Quadrant II – Notes

Programme: Bachelor of Science (First Year)

Subject: Chemistry

Course Code: CHC 101

Course Title: DSC: Inorganic and Organic chemistry (Section B)

Unit: Unit 3 – Aliphatic hydrocarbons.

Module Name: Alkanes: (upto 5 carbons). Preparation: Wurtz reaction.

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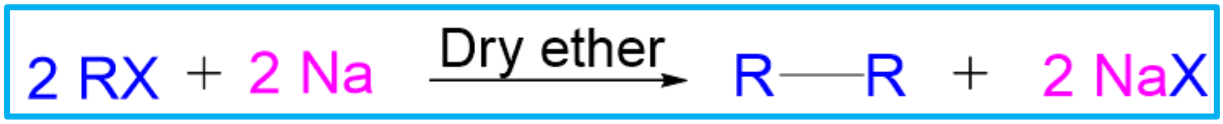
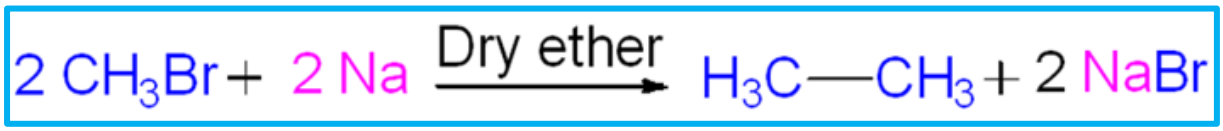
Wurtz reaction: is a **sodium** mediated **coupling of alkyl halides** to form an **alkane**. Wurtz reaction is used for the **preparation of alkanes.**

It is generally carried out by treating two moles of alkyl halide with two moles of sodium in presence of anhydrous solvent like dry ether.

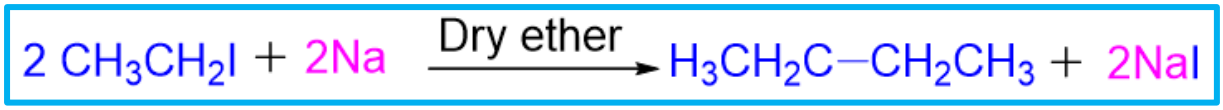


Where, X = halogen such as Cl, Br and I

The simplest alkane which can be prepared by this method is **ethane**. It is prepared by sodium mediated coupling of methyl bromide in dry ether.



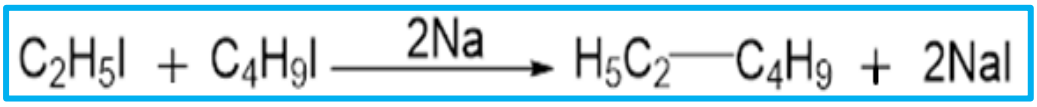
Butane can also be prepared using this method.



Metals other than sodium, such as zinc, manganese, activated copper etc. have also been used to effect Wurtz reactions.

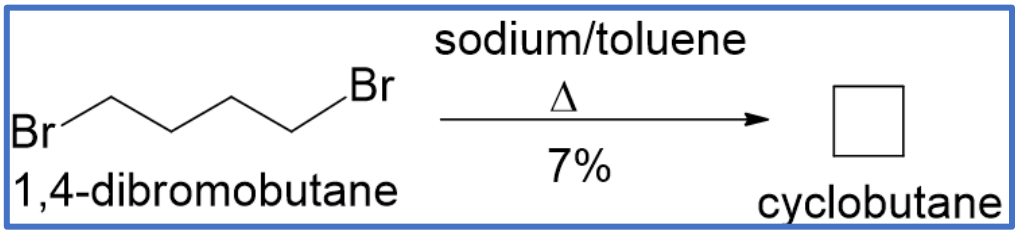
This reaction was first reported by **Charles Adolphe Wurtz** in the year **1855**. Wurtz reacted a mixture of two alkyl iodides with sodium & based on vapour

density, boiling point and formation pathway concluded formation of ethyl-butyl (hexane).



The Wurtz reaction is useful for synthesis of symmetrical alkanes. If we use different alkyl halides a mixture of hydrocarbons is obtained, which is difficult to separate. Also poor yields are obtained in case of secondary & tertiary alkyl halides.

Cyclopropane is prepared *via* intramolecular Wurtz reaction by treatment of 1,3-dibromopropane with sodium in good yield. Cyclobutane is prepared by treatment of 1,4-dibromobutane with sodium. Yield for cyclobutane can be improved by using Zn metal instead of Na.



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The classical Wurtz reaction is also useful in the preparation of small bicyclic systems such as bicyclo [1.1.0] butane