

the same -OH group behaves differently on a chain than on a ring, and an ether just hides the OH between two carbons

Alcohol vs phenol

Alcohol

- OH on an sp^3 carbon, e.g. CH_3CH_2OH
- classified 1°, 2°, 3° by the carbon it sits on
- weaker acid than phenol; the alkyl group pushes electron density onto oxygen

Phenol

- OH directly on an aromatic ring carbon
- the O lone pair conjugates into the ring, so the O-H bond is more polarised
- stronger acid than an alcohol; the phenoxide ion formed is resonance-stabilised across the ring

resonance in phenoxide spreads the negative charge over the ring, which is why phenol reacts with NaOH but a plain alcohol does not

Classification and nomenclature *

- 1°/2°/3°: named by carbons on the carbinol carbon (bearing -OH), same as haloalkane classification
- IUPAC name: replace alkane's -e with -ol, number chain for -OH's lowest locant
- a diol has two -OH groups (e.g. ethylene glycol), a triol has three (e.g. glycerol)
- ethers are named as alkoxyalkanes, e.g. $CH_3-O-CH_2CH_3$ is methoxyethane

Preparation of alcohols

from an alkyl halide, $R-X + NaOH \rightarrow R-OH + NaX$
aqueous NaOH/KOH, SN_2

from a Grignard reagent + formaldehyde, then aqueous acid workup



from an alkene, acid-catalysed hydration (Markovnikov)



dry ether, then H_2O



a Grignard reagent adding to formaldehyde, then hydrolysed on workup, gives a primary alcohol

a Grignard reagent with formaldehyde gives a 1° alcohol, with any other aldehyde gives a 2° alcohol, and with a ketone gives a 3° alcohol

same -OH, different carbon: sp^3 keeps it a weak base/weak acid, aromatic sp^2 turns it noticeably acidic