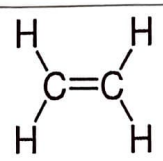
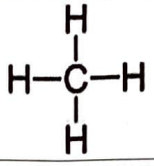
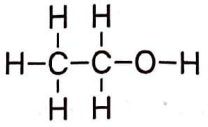
Reactions of Alcohols

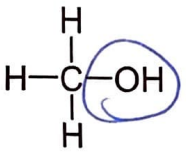
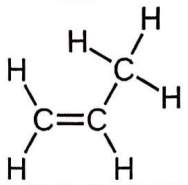
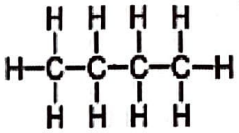
Name Answer Key

1. **These six molecules include alkanes, alkenes and alcohols.**

a) **State which molecules belong to which group.**

Write your answer underneath each molecular structure.

		
alkene	alkane	alcohol

		
alcohol	alkene	alkane

b) **Name each of the substances in part a).**

Write your answer in the same boxes.

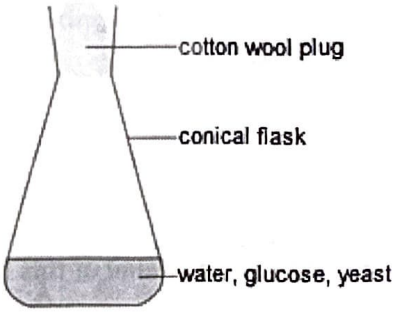
ethene, methane, ~~or~~ ethanol, methanol, propene, butane

c) **Using one of the molecules shown, circle the ~~alcohol~~ functional group.**

hydroxyl

2. **Janice and Matt set up this equipment then waited for one week.**

A chemical reaction takes place in which new substances are made.



a) **Complete the word equation for this reaction:**

Glucose → ethanol + carbon dioxide

b) **Complete the symbol equation for the reaction.**

$C_6H_{12}O_6(aq) \rightarrow 2\ CH_3CH_2OH(aq) + 2\ CO_2(g)$

c) **What is the name given to the type of reaction taking place?**

Fermentation

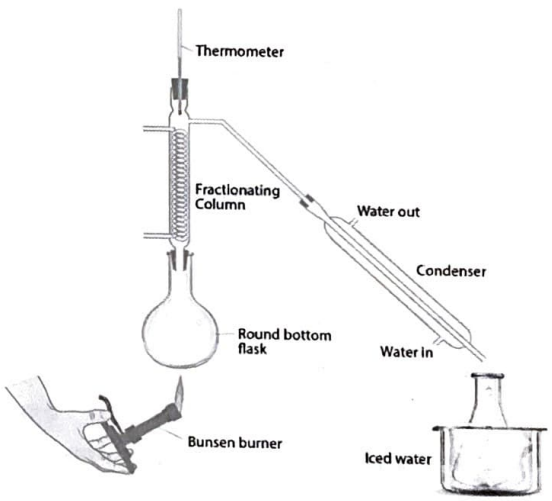
d) **Explain why yeast is used in the experiment.**

acts as a catalyst to ↑ rxn rate

Janice and Matt then add the mixture from the conical flask to the round-bottom flask in a different experiment.

e) **What is the purpose of this new experiment?**

separate ethanol via fractional distillation



Source: Royal Society of Chemistry

f) **Explain how this experiment works.**

ethanol has a lower boiling pt. so will be removed first and can be condensed to purify

g) **What is the name of this technique or experiment?**

fractional distillation

h) **Give two uses of alcohols.**

solvent (dissolves other substances), fuel source

3. **Ravi carries out an experiment with a mixture of ethanol dissolved in water.**

→ causes oxidation

He leaves the ethanol open to the air for two weeks.
He notices that a very slow chemical reaction takes place.
He removes a few drops of his new mixture and adds some universal indicator solution.
He notices that the indicator turns orange.

assuming some ethanal vapors can condense on side of flask and fall back in

a) What type of substance has formed?

carboxylic acid

b) What is the name of the new organic product formed?

ethanoic acid

c) State the name of the chemical substance that reacts with ethanol in this reaction.

oxygen

d) What type of reaction has taken place?

oxidation

e) Ravi knows that a different chemical substance could be added to ethanol to make the same product, but a lot faster.

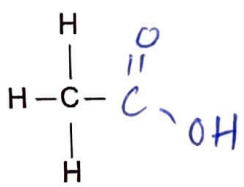
State the name of this substance.

oxidizing agent (e.g. acidified $KMnO_4$ or $K_2Cr_2O_7$)

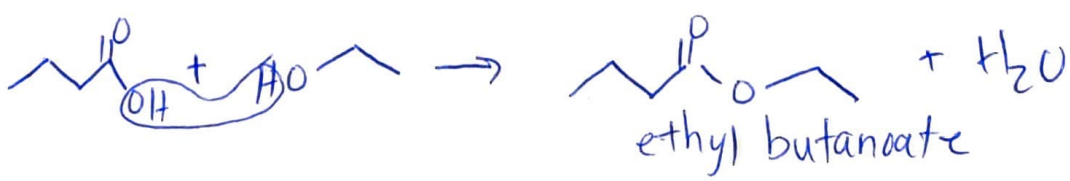
f) Complete the chemical equation that shows the reaction taking place:

$C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$

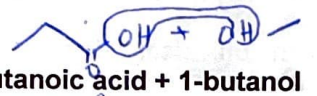
g) Complete the diagram to show the structure of the new organic product made.

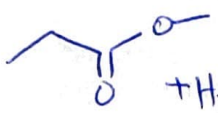


3. Complete and balance the following reactions. Name the ester produced.
a) butanoic acid + ethanol



b) propanoic acid + methanol

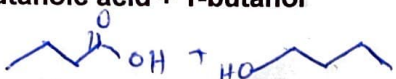


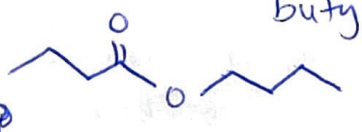


methyl propanoate

$+H_2O$

c) butanoic acid + 1-butanol

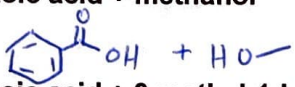


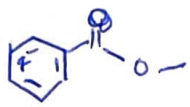


butyl butanoate

$+H_2O$

d) benzoic acid + methanol

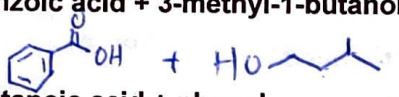


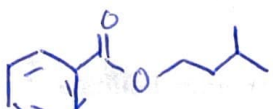


$+H_2O$

methyl benzoate

e) benzoic acid + 3-methyl-1-butanol



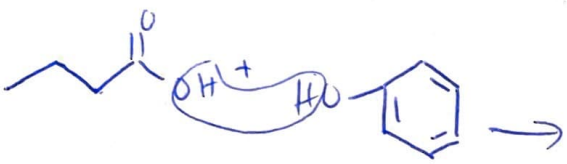


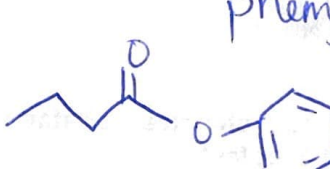
$+H_2O$

3-methyl-1-benzoate

butyl

f) butanoic acid + phenol





$+H_2O$

phenyl butanoate

$+H_2O$