

Hydrocarbons

CHAPTER

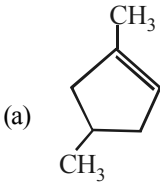
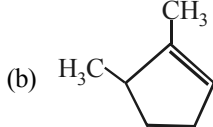
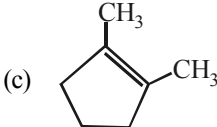
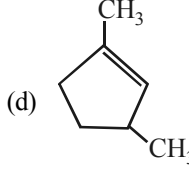
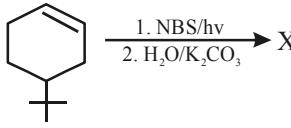
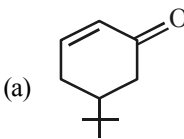
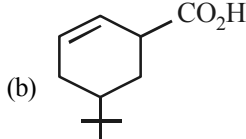
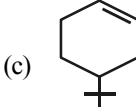
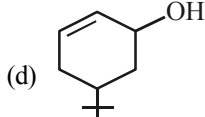
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- Which of these will not react with acetylene?
[2002]
(a) NaOH (b) ammonical AgNO_3
(c) Na (d) HCl.
- What is the product when acetylene reacts with hypochlorous acid?
[2002]
(a) CH_3COCl (b) ClCH_2CHO
(c) Cl_2CHCHO (d) ClCH_2COOH .
- On mixing a certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane. This alkane could be
[2003]
(a) pentane (b) isopentane
(c) neopentane (d) propane
- Butene-1 may be converted to butane by reaction with
[2003]
(a) Sn-HCl (b) Zn-Hg
(c) Pd/H_2 (d) Zn-HCl
- Which one of the following has the minimum boiling point?
[2004]
(a) 1-Butene (b) 1-Butyne
(c) n-Butane (d) isobutane
- 2-Methylbutane on reacting with bromine in the presence of sunlight gives mainly
[2005]
(a) 1-bromo-3-methylbutane
(b) 2-bromo-3-methylbutane
(c) 2-bromo-2-methylbutane
(d) 1-bromo-2-methylbutane
- Reaction of one molecule of HBr with one molecule of 1, 3-butadiene at 40°C gives predominantly
[2005]
(a) 1-bromo-2-butene under kinetically controlled conditions
(b) 3-bromobutene under thermodynamically controlled conditions
(c) 1-bromo-2-butene under thermodynamically controlled conditions
(d) 3-bromobutene under kinetically controlled conditions
- Of the five isomeric hexanes, the isomer which can give two monochlorinated compounds is
[2005]
(a) 2-methylpentane
(b) 2, 2-dimethylbutane
(c) 2, 3-dimethylbutane
(d) n-hexane
- The compound formed as a result of oxidation of ethyl benzene by KMnO_4 is
[2007]
(a) benzyl alcohol (b) benzophenone
(c) acetophenone (d) benzoic acid.
- Which of the following reactions will yield 2, 2-dibromopropane?
[2007]
(a) $\text{CH}_3-\text{CH}=\text{CH}_2 + \text{HBr} \rightarrow$
(b) $\text{CH}_3-\text{C}\equiv\text{CH} + 2\text{HBr} \rightarrow$
(c) $\text{CH}_3\text{CH}=\text{CHBr} + \text{HBr} \rightarrow$
(d) $\text{CH}\equiv\text{CH} + 2\text{HBr} \rightarrow$
- The reaction of toluene with Cl_2 in presence of FeCl_3 gives predominantly
[2007]
(a) m-chlorobenzene
(b) benzoyl chloride
(c) benzyl chloride
(d) o- and p-chlorotoluene.
- Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated with cuprous bromide. The reaction mixture so formed contains
[2008]
(a) mixture of o- and p-bromotoluenes
(b) mixture of o- and p-dibromobenzenes
(c) mixture of o- and p-bromoanilines
(d) mixture of o- and m-bromotoluenes
- In the following sequence of reactions, the alkene affords the compound 'B'
$$\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3 \xrightarrow{\text{O}_3} \text{A} \xrightarrow[\text{Zn}]{\text{H}_2\text{O}} \text{B}.$$

The compound B is
[2008]

c-62

Chemistry

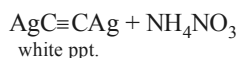
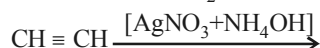
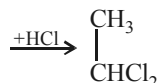
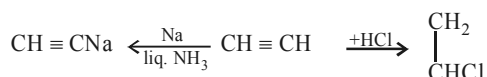
- (a) $\text{CH}_3\text{CH}_2\text{CHO}$ (b) CH_3COCH_3
 (c) $\text{CH}_3\text{CH}_2\text{COCH}_3$ (d) CH_3CHO
14. The hydrocarbon which can react with sodium in liquid ammonia is [2008]
 (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{CCH}_2\text{CH}_2\text{CH}_3$
 (b) $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$
 (c) $\text{CH}_3\text{CH}=\text{CHCH}_3$
 (d) $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CCH}_2\text{CH}_3$
15. The treatment of CH_3MgX with $\text{CH}_3\text{C}\equiv\text{C}-\text{H}$ produces [2008]
 (a) $\text{CH}_3-\text{CH}=\text{CH}_2$
 (b) $\text{CH}_3\text{C}\equiv\text{C}-\text{CH}_3$
 (c) $\text{CH}_3-\text{C}(\text{H})=\text{C}(\text{H})-\text{CH}_3$
 (d) CH_4
16. One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 u. The alkene is [2010]
 (a) propene (b) 1-butene
 (c) 2-butene (d) ethene
17. Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify 'A' from the following compounds: [2011RS]
 (a) 1-Pentene
 (b) 2-Pentene
 (c) 2-Methyl-2-pentene
 (d) 2-Methyl-1-pentene
18. Which branched chain isomer of the hydrocarbon with molecular mass 72u gives only one isomer of mono substituted alkyl halide? [2012]
 (a) Tertiary butyl chloride
 (b) Neopentane
 (c) Isohexane
 (d) Neohexane
19. 2-Hexyne gives *trans*-2-Hexene on treatment with: [2012]
 (a) Pt/H_2 (b) Li/NH_3
 (c) Pd/BaSO_4 (d) LiAlH_4
20. Which compound would give 5-keto-2-methylhexanal upon ozonolysis? [JEE M 2015]
- (a)  (b) 
 (c)  (d) 
21. The product of the reaction given below is: [JEE M 2016]

- (a)  (b) 
 (c)  (d) 
22. The reaction of propene with HOCl ($\text{Cl}_2 + \text{H}_2\text{O}$) proceeds through the intermediate: [JEE M 2016]
 (a) $\text{CH}_3-\text{CH}(\text{OH})-\text{CH}_2^+$
 (b) $\text{CH}_3-\text{CHCl}-\text{CH}_2^+$
 (c) $\text{CH}_3-\text{CH}^+-\text{CH}_2-\text{OH}$
 (d) $\text{CH}_3-\text{CH}^+-\text{CH}_2-\text{Cl}$
23. 3-Methyl-pent-2-ene on reaction with HBr in presence of peroxide forms an addition product. The number of possible stereoisomers for the product is: [JEE M 2017]
 (a) Six (b) Zero
 (c) Two (d) Four

Answer Key

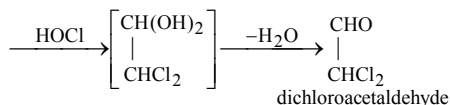
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(a)	(c)	(c)	(c)	(d)	(c)	(c)	(c)	(d)	(b)	(d)	(a)	(d)	(b)	(d)
16	17	18	19	20	21	22	23							
(c)	(c)	(b)	(b)	(d)	(d)	(d)	(d)							

SOLUTIONS

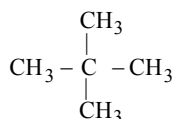
1. (a) Acetylene reacts with the other three as:



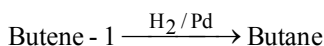
2. (c) $\text{CH} \equiv \text{CH} + \text{HOCl} \longrightarrow \begin{array}{c} \text{CHOH} \\ || \\ \text{CHCl} \end{array}$



3. (c) In neopentane all the H atoms are same (1°).



4. (c) Alkenes combine with hydrogen under pressure and in presence of a catalyst (Ni, Pt or Pd) and form alkanes.

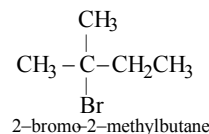


5. (d) **NOTE** Among isomeric alkanes, the straight chain isomer has higher boiling point than the branched chain isomer. The greater the branching of the chain, the lower is the boiling point. Further due to the presence of π electrons, these molecules are slightly polar and hence have higher

boiling points than the corresponding alkanes.

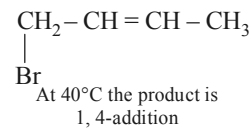
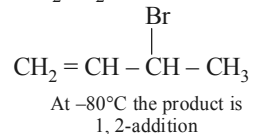
Thus B.pt. follows the order
alkynes > alkene > alkanes (straight chain)
> branched chain alkanes.

6. (c) $\text{CH}_3 - \begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} \end{array} - \text{CH}_2 - \text{CH}_3 \xrightarrow[\text{sun light}]{\text{Br}_2}$

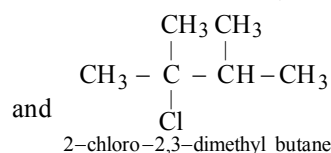
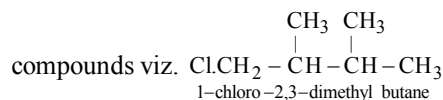


Ease of replacement of H-atom $3^\circ > 2^\circ > 1^\circ$.

7. (c) $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2 + \text{HBr} \longrightarrow$



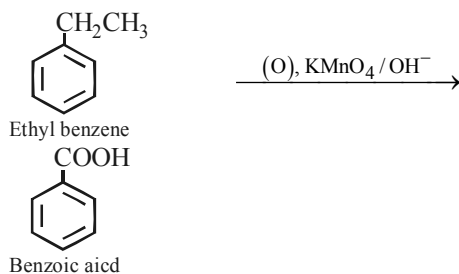
8. (c) $\text{CH}_3 - \begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} \end{array} - \begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} \end{array} - \text{CH}_3$. Since it contains only two types of H-atoms hence it will give only two mono chlorinated



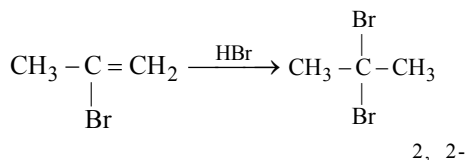
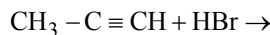
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Chemistry

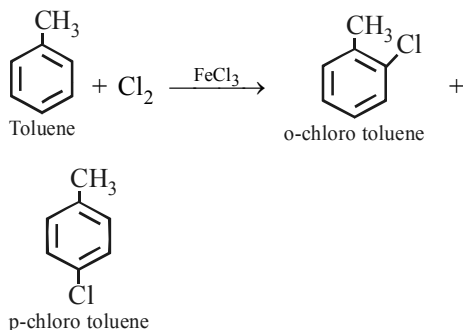
9. (d) When alkyl benzene are oxidised with alkaline KMnO_4 , (strong oxidising agent) the entire alkyl group is oxidised to $-\text{COOH}$ group regardless of length of side chain.



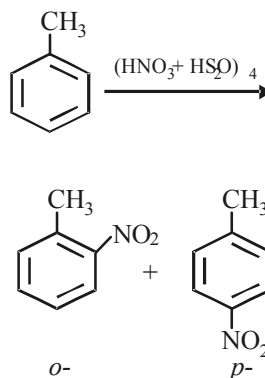
10. (b) The reaction follows Markownikoff rule which states that when unsymmetrical reagent adds across unsymmetrical double or triple bond the negative part adds to carbon atom having lesser number of hydrogen atoms.



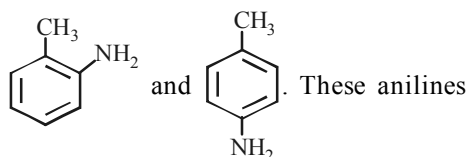
11. (d) FeCl_3 is Lewis acid. In presence of FeCl_3 side chain hydrogen atoms of toluene are substituted.



12. (a) **NOTE** Toluene () contains – CH_3 group which is *o*-, *p*- directing group so on nitration of toluene the $-\text{NO}_2$ group will occupy *o*-, *p*- positions.

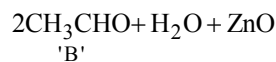
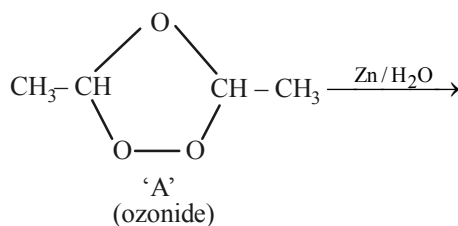


on reduction with Sn/HCl they will form corresponding anilines in which $-\text{NO}_2$ group changes to $-\text{NH}_2$. The mixture now contains



when diazotized and then treated with CuBr forms *o*-, *p*- bromotoluenes.

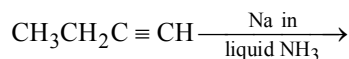
13. (d) Completing the sequence of given reactions,



Thus 'B' is CH_3CHO

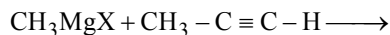
Hence (d) is correct answer.

14. (b) Alkynes having terminal $-\text{C} \equiv \text{H}$ react with Na in liquid ammonia to yield H_2 gas of the given compounds $\text{CH}_3\text{CH}_2\text{C} \equiv \text{CH}$ can react with Na in liquid NH_3 so the correct answer is (b).



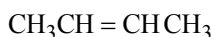


15. (d) Writing the reaction we get

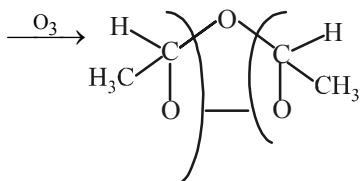


So we find that CH_4 is produced in this reaction.

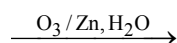
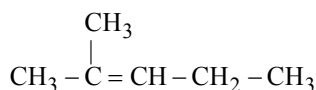
16. (c) The given molecular formula suggests that the aldehyde formed will be acetaldehyde hence the alkene will be



2-butene

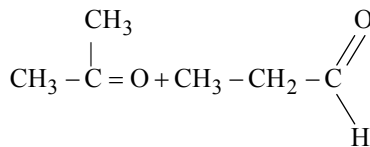


17. (c) From the products formed it is clear that the compound has 5 carbon atoms with a double bond and methyl group on 2nd carbon atom.



(2-Methyl-2-pentene)

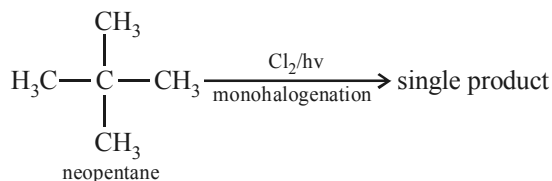
(A)



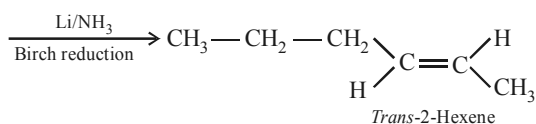
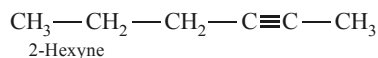
Acetone

Propionaldehyde

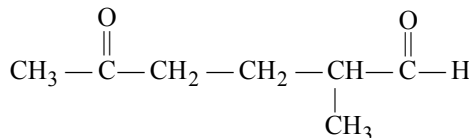
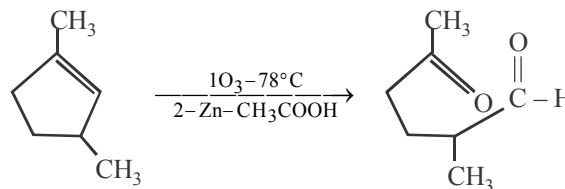
18. (b)



19. (b) Anti addition of hydrogen atoms to the triple bond occurs when alkynes are reduced with sodium (or lithium) metal in ammonia, ethylamine, or alcohol at low temperatures. This reaction called, a dissolving metal reduction, produces an (E)- or *trans*-alkene. Sodium in liq. NH_3 is used as a source of electrons in the reduction of an alkyne to a *trans* alkene.

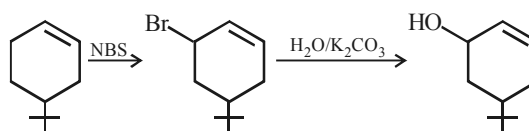
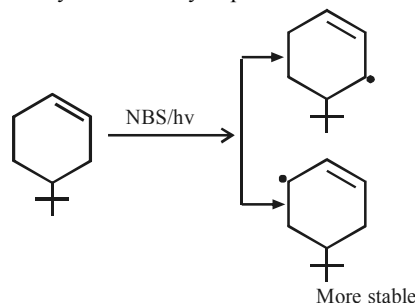


20. (d) When 1, 3-dimethylcyclopentene is heated with ozone and then with zinc and acetic acid, oxidative cleavage leads to keto - aldehyde.



5- keto - 2 - methylhexanal

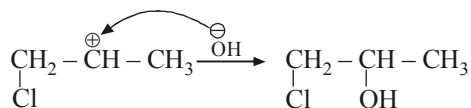
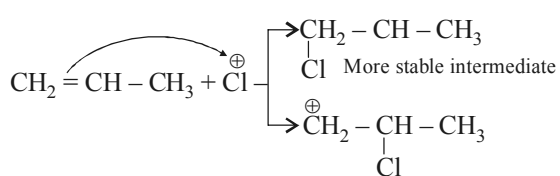
21. (d) N - bromosuccinimide results into bromination at allylic and benzylic positions



c-66

Chemistry

22. (d)



23. (d) If two chirality centres are created as a result of an addition reaction four stereoisomers can be obtained as products.

