ene — Acetic acid

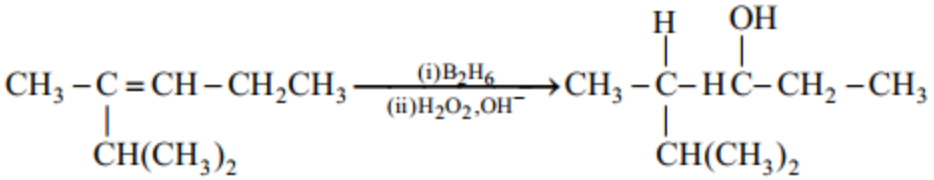
(V) Cyclohexene

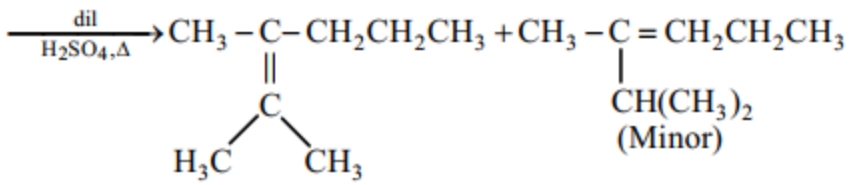
$$\xrightarrow[[O]]{KMnO_4/H^+} HOOC-(CH_2)_4-COOH$$

Adipic acid

Cyclohexane

14. 6 All single bonded C-atoms are sp^3 hybridized here in major product

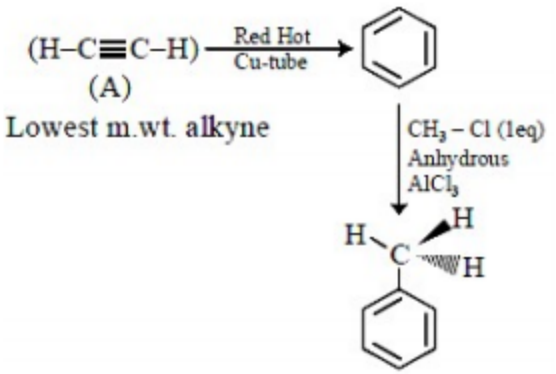




(Major) (Minor)

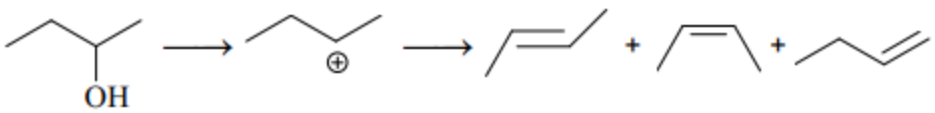
More hyper conjugation form

15. 13

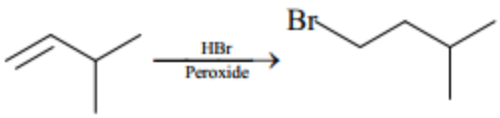


Total 13 atoms are present in same plane (7 carbon and 6 hydrogen atoms)

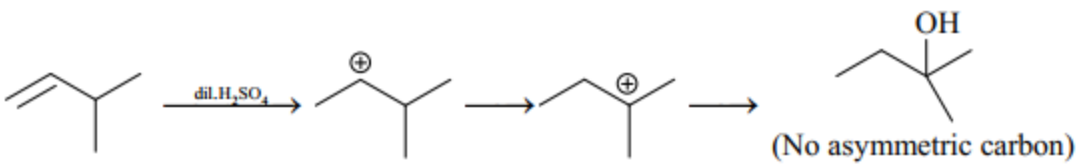
16. 3



17. 0

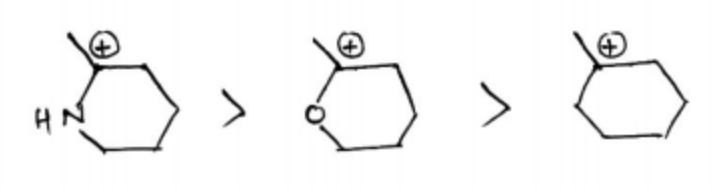


(No asymmetric carbon)

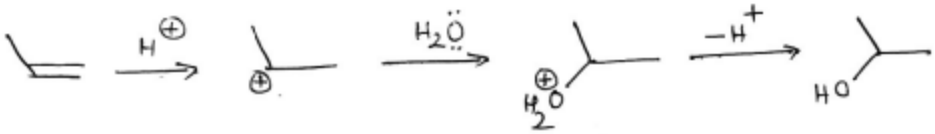


(No asymmetric carbon)

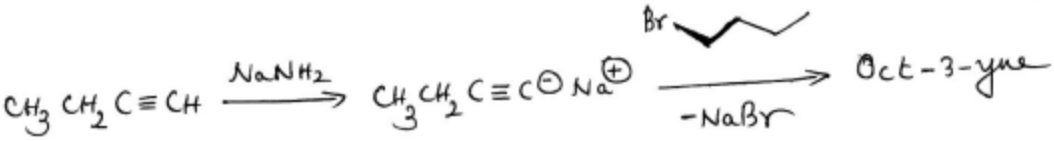
18. A Formation of carbocation is the rate determining step of HBr addition
Stability of carbocations follows the order



19. C

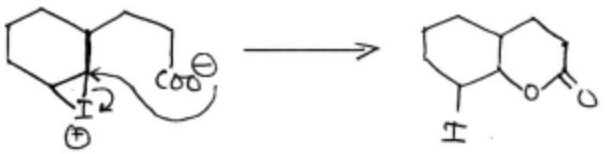


20. D



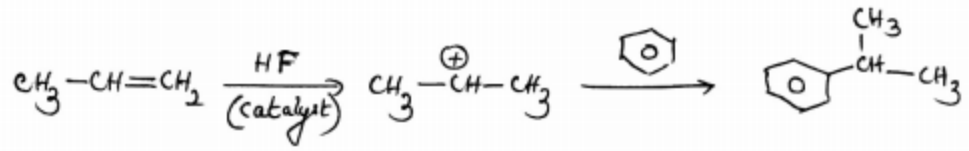
21. C H–Cl bond is stronger hence its homolysis is difficult. H –I bond is weaker hence its homolysis is easy. But I° produced will combine together to form I_2

22. A

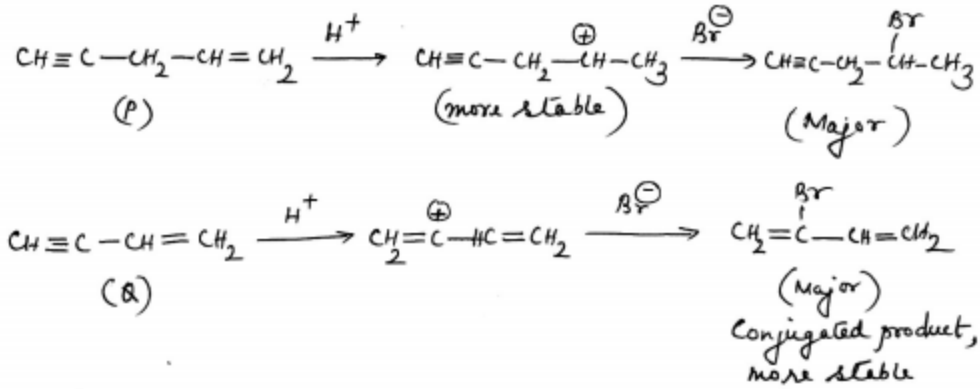


23. B para - position of –$NHCOCH_3$ group is most activated in the given compound
24. C Oxymercuration - demercuration is the suitable pathway
25. C HOBr addition; follows Markownikov's rule

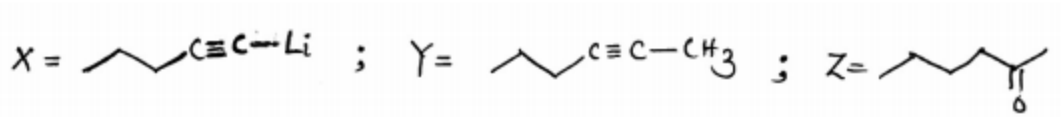
26. ABC



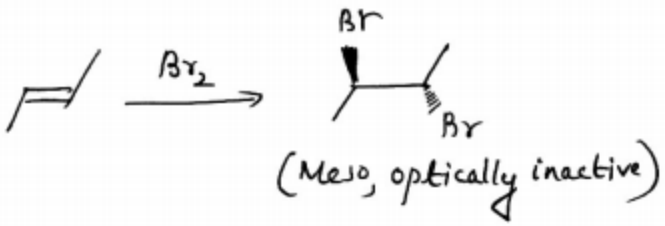
27. AB



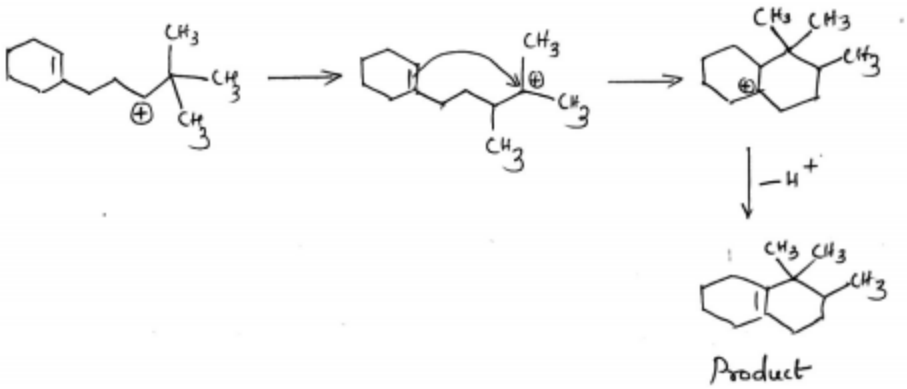
28. BC



29. CD



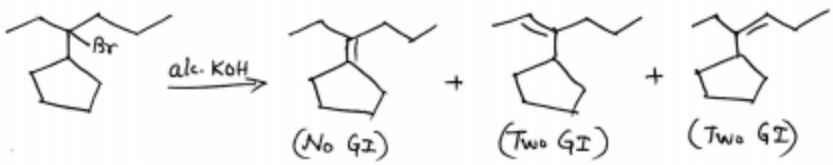
30. ABD



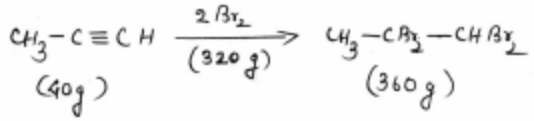
31. 5.00 In compounds (2), (3), (5), (7) and (8), ring (B) is more reactive than ring (A)

32. 6.00 Compounds (1), (4), (6), (7), (8) and (10) are more reactive than flurrobenzene

33. 5.00



34. 3.04

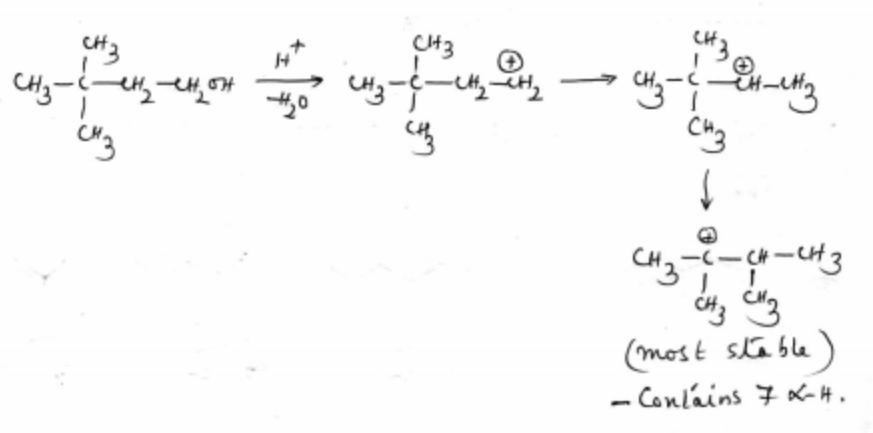


320 g Br_2 gives 360 g product

∴ 1 g Br_2 gives $\frac{360}{320}$ g product.

Since the yield is only 27%, the amount of product obtained will be $\frac{360}{320} \times 0.27 = 0.30375$ g or 3.0375×10^{-1} g

35. 7.00



36. A

Terminal alkynes are not reduced with Na/Liq. NH_3.

37. **D**