This is an example of an alkenol (an alcohol molecule with a double bond) – prop-2-en-1-ol (CH$_2=CH$-CH$_2$-OH).
This is the same molecule but with depicted single bonds and hydrogen atoms.
This is a molecule of vinyl alcohol (ethenol, \( \text{CH}_2=\text{CH-OH} \)).
An ethenol molecule easily converts (tautomerizes) to a molecule that has a double bond between carbon and oxygen atoms (acetaldehyde). We illustrate this in the next slides. One pair of electrons from a double bond migrates to a carbon atom...
... then a hydrogen atom from the hydroxyl group attaches to that pair ...
... and where we had the double bond we now have a single bond ...
... and a free pair of electrons from the oxygen atom migrates to the adjacent carbon atom with the formation of a double bond.
We now have a molecule of acetaldehyde (ethanal, $\text{CH}_3\text{CH}=\text{O}$).
This is the same molecule but with depicted double bond using orange color.
This is the simplest aldehyde – formaldehyde (methanal, CH$_2$=O). The functional group $>$C=O is called a carbonyl group.
This is an example of a carboxylic acid – a formic acid (methanoic acid, HCOOH). The functional group -COOH is called a carboxyl group. It “contains” a carbonyl (>C=O) and hydroxyl groups (-OH).
Methanoic acid \((\text{HCOOH})\)

Methanal \((\text{HCHO})\)

Methanol \((\text{CH}_3\text{OH})\)
Acetic acid (ethanoic acid, $\text{CH}_3\text{COOH}$)

Acetaldehyde (ethanal, $\text{CH}_3\text{CHO}$)

Ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)
If we replace the hydrogen atom in a methanol hydroxyl group with a methyl group (CH₃), we get a dimethyl ether molecule (CH₃-O-CH₃). Such compounds are called ethers.
If we replace the hydrogen atom in a methanoic acid carboxyl group with a methyl group ($\text{CH}_3$), we get a methyl formate molecule (methyl methanoate, $\text{HCOOCH}_3$). Such compounds are called esters.
This is a glycerol (glycerine) molecule, a simple polyol compound.
This is a glycerol ether (an example of alkyl ethers).
This is another example of glycerol ethers.
This is an example of ethylene glycol ether.
This is an example of a molecule which is ether and diol (two hydroxyl groups).
Continued with Part 11