

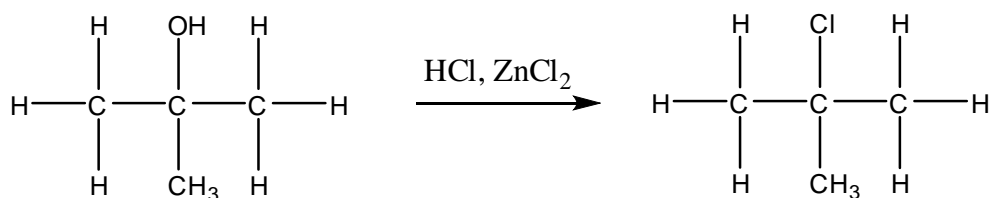
**Question One-** Complete the table

Name	Structure	Optical isomers (Y/N)
Example: Pentan-2-one	$  \begin{array}{ccccccccc}  & \text{H} & & \text{H} & & & \text{H} & & \text{H} \\  &   & &   & & &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\  &   & &   & & &    & &   & &   \\  & \text{H} & & \text{H} & & & \text{O} & & \text{H} & & \text{H}  \end{array}  $	No
4-methyl pentanal	$  \begin{array}{ccccccccc}  & \text{H} & & \text{H} & & \text{H} & & \text{H} & & & \text{H} \\  &   & &   & &   & &   & & & / \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & = \\  &   & &   & &   & &   & & & \backslash \\  & \text{H} & & \text{CH}_3 & & \text{H} & & \text{H} & & & \text{O}  \end{array}  $	No
3-methyl Butan-1-ol	$  \begin{array}{ccccccccc}  & \text{H} & & \text{H} & & \text{H} & & \text{H} & & & \\  &   & &   & &   & &   & & & \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\  &   & &   & &   & &   & & & \\  & \text{H} & & \text{CH}_3 & & \text{H} & & \text{OH} & & &   \end{array}  $	No
Pentan-2-ol	$  \begin{array}{ccccccccc}  & \text{H} & & \text{H} & & \text{H} & & \text{OH} & & \text{H} \\  &   & &   & &   & &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\  &   & &   & &   & &   & &   & & \\  & \text{H} & & \text{H} & & \text{H} & & \text{H} & & \text{H} & &   \end{array}  $	Yes
2-methyl propan-2-ol	$  \begin{array}{ccccccc}  & & \text{H} & & \text{OH} & & \text{H} \\  & &   & &   & &   \\  \text{H} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\  & &   & &   & &   \\  & & \text{H} & & \text{CH}_3 & & \text{H}  \end{array}  $	No

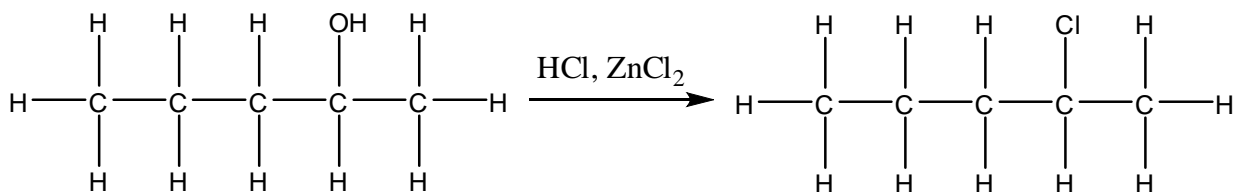
**Question Two-** Discuss a series of chemical tests to distinguish all the chemicals on the list above

Take a small amount of sample of each substance and reacts them with Lucas reagent (HCl/ZnCl<sub>2</sub>)

For 2-methyl propan-2-ol, it will turn cloudy quickly due to the substitution reaction with HCl/ZnCl<sub>2</sub> forming insoluble 2-chloro-2-methyl propane



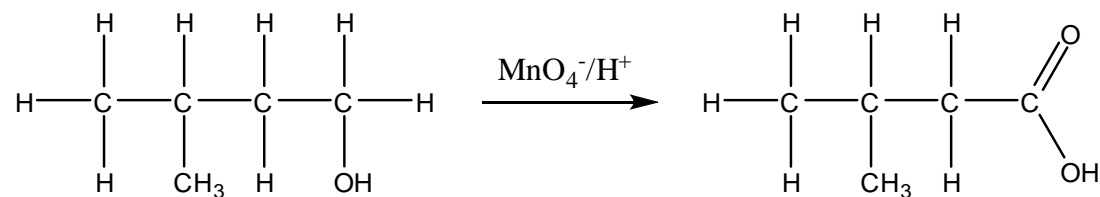
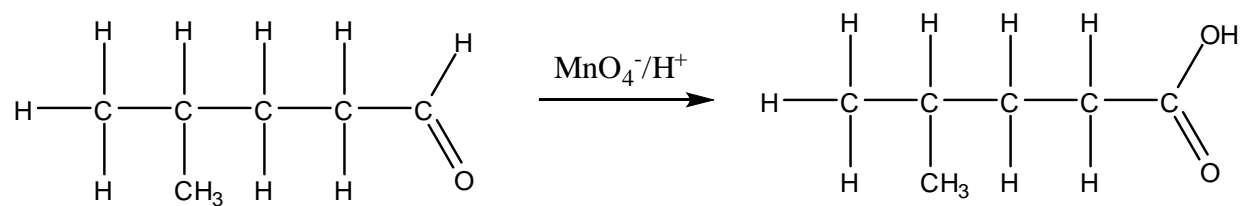
Similarly, pentan-2-ol will also react and turn the mixture cloudy, however, it takes around 5-10 minutes under warm water bath



No observation for the remaining, Pentan-2-one, 4-methyl pentanal and 3-methyl butan-1-ol

Take some sample of the remaining substances and react with  $\text{KMnO}_4/\text{H}^+$  in a warm water bath

4-methyl pentanal and 3-methyl butan-1-ol will result in a colourless mixture due to the reduction of  $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$



Whole Pentan-2-one remains unchanged

Finally react 4-methyl pentanal and 3-methyl butan-1-ol with Tollens reagent,  $[\text{Ag}(\text{NH}_3)_2]^+$

for 4-methyl pentanal, a grey deposit will form due to the reduction of  $\text{Ag}^+ \rightarrow \text{Ag}$  while no observation for butan-1-ol

