(Organo Magnesium Compounds)
(Grignard reagent)

Imp. Compounds which contain a carbon magnesium (C-Mg) bond are called Grignard reagent. Their general formula may be written as R-Mg-X where R is alkyl or aryl group and X is Cl, Br or I.

Imp

Preparation-

Grignard reagents are prepared by the action of alkyl halide on magnesium metal in the presence of alcohol free dry ether.

$$R-X + Mg \xrightarrow{\text{Ether}} R-Mg-X.$$

$$C_2H_5-Br + Mg \xrightarrow{\text{Ether}} C_2H_5Mg-Br$$

Ethyl magnesium bromide.

In the preparation of Grignard reagent the reagents should be pure and dry.

Precipitation of Reagents

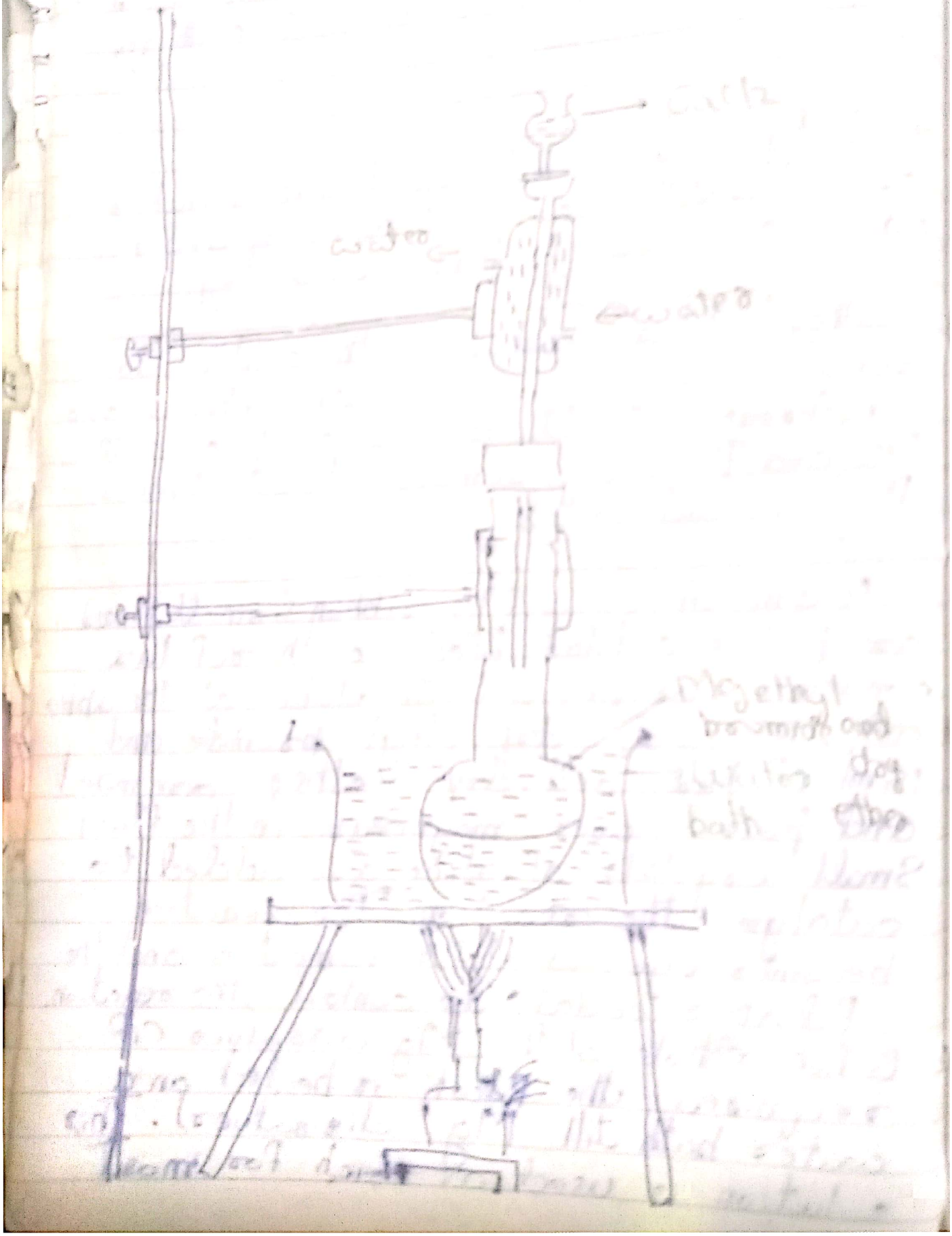
(1) Magnesium (Mg) - Magnesium ribbon is rubbed with sand paper to remove the film of oxide and is then cut into small pieces. It is then washed with dry ether to remove grease and dried in an oven at 120°C.

(2) Alkly halide :- Alkly halide is taken and distilled with P_2O_5 in order to obtain completely pure and dry.

(3) Ether :- It is washed with water to remove traces of alcohol and dried over anhydrous $CaCl_2$. It is then distilled with Na and P_2O_5 to remove last traces of alcohol and water.

4 gm of clean Mg ribbon (small pieces) are put in a flask fitted with reflux condenser carrying a $CaCl_2$ tube at the upper end. 25 gm of dry ethyl bromide and 150ml of pure and dry ether are mixed and poured over magnesium in the flask. Small crystals of iodine are added to catalyse the reaction. The reaction becomes vigorous after some time and the flask is cooled to control the reaction. When whole of the Mg dissolves (if required the flask is heated on a water bath till Mg dissolves). This

of the reaction and is never subject
in solid state for synthetic purposes.



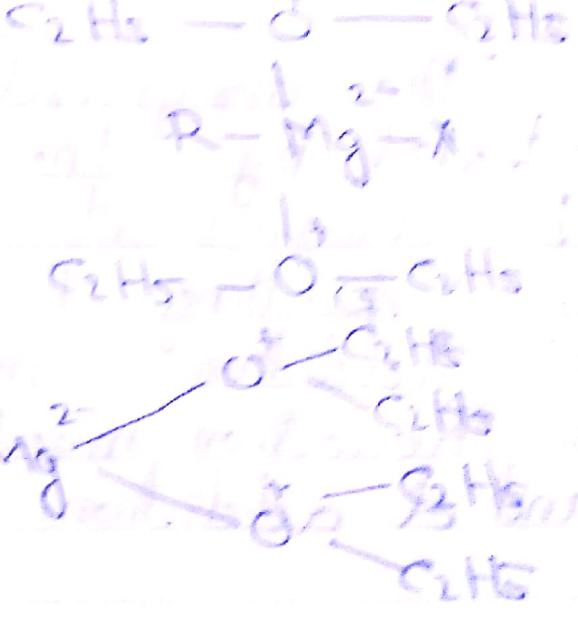
Role of ether :-

The role of ether is not only to provide a medium for the formation of Grignard reagent but it also makes them dissolve through solvolysis.

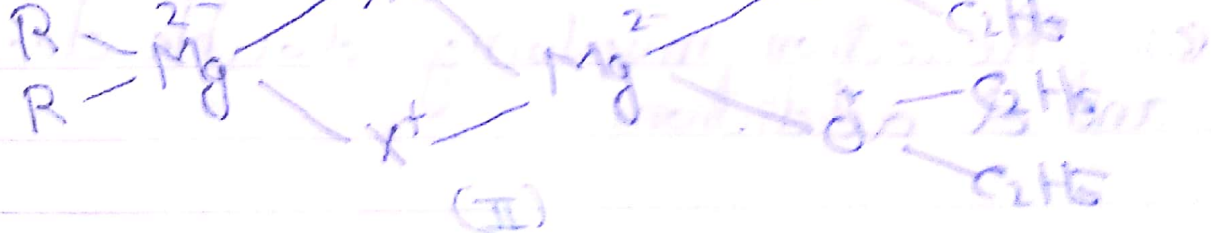
If the function of ether is to dissolve the Grignard reagent by co-ordination, then it should be possible to prepare the Grignard reagent even in presence of a base like dry ethyl amine. It has actually been found to be so.

The reagent in ether can exist either in structure I or structure II

$$R\text{-}Mg\text{-}X \xrightarrow{\text{ether}}$$



OR



(II)

The structure (II) is considered to be more ~~probable~~ probable.

Probabilities :-