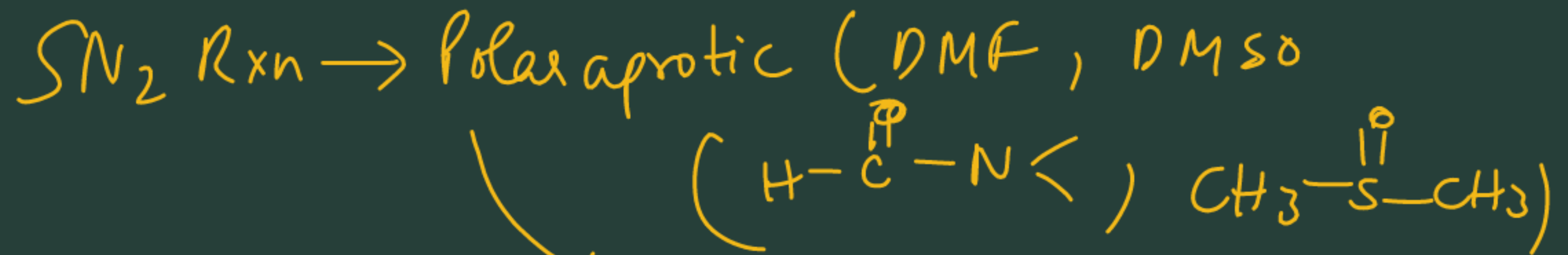


$S_N2$  Rxn  $\rightarrow$  Polar aprotic (DMF, DMSO)



$\rightarrow$  because Nu do not solvate in PAPS

$S_N1$  Rxn  $\rightarrow$

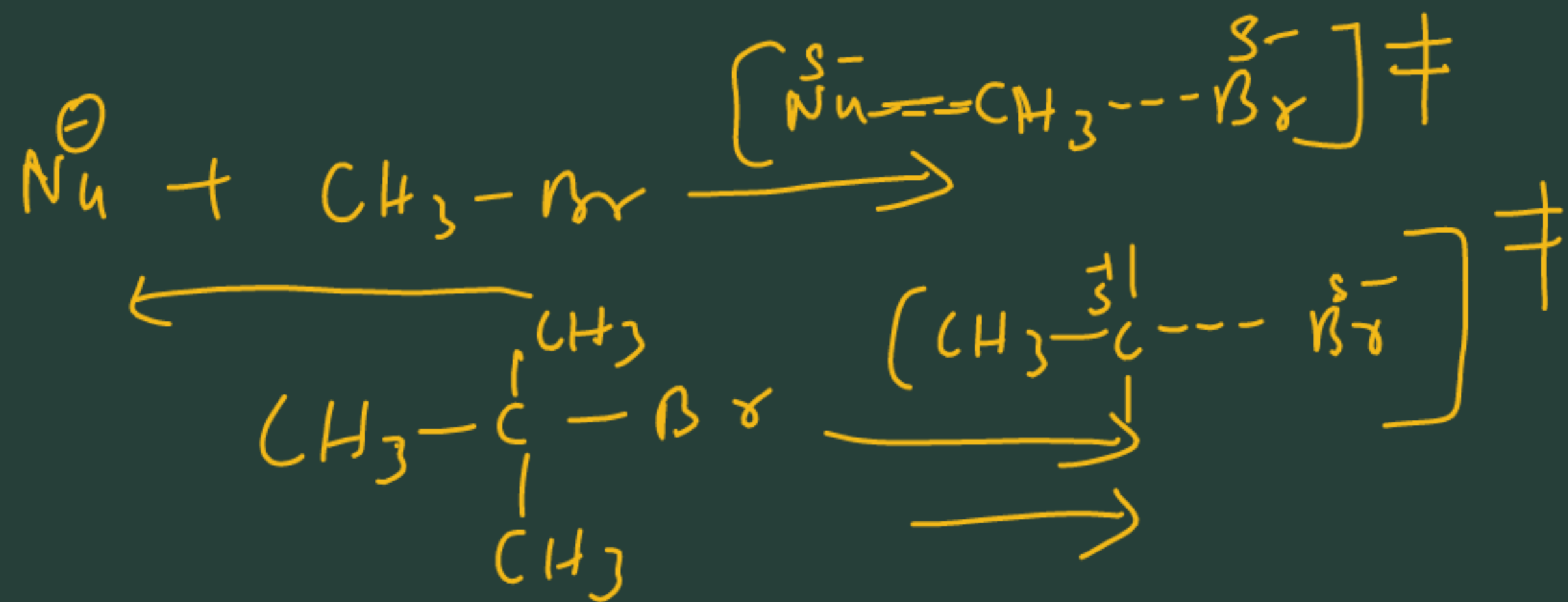
Polar Protic solvent ( $\text{H}_2\text{O}$ ,  $\text{CH}_3-\text{OH}$ ,  $\text{EtOH}$ ,  $\text{CH}_3\text{COOH}$ )

$\rightarrow$  solvate ions generated in rxn

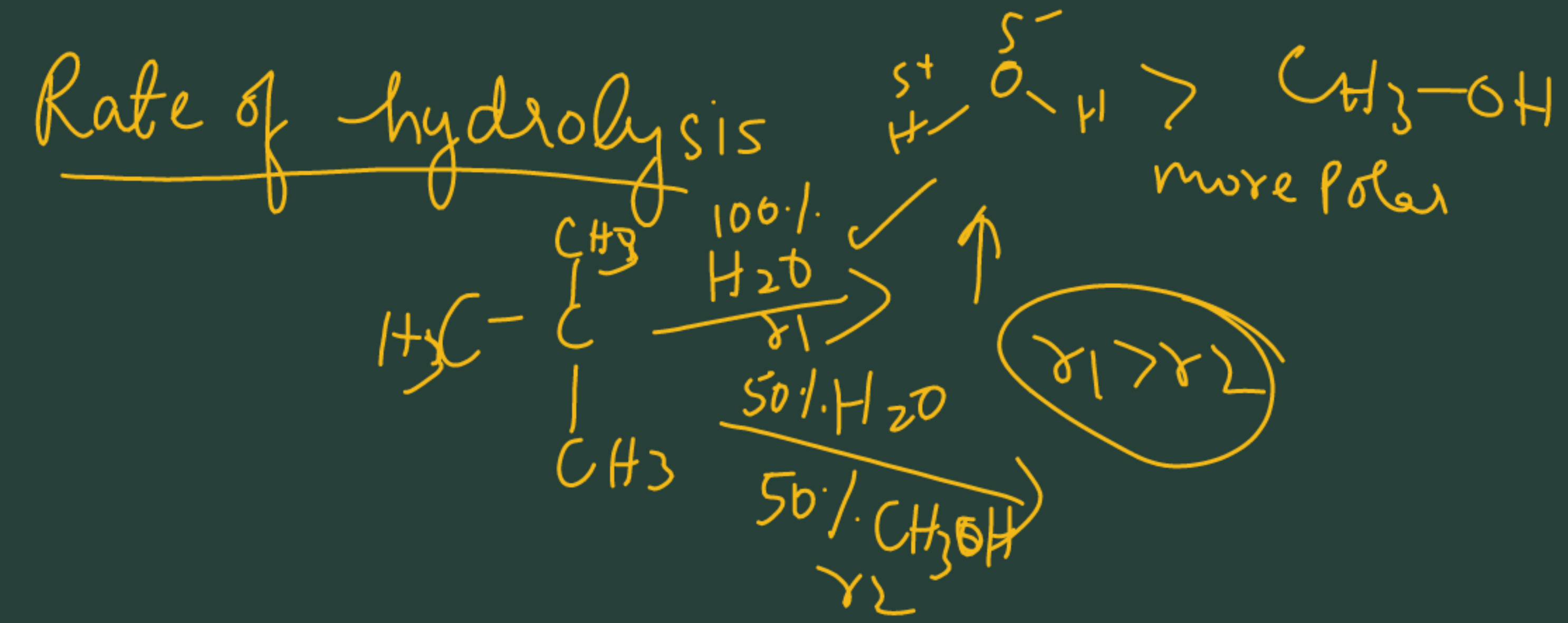
Effect of Polarity of solvent on Rate of  $S_N1$  &  $S_N2$

Solvent Polarity  $\uparrow$   $S_N2$   $\downarrow$

Solvent Polarity  $\uparrow$   $S_N1$   $\uparrow$



Solvolysis  
 ↓  
 when solvent  
 act as a nucleophile  
 (S<sub>N</sub>1 rxn)



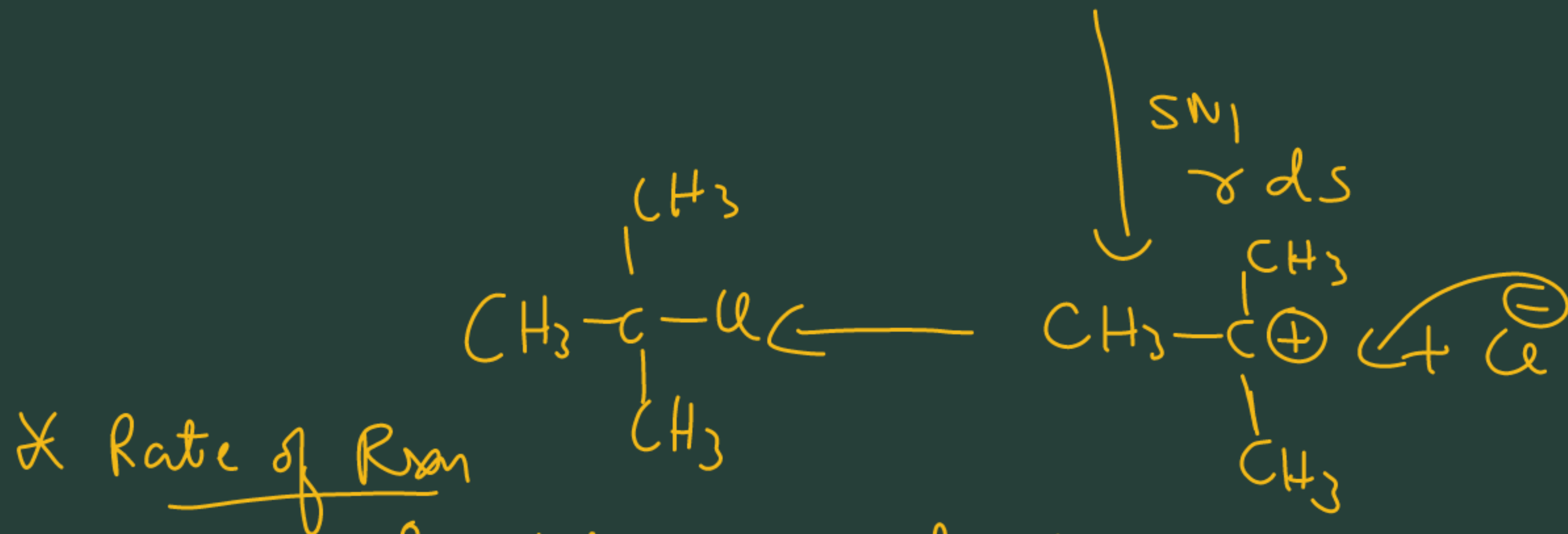
V. 9 mp Nucleophilic Substitution Rxn of alcohol  
(Methods to Prepare haloalkanes from alcohol)

I Rxn of alcohol with  $\text{H-X} + \text{anhy ZnCl}_2$  (Lucas Reagent)



$\xrightarrow{\text{catalyst}}$  white turbidity

- $\rightarrow$  3° alcohol  $\rightarrow$  immediate turbidity
- 2° alcohol  $\rightarrow$  3-5 (min) "
- 1° alcohol  $\rightarrow$  turbidity on heating.



\* Rate of Rxn

1° alcohol react by  
SN2  
2° & 3° by SN1

\* 3° alcohol > 2° alcohol > 1° alcohol

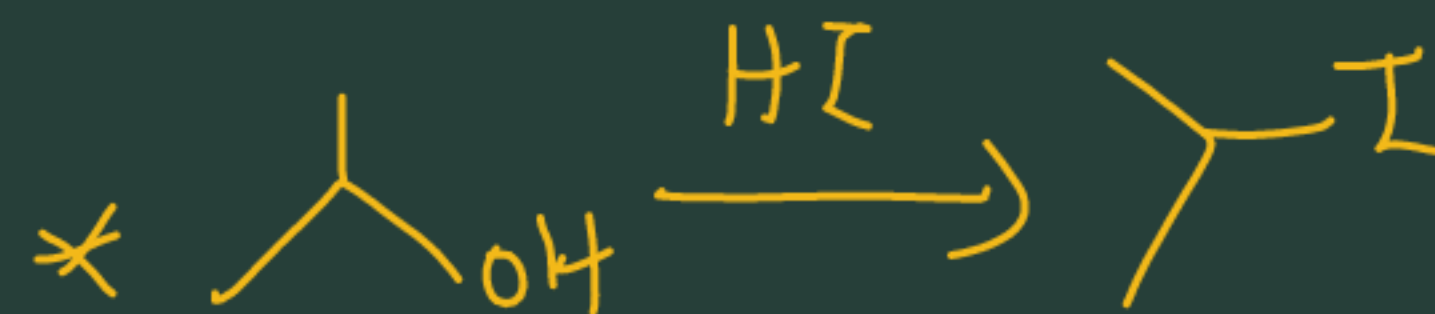
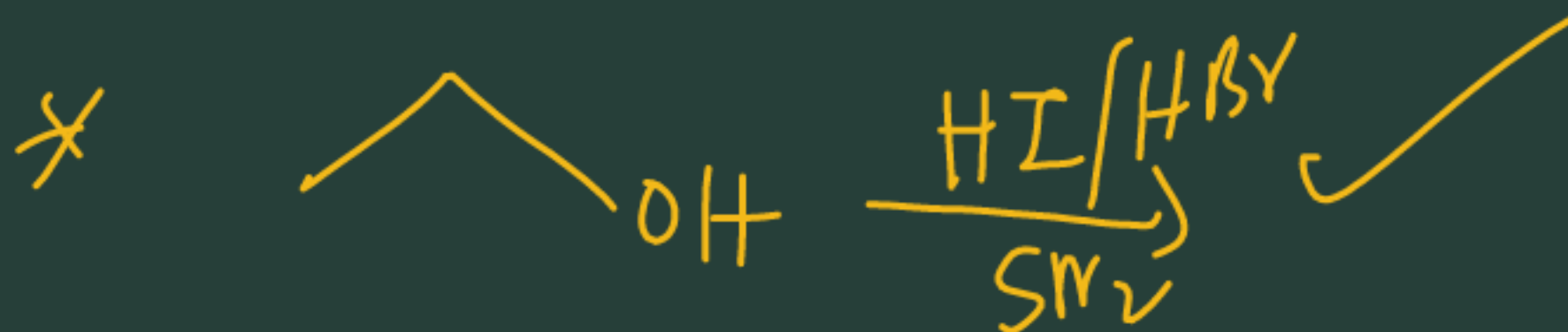
\* HI > HBr > HCl > HF



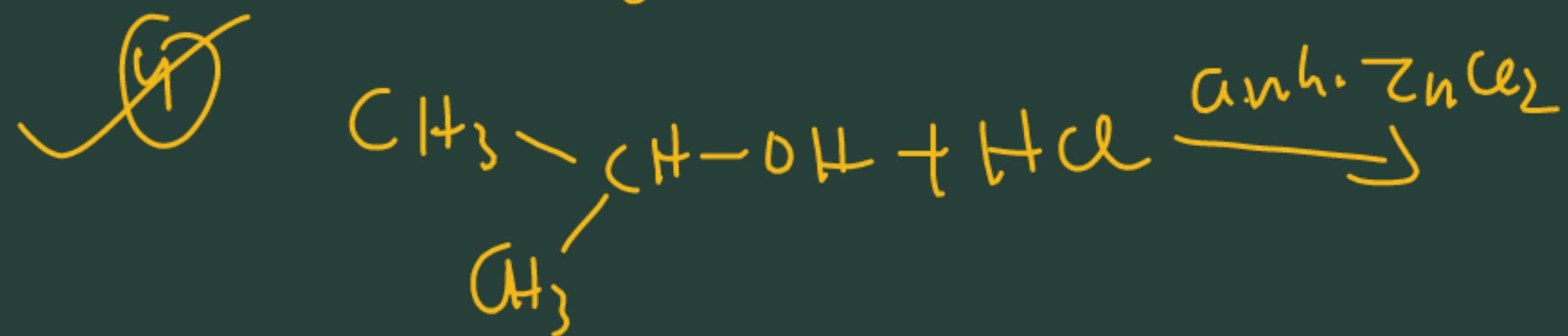
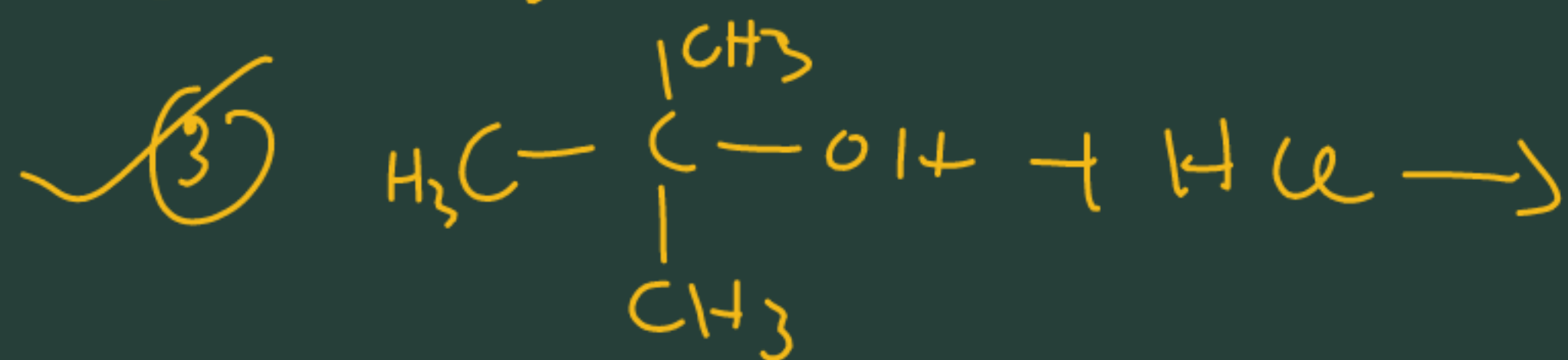
\*  $ZnCl_2$  is required for  $1^\circ$  alcohol,  $2^\circ$  and  $3^\circ$  react without  $ZnCl_2$

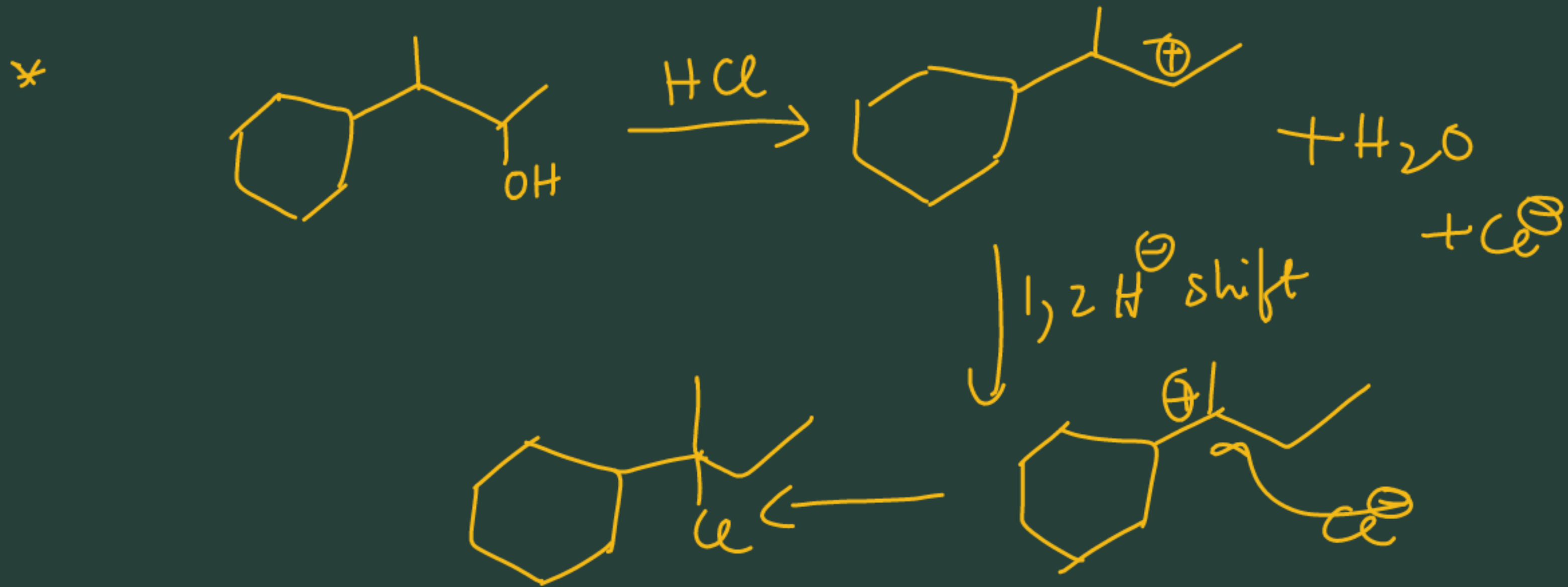


( $Cl^-$  is poor Nu  
it requires  
 $ZnCl_2$  for  $SN_2$ )



Q. Which of the following rxn can be used to prepare alkyl halide



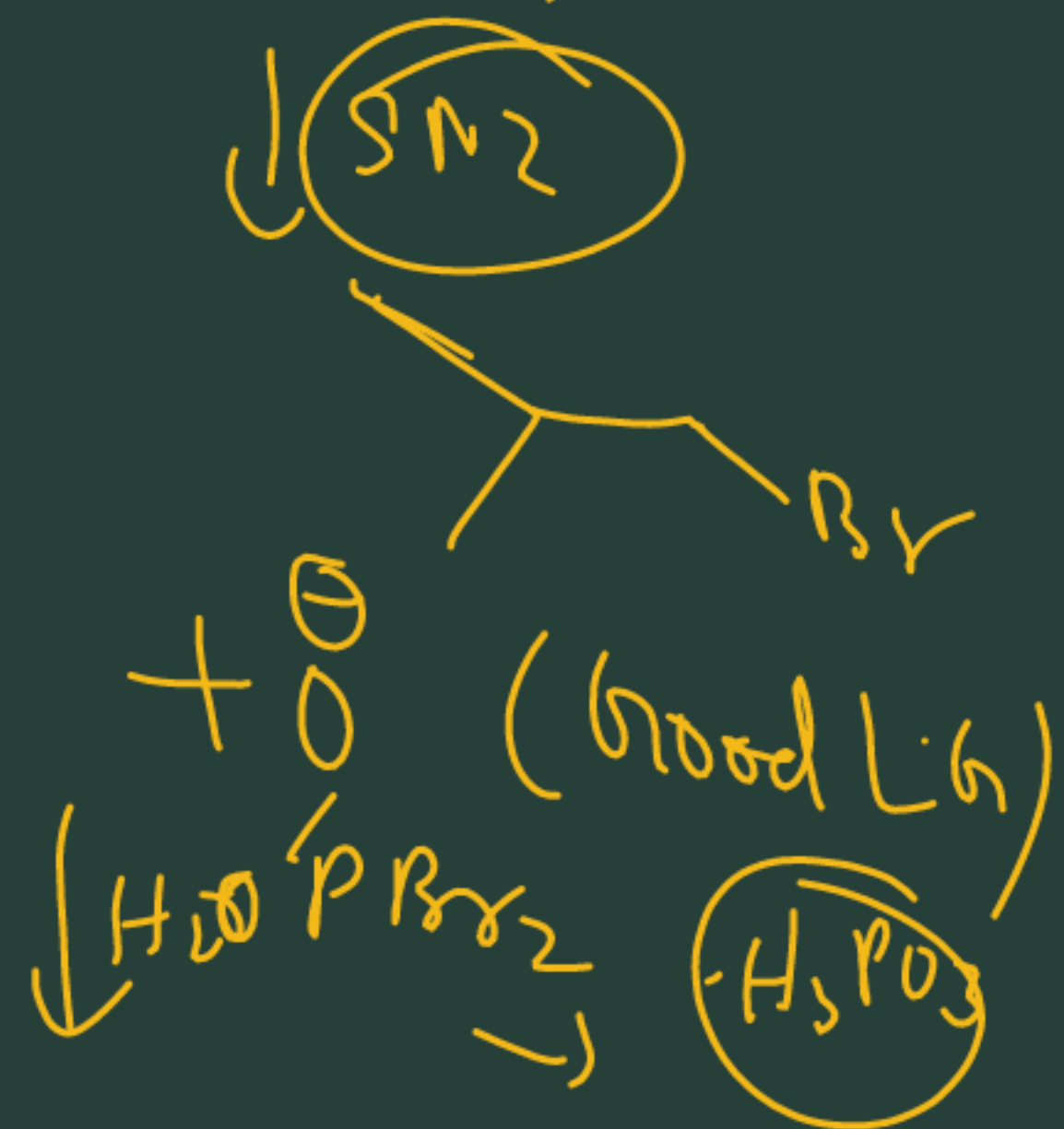
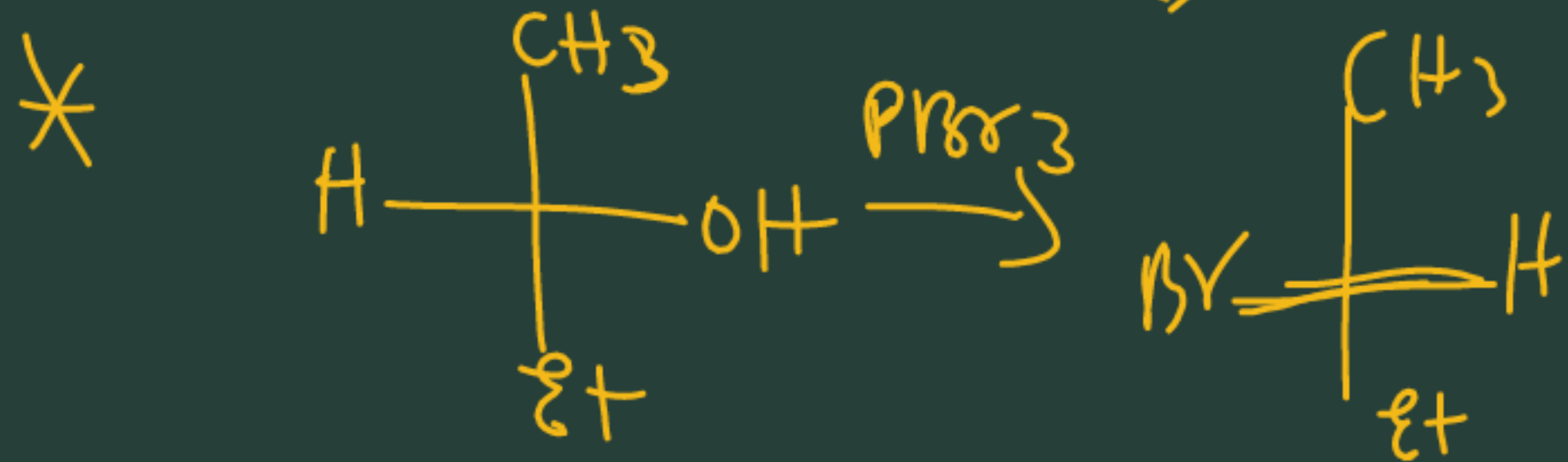
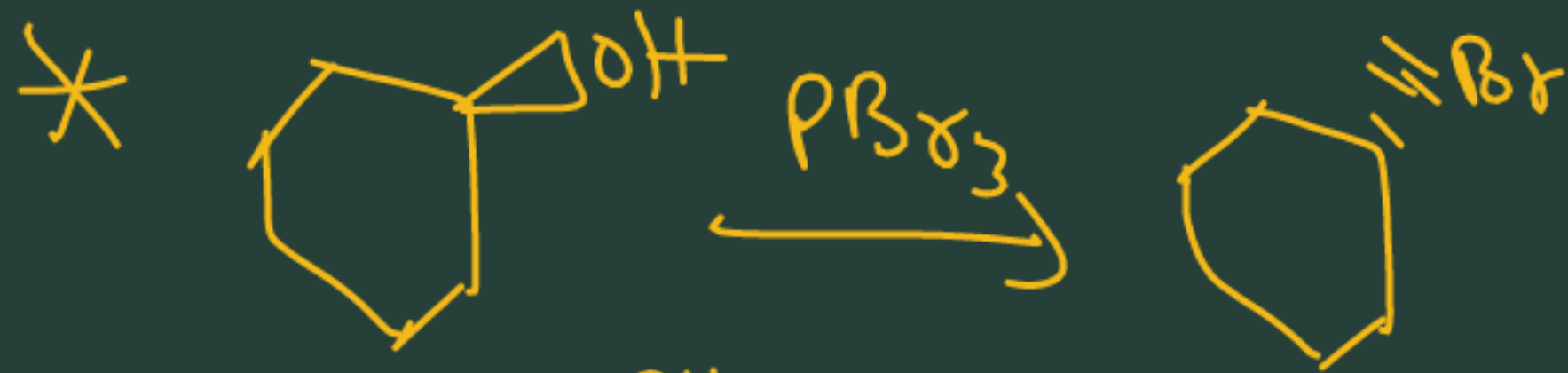


II Rxn with phosphorous halides  $\rightarrow$   $PBr_3$   $\rightarrow$   $PI_3$

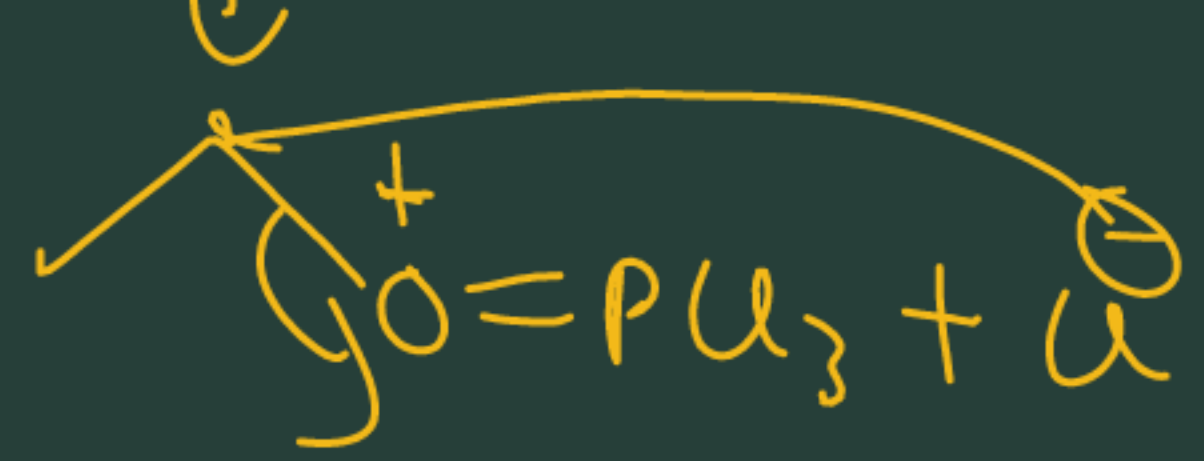
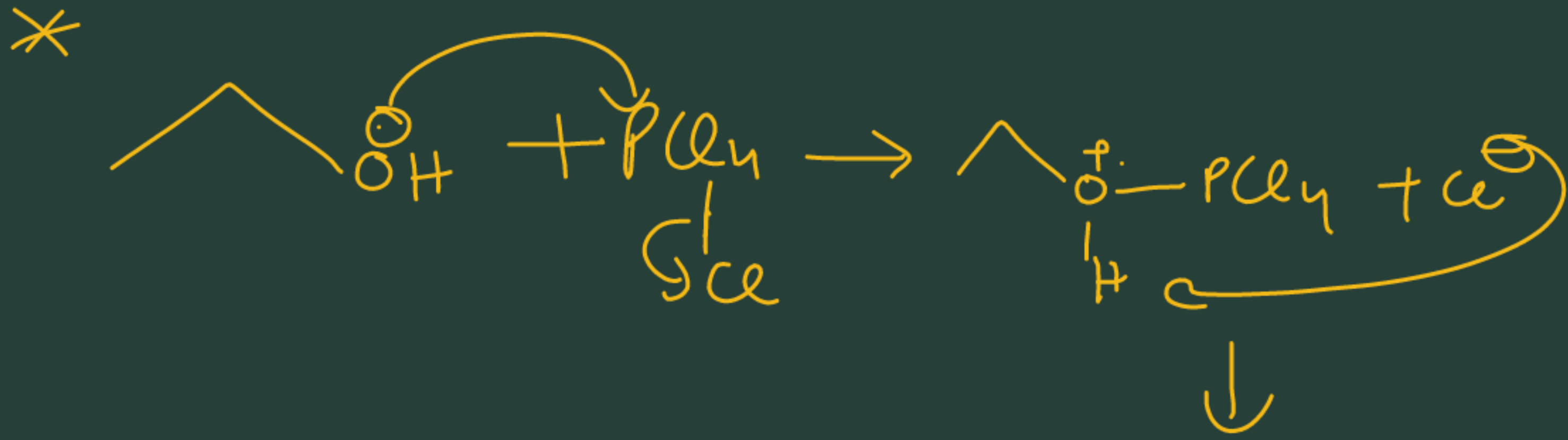
$PCl_5$  /  $PCl_3$  /  $PBr_3$  / red P +  $Br_2$  / red P +  $I_2$

Order of Reactivity  
 $1^\circ \text{ alcohol} > 2^\circ > 3^\circ$

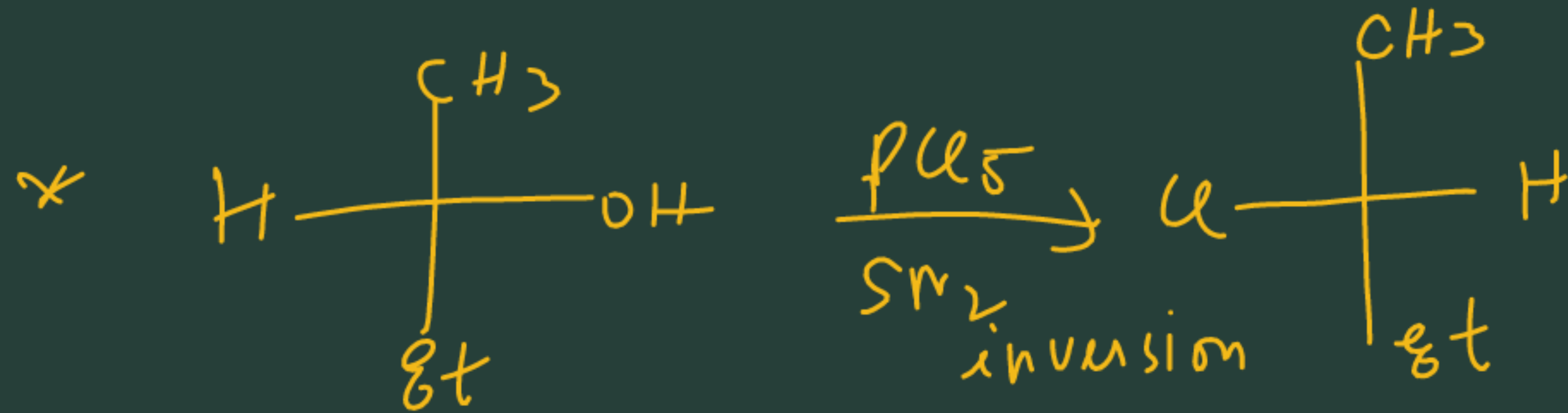
$S_N2$  Rxn











V. Imp

Rxn with thionyl chloride SOCl<sub>2</sub> (Darzen's process)

