AFE BABALOLA UNIVERSITY,
ADO EKITI (ABUAD)
Afe Babalola Way, P.M.B. 5454, Ado Ekiti

Onyenkwere Light
Geology
19/SCI14/1015.

1. Primary Alcohols / Alkanols: Primary school are those alchols where the carbon atom of the hydroxyl group (-OH) is attached to only one single Alkyl group. some of the example of these Primary alchols include Methanol, Propanol, ethanol, e.t.c. The complexity of this alkyl chain is unrelated to the classification of any alcohol considered as Primary. The existence of only one Linkage among -OH group and an alkyl group and the thing that qualifies any alchol as a primary

CH_3-CH_2-OH ethanol

$CH_3-CH_2-CH_2-OH$ Propan-1-ol

$CH_3-CH-CH_2-OH$ 2-methyl propan-1-ol.

2. Secondary ~~Alchol~~ Alcohols / Alkanols: secondary alcohols are those where the carbon atom of the hydroxyl group is attached to two alkyl groups present maybe either structurally identical or even different. some of the example of secondary alcohols are given below-

$CH_3-CH(OH)-CH_3$ Propan-2-ol

$CH_3-CH(OH)-CH_2-CH_3$ butan-2-ol

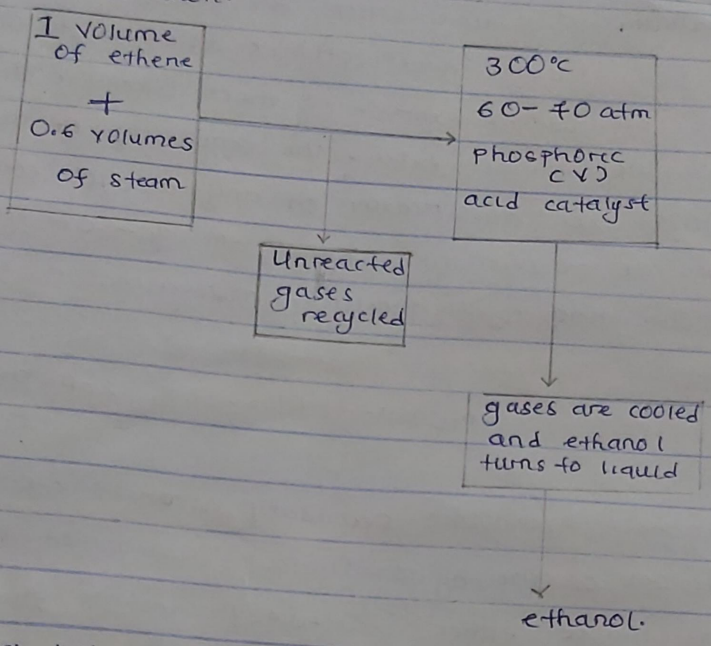
$CH_3-CH_2-CH(OH)-CH_2-CH_3$ Pentan-3-ol.

3. Ethanol is manufactured by reacting ethene with steam. The catalyst used is solid ~~carbon~~ silicon dioxide coated with phosphoric (V) acid. The reaction is rexersible.

$$CH_2=CH_2(g) + H_2O(g) \rightleftharpoons[H_3PO_4] CH_3CH_2OH(g).$$

Only 5% of the ethene is converted into ethanol at each pass through the reactor. By removing the ethanol from the equilibrium mixture and recycling the ethene, it is possible to achieve an overall

95% conversion.



This is a bit of a simplication! when the gases from the reactor are cooled, then excess steam will condense as well as the ethanol. The ethanol will have to be separated from the water by fractional distillation.

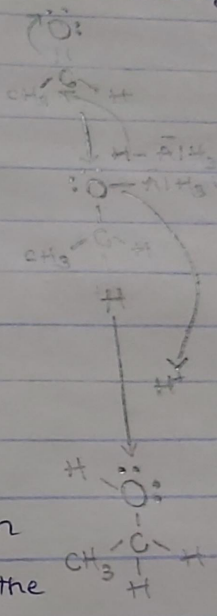
4). Aldehydes and Ketones are mostly readily reduced by hydride reagents

- The reducing agents $LiAlH_4$ and $NaBH_4$ act as a source of $4x\ H^-C$ hydride ion).
- Overall 2H atoms are added across the $C=O$, in aldehydes or ketones to give alcohols.
- The substituents on the carbonyl dictate the nature of the product alcohol.

- Reduction of methanal (formaldehyde) gives methanol.
- Reduction of the other aldehydes gives primary alcohols.
- Reduction of ketones gives secondary alcohols.
- The acidic work-up converts an intermediate metal alkoxide salt into the desired alcohol via a simple acid base reaction.

Nucleophilic Addition of $LiAlH_4$ to an Aldehyde.

The nucleophilic H in the hydride reagent adds to the electrophilic C in the polar carbonyl group in the aldehyde, electrons from the C=O move to the O creating an intermediate metal alkoxide complex (note that all 4 of the H atoms can react).



This is the work-up-step, a simple acid/base reaction, Protonation of the alkoxide Oxygen creates the primary alcohol product from the intermediate complex.

Alkanone.

For example: (CH_3CH_2OH).

$$CH_3-C(=O)-H + 2(H) \longrightarrow CH_3-C(OH)(H)-H$$

Alkanal

For example ($CH_3CH(OH)CH_3$).

$$(CH_3)_2C=O + 2(H) \longrightarrow CH_3-C(OH)(CH_3)-H$$

2. Grignard reagent: CH_3CH_2MgCl

[ethyl magnesium chloride].

$$CH_3CH_2MgCl + CH_3CH_2CH_2CH_2C{=}O\,CH_2CH_3CH_3 \longrightarrow$$

$$CH_3CH_2CH_2CH_2-\underset{\displaystyle CH_2CH_2CH_3}{\overset{\displaystyle CH_3CH_2}{\overset{|}{\underset{|}{C}}}}-OMgCl \xrightarrow[\text{Dil. acid}]{HCl} CH_3CH_2CH_2 \cdot$$

$$CH_3-\underset{\displaystyle CH_2CH_2CH_3}{\overset{\displaystyle CH_3CH_2}{\overset{|}{\underset{|}{C}}}}-OH + Mg(OH)Cl$$