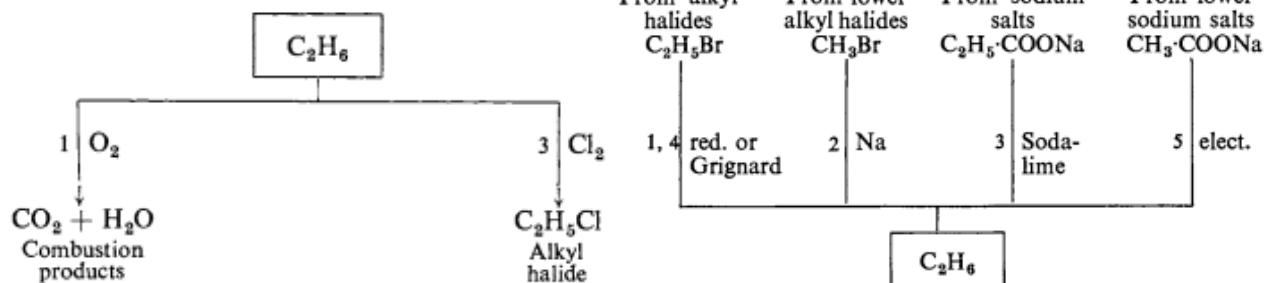


## All organic chemistry in schemes

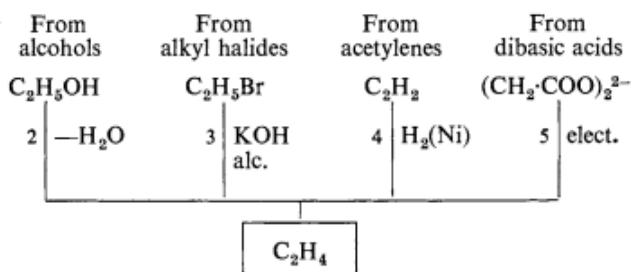
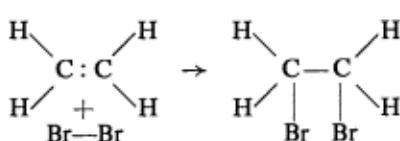
### Reactions of Paraffin Hydrocarbons



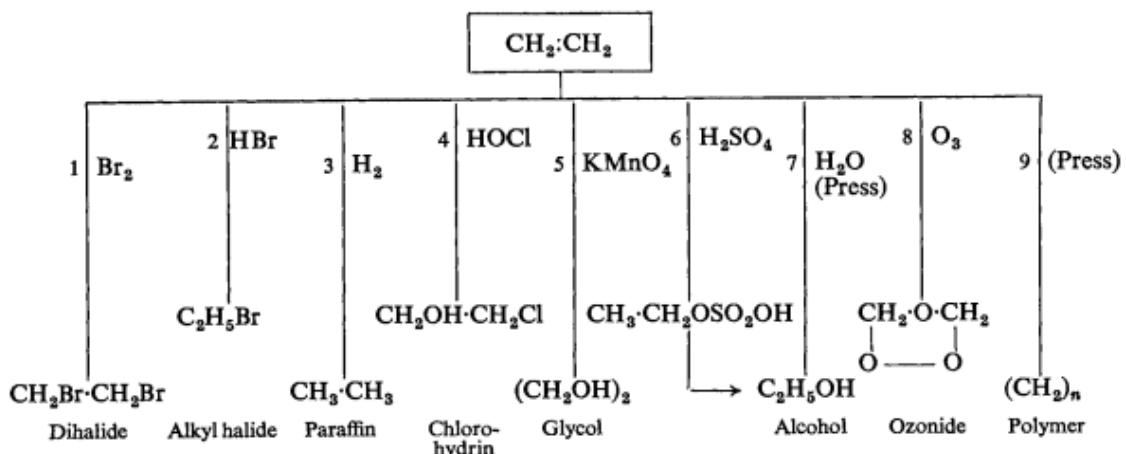
### Alkenes

### Preparation of Ethylenic Hydrocarbons

The double bond is reactive and readily becomes converted by *addition reactions* into single bonds, e.g. by reaction with halogens, halogen hydrides and hydrogen.

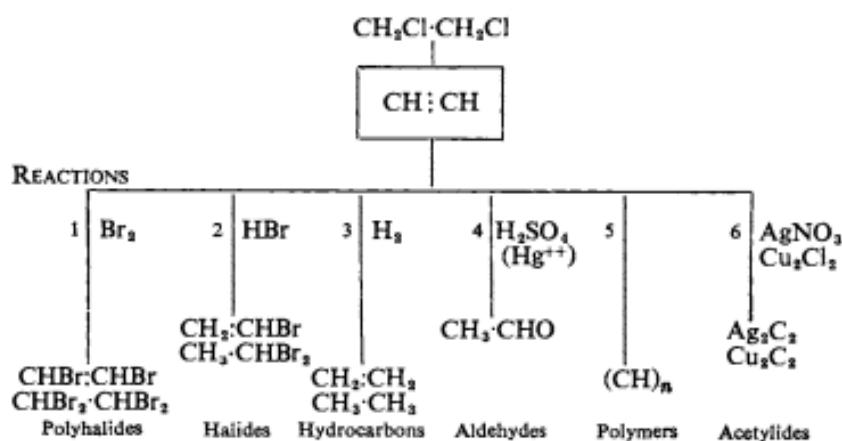


### Reactions of Ethylenic Hydrocarbons

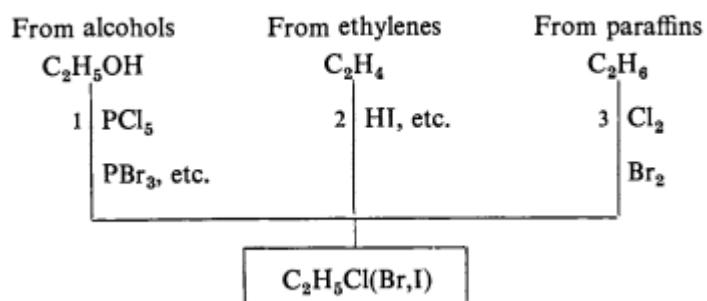


### Triple-bonded Hydrocarbons

**PREPARATION.** From unsaturated dihalide



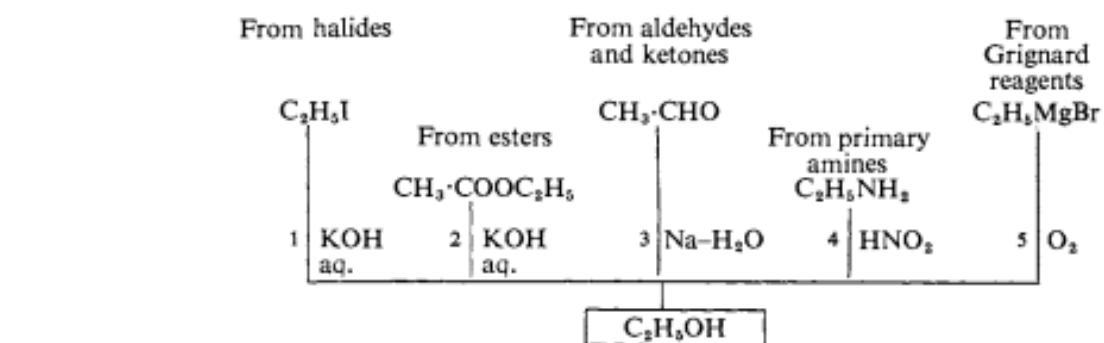
### Preparation of Alkyl Halides



### Reactions of Alkyl Halides

$C_2H_5Cl$										
1 $Na-H_2O$	3 $KOH$ aq.	5 $NH_3$	7 $AgCN$	9 $AgNO_2$	11 $Mg$					
2 $Na$	4 $KOH$ alc.	6 $KCN$	8 $C_2H_5ONa$	10 $CH_3COOAg$						
$C_2H_5-C_2H_5$ Higher paraffin	$CH_2:CH_2$ Ethylene (but see 4)	$C_2H_5CN$ Nitrile	$C_2H_5OC_2H_5$ Ether	$CH_3\cdot COOC_2H_5$ Ester						
$CH_3\cdot CH_3$ Paraffin	$C_2H_5OH$ Alcohol	$C_2H_5NH_2$ Amine	$C_2H_5NC$ Isonitrile	$C_2H_5\cdot NO_2$ Nitro compound	$C_2H_5MgCl$ Grignard reagent					

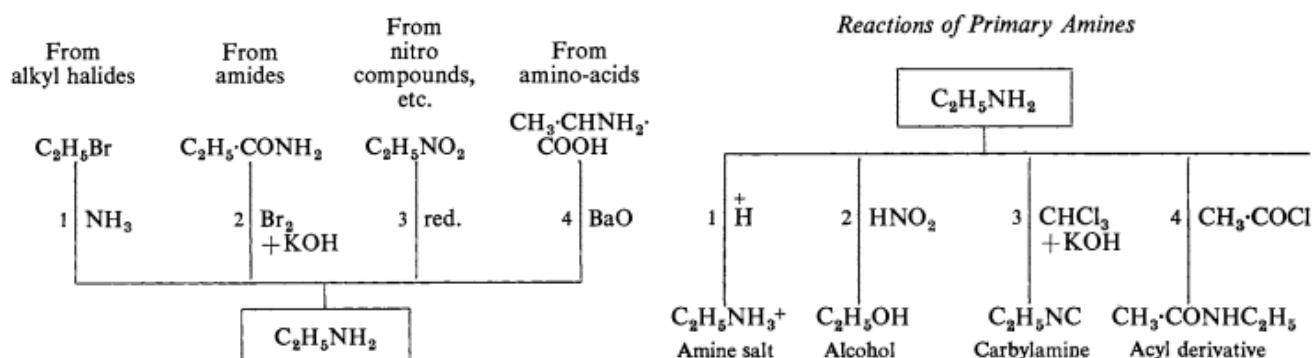
### Preparation of Alcohols



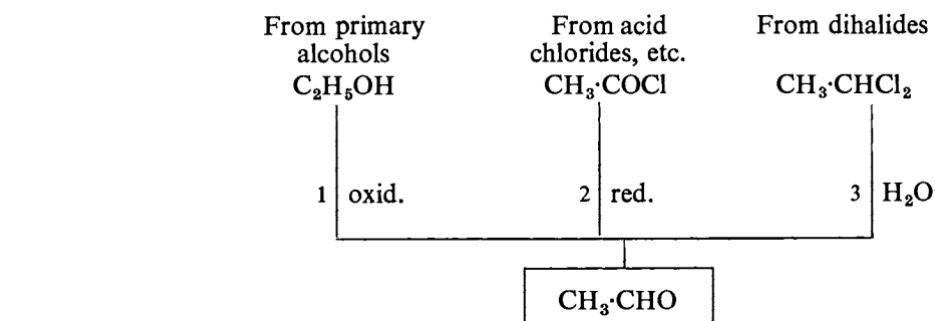
### Reactions of Alcohols

$C_2H_5OH$						
1 $Na$	2 $PCl_3$	3 $CH_3\cdot COOH$	5 $H_2SO_4$	6 oxid.	7 $CH_3\cdot CHO$	
		4 $CH_3\cdot COCl$				
			$C_2H_5OC_2H_5$ Ether	$CH_2:CH_2$ Ethylene		
$C_2H_5ONa$ Alkoxide	$CH_3\cdot COOC_2H_5$ Ester				$CH_3\cdot CH(OC_2H_5)_2$ Acetal	
					$CH_3\cdot CHO$ Aldehyde	
					$CH_3\cdot COOH$ Acid	

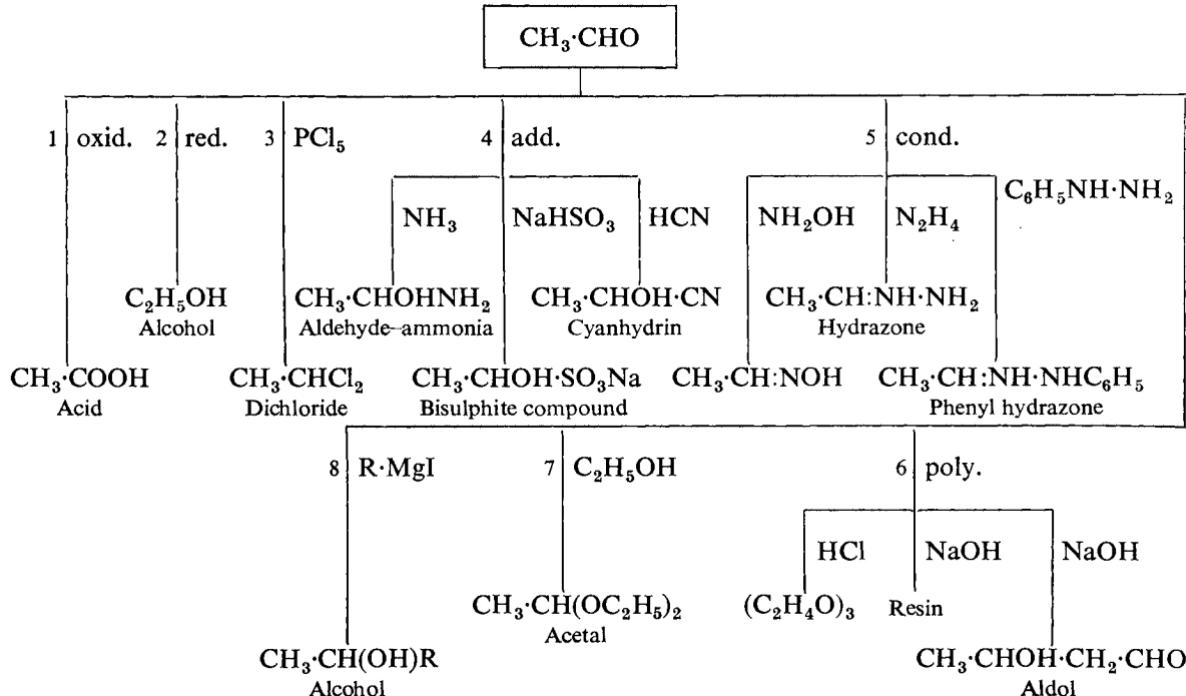
### Preparation of Primary Amines



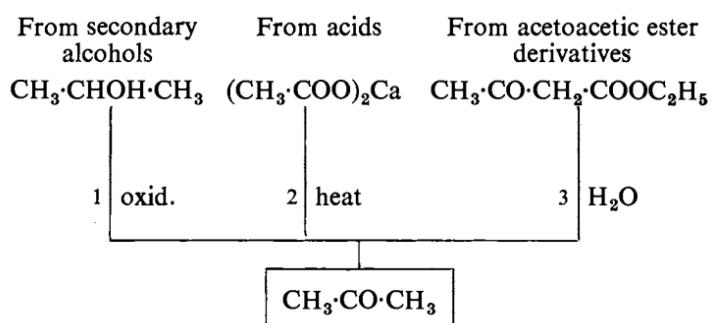
### Preparation of Aldehydes



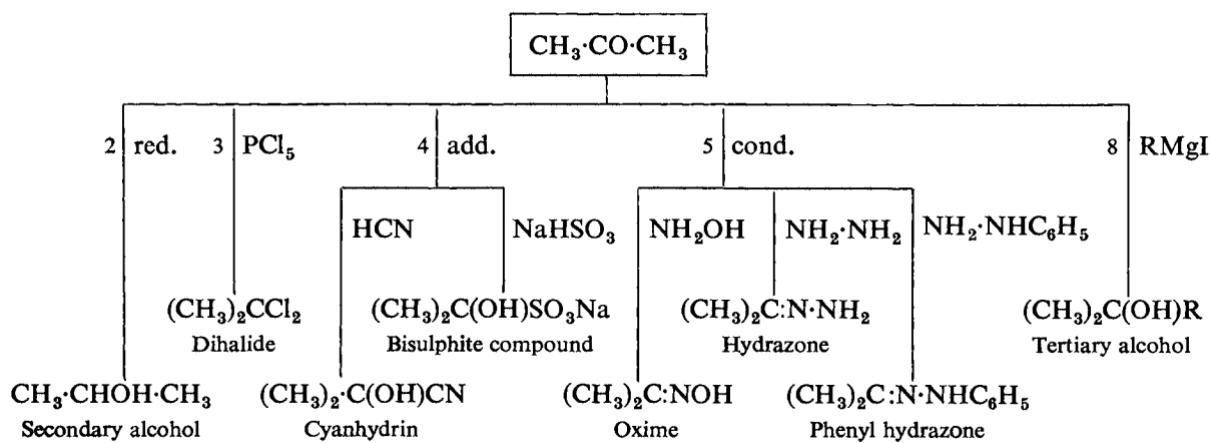
### Reactions of Aldehydes



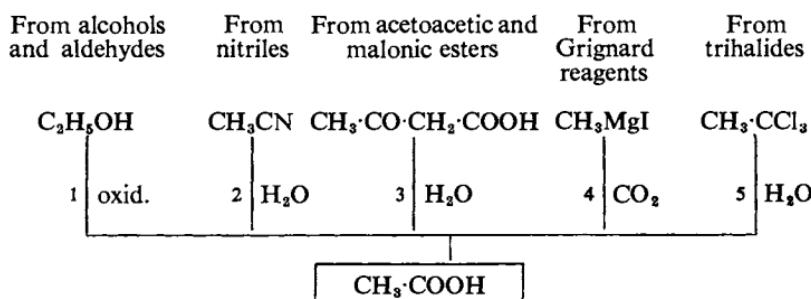
### Preparation of Ketones



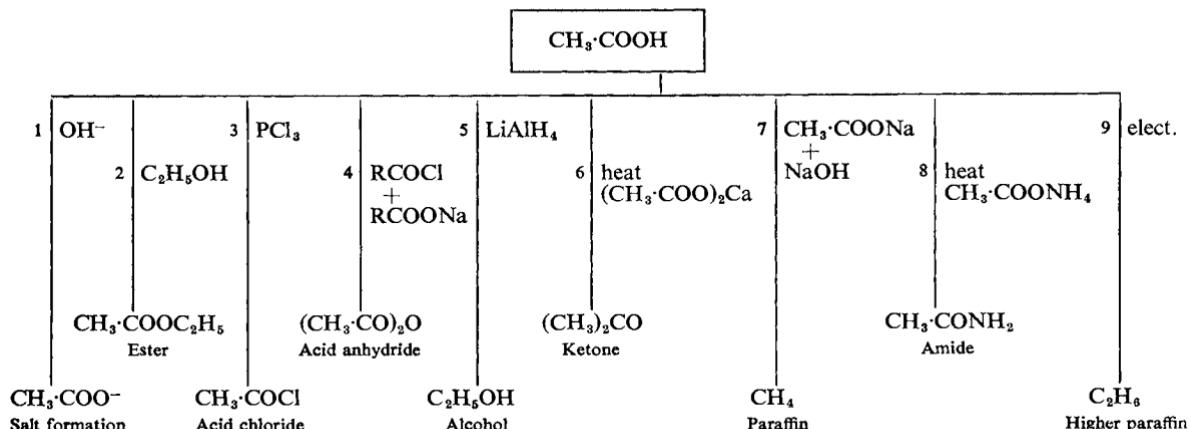
### Reactions of Ketones



### Preparation of Acids

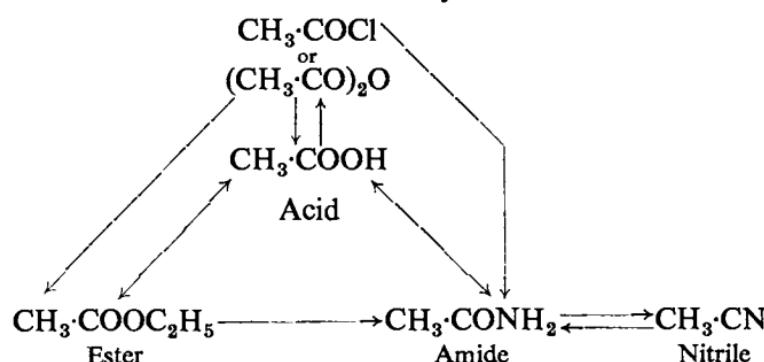


### Reactions of Acids

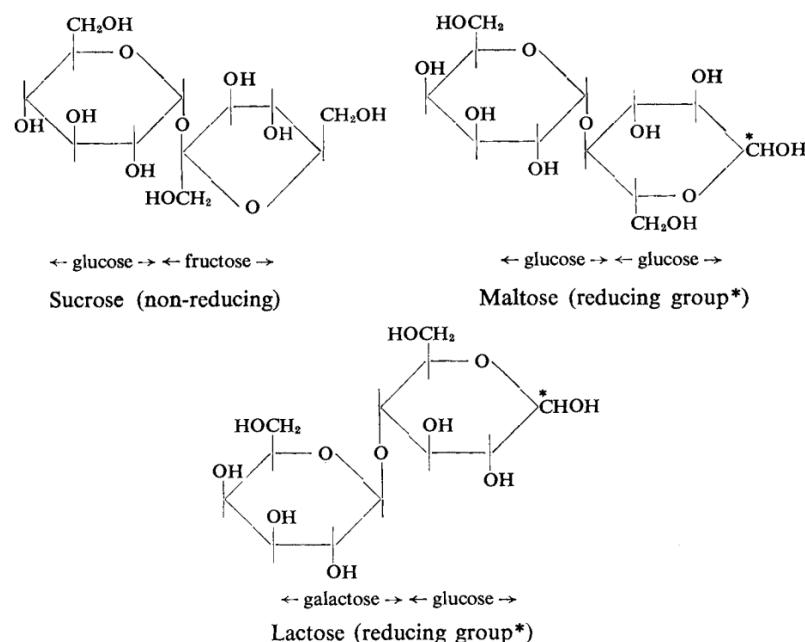
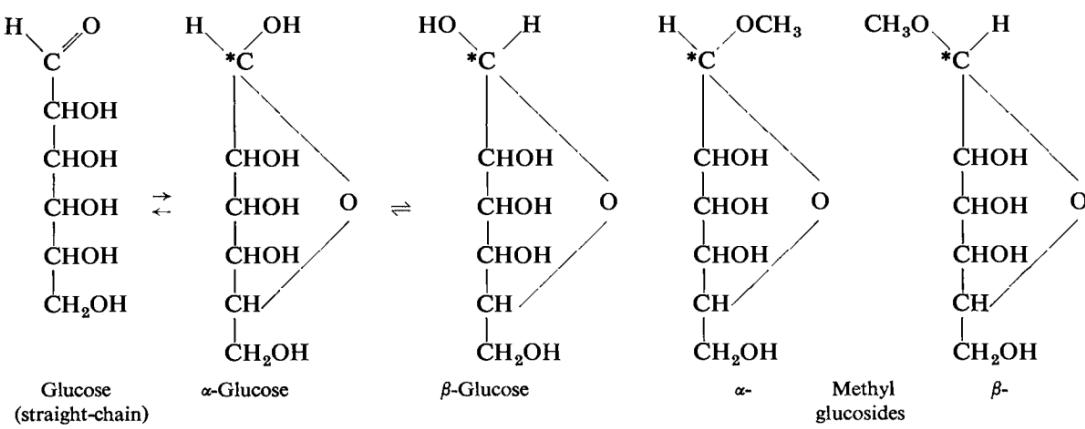


### Interconversion of Derivatives of Acids

#### Acid chloride or anhydride



#### Carbohydrates



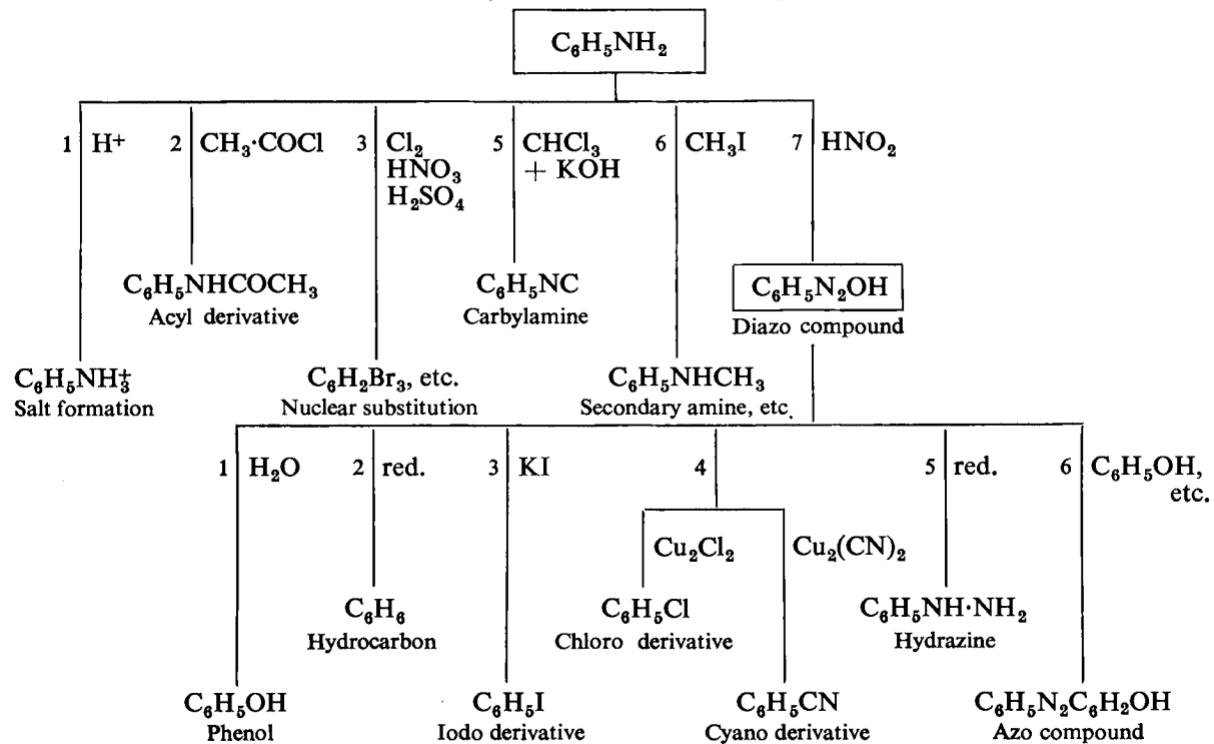
### Reactions of Benzene Hydrocarbons

$C_6H_6$			Addition				$C_6H_5\cdot CH_3$		
Substitution							Side-chain reactions		
1 $Cl_2$	2 $H_2SO_4$	3 $HNO_3$	4 $AlCl_3$	$CH_3Cl$	$CH_3\cdot COCl$	1 $Cl_2$	2 $H_2$	3 $O_3$	1 oxid.
$C_6H_5Cl$ Halogen substitution	$C_6H_5SO_2OH$ Sulphonic acid	$C_6H_5NO_2$ Nitro compound		$C_6H_5\cdot CH_3$ Homologue		$C_6H_6Cl_6$ Hexachloro-cyclohexane		$(CHO)_2$ Disruption of nucleus	2 $Cl_2$
				$C_6H_5\cdot CO\cdot CH_3$ Ketone		$Cyclohexane$		$C_6H_5\cdot COOH$ Aromatic acid	$C_6H_5\cdot CH_2Cl$ etc. Side-chain halide

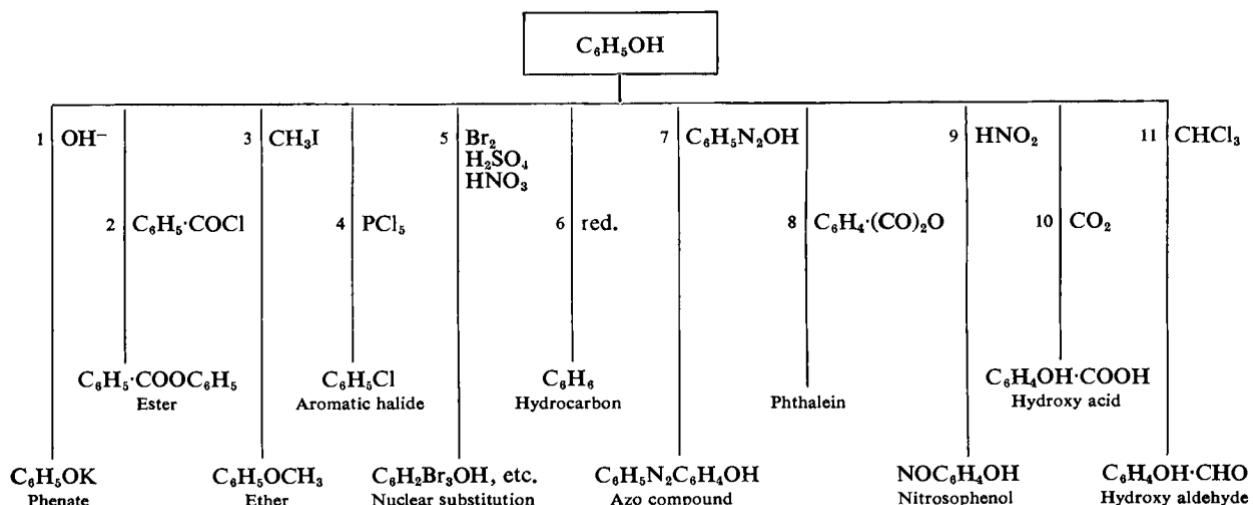
*Comparison of Reactions of Hydrocarbons*

Reactant	Aliphatic			Aromatic	
	Paraffins	Ethylenes	Acetylenes	Benzene	Homologues
Hydrogen Chlorine; bromine	no action substitution	addition addition	addition addition	addition addition or substitution	addition nuclear or side-chain substitution
Iodine	no action	addition	addition	no action	no action
Hydrogen halide	no action	addition	addition	no action	acid formed
Permanganate	no action	decolorization	decolorization	no action	addition
Ozone	no action	addition	addition	addition	sulphonation
Sulphuric acid	no action	addition	addition	sulphonation	nitration
Nitric acid	no action	no action	complex action	nitration	

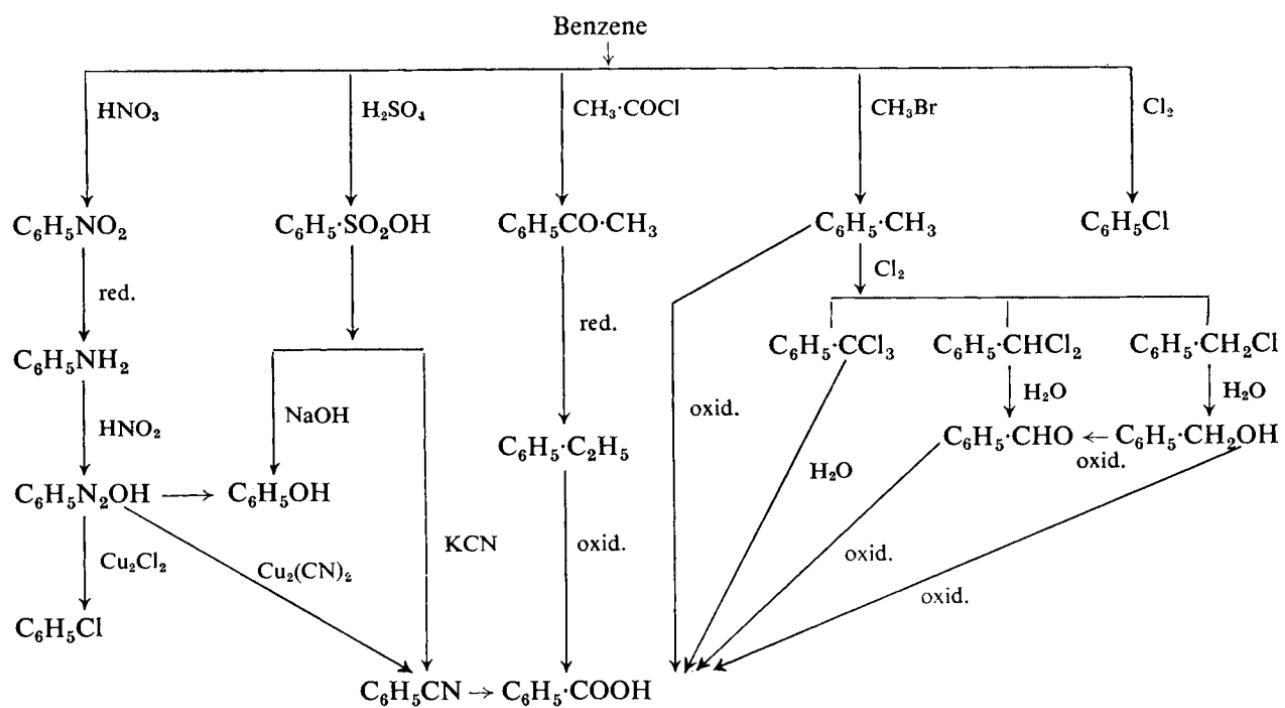
*Reactions of Amines and Diazo Compounds*



*Reactions of Phenols*



*Interconversion of Aromatic Compounds*



**RECOGNITION OF SOME COMMON FUNCTIONAL GROUPS**

GROUP	Reagent	Result
<i>Aliphatic</i>		
C:C or C:C	Bromine water or pot. permanganate	Decolorized
C—Cl (Br, I)	Hydrolysis with pot. hydroxide	Alcohol
CH <sub>2</sub> OH	Oxidation by dichromate + dil. sulphuric acid	Aldehyde
CHOH	Oxidation by dichromate + dil. sulphuric acid	Ketone
C <sub>2</sub> H <sub>5</sub> OH or (CH <sub>3</sub> ) <sub>2</sub> CHOH	Iodine + sodium hydroxide	Iodoform
C—O—C	Hydrogen iodide	Alkyl halide
—NH <sub>2</sub>	Chloroform + pot. hydroxide Nitrous acid Acetyl chloride	Carbylamine Nitrogen + alcohol Substituted amide
>NH	Nitrous acid Acetyl chloride	Nitrosamine (yellow oil) Substituted amide
CO or CHO	Hydroxylamine	Oxime
CO or CHO	Phenyl hydrazine	Phenyl hydrazone
CHO	Silver salt; Fehling's solution	Reduction
COOH	Phosphorus pentachloride	Acid chloride
COCl or (CO) <sub>2</sub> O	Primary amine	Substituted amide
Ester	Potassium hydroxide	Alcohol + salt of acid
<i>Aromatic</i>		
Primary amine	Nitrous acid then phenol and alkali	Diazo compound Azo compound
Phenol	Diazo compound + alkali	Azo compound

C. G. Lyons, S. Mc Lintock, N. H. Lumb, *A concise text-book of organic chemistry*.

PERGAMON PRESS LTD., OXFORD-LONDON-EDINBURGH-NEW YORK-PARIS-FRANKFURT. - 1965. - 254 p.