Properties of Alcohols - 3

② Reactions due to cleavage of R–OH bond (order will be 3°>2°>1°)

i) Reaction with Halogen Acids:

$$ROH + HCl \xrightarrow[ZnCl_2]{Anhyd} RCl + H_2O$$

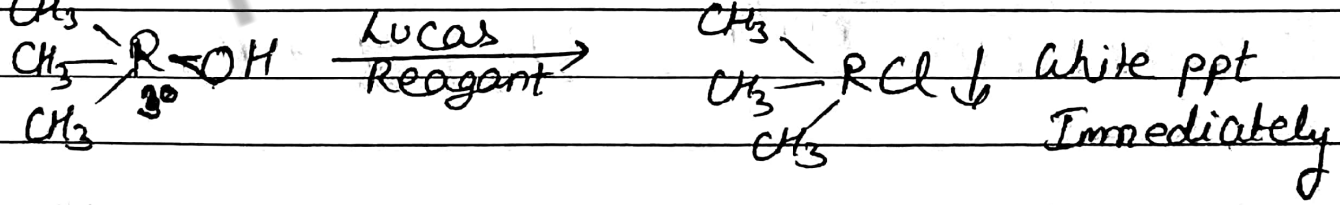
$$C_2H_5OH + HCl \xrightarrow[ZnCl_2]{Anhyd} C_2H_5Cl + H_2O$$

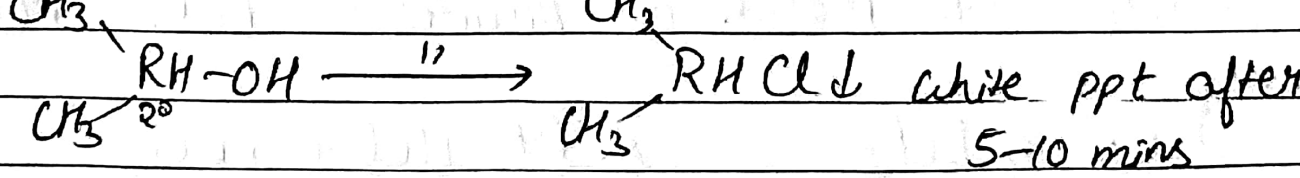
Proceeds through Carbocation Intermediate & SN^1 Mechanism

Order ⟶ 3° > 2° > 1°

$HCl + ZnCl_2 \longrightarrow$ Lucas Reagent

Lucas Test → To distinguish 1°, 2°, 3° Alcohol





$R\underset{1^\circ}{OH} \xrightarrow{"} $ No white ppt at Room Temperature

*** Note: Detailed Mechanism already discussed in "Haloalkanes & Haloarenes 02" Physicswallah

$$ROH + HBr \xrightarrow[H_2SO_4]{Conc} RBr + H_2O$$

↓ helps in removal of OH

$$C_2H_5OH + HBr \xrightarrow[H_2SO_4]{Conc} C_2H_5Br + H_2O$$

$$C_2H_5OH + HI \xrightarrow{\Delta} C_2H_5I + H_2O$$

Note: if HI / Red P is given ⇒ Reduction occurs

$$\underset{\text{alcohol}}{ROH} \xrightarrow{HI/Red\,P} \underset{\text{alkane}}{RH}$$ (imp for conversion)

$$C_2H_5OH + 2HI \xrightarrow{Red\,P} C_2H_6 + I_2 + H_2O$$

ii) Reaction with Phosphorous Halides – PCl_5 / PCl_3

$$ROH + PCl_5 \longrightarrow RCl + HCl + POCl_3$$

$$C_2H_5OH + PCl_5 \longrightarrow C_2H_5Cl + HCl + POCl_3$$

"Mechanism discussed in Haloalkanes & Haloalkenes – 02"

$3ROH + PCl_3 \longrightarrow 3RCl + H_3PO_3$

$3C_2H_5OH + PCl_3 \longrightarrow 3C_2H_5Cl + H_3PO_3$

iii) Reaction with Thionyl chloride: $SOCl_2$ → Darzen's Method

$ROH + SOCl_2 \longrightarrow RCl + SO_2\uparrow + HCl\uparrow$

$C_2H_5OH + SOCl_2 \longrightarrow C_2H_5Cl + SO_2\uparrow + HCl\uparrow$

"Mechanism discussed in Haloalkanes & Haloarenes - Of Physicswallah"

iv) Reaction with Ammonia: NH_3

$ROH + NH_3 \xrightarrow{Al_2O_3} RNH_2$ 1° Amine

Al_2O_3 | ROH

$R-NH$ 2° Amine

Al_2O_3 | ROH

$R-N(R)-R$ 3° Amine