**NCEA Past exam questions on distinguishing between organic substances (Level 3)**

**2017**

**1.** Compound **P** and compound **Q** are straight-chain constitutional (structural) isomers with the molecular

formula C5H12O. Compound **P** can form optical isomers, whereas compound **Q** cannot.

When reacted with concentrated sulfuric acid, compound **P** forms two products, compounds **R** and **S**

compound **Q** forms only one product, compound **S**.

When compound **Q** is reacted with *Reagent 1*, it forms a chloroalkane, compound **T**.

Compound **T** reacts with concentrated NH3 to form compound **U**.

Compound **Q** can also be oxidised to form compound **V**, which will turn moist blue litmus paper red.

Compound **V** can also be reacted with compound **Q** and *Reagent 2*, to form a sweet-smelling liquid,

compound **W**.

Use the information above to identify compounds **P** to **W**, and *reagents* **1** and **2**.

**2.** Explain how Benedict’s solution can be used to distinguish between propanone and propanal.

In your answer, you should include:

• any observations made linked to the organic compounds involved

• the type of reaction occurring

• relevant equations showing any organic reactants and products involved.

**2016**

Explain how you would identify each of the organic substances, **A** to **D**, from the table in (b)(i), using only

moist litmus paper, water, and Benedict’s solution.



In your answer, you should include:

• a description of any tests carried out and any observations you would make

• equations to show the organic products formed, if applicable.

**2015**

A type of triglyceride can be described as unsaturated. Describe a chemical test that can be used to show that a

molecule is unsaturated. Give any observations, and state the type of reaction occurring.

**2014**

Identify the reagents, conditions required, and observations linked to species, to enable the following

pairs of chemicals to be distinguished from each other.

(i) Aqueous solutions of propanamine and propanamide.

(ii) Propanone and propanal.

(iii) Propanoyl chloride and propyl propanoate.

**2013**

**1.** Draw the structural formulae of three different isomers of 

which show the following properties:

• Isomer 1 turns moist blue litmus paper red.

• Isomer 2 is an ester.

• Isomer 3 is a ketone.

**2.** Devise a method for distinguishing between the three liquid compounds, butan-1-ol, butanoic acid, and

butanoyl chloride, using only blue litmus paper and water.

Explain each of the observations in your method, with reference to the structure of the organic compounds.

**3.** Describe how you could distinguish between the alcohols

methylpropan-2-ol

butan-1-ol

butan-2-ol

using chemical tests on the alcohols and / or their oxidation products.

**2012**

Outline how you would distinguish between the following substances using only litmus paper, water and Tollens’ reagent. In your answer you should include:

• the name of each molecule

• the test(s) that you would carry out to identify each molecule

• any equations, if applicable, to identify the organic products formed.



**2011**

**1. Compound A** C4H8O2 forms a number of structural isomers that have **different** functional groups.

These isomers are involved in the following reactions:

**• Compound B** rapidly decolourises bromine water.

**• Compound C** will react with acidified potassium dichromate solution, and will also react with Fehling’s solution.

**• Compound D** can be hydrolysed to form methanol as one of its products.

Draw the structural formula for Compounds A – D and use the descriptions of the reactions to justify your choice.

**2.** Describe a test that could distinguish between the two organic products produced in reactions (i) and (ii).

**2010**

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(a) Your explanation should include:

• the reagents used and the conditions needed

• the expected observations.

(b) Compound **X**, C3H6O3, can exist as enantiomers. It reacts with acidified dichromate solution to give

Compound **Y**, C3H4O3. Both compounds **X** and **Y** react with sodium carbonate to produce carbon dioxide

gas.

Identify Compounds **X** and **Y** and justify your answers in relation to the information above.

**2009**

A colourless liquid is known to be a branched-chain alcohol with the molecular formula C5H11OH.

Investigations of this liquid show the following features:

• It does not rotate the plane of polarised light.

• It reacts with acidified potassium dichromate solution.

• It reacts with concentrated sulfuric acid. The product of this reaction decolourises bromine water.

Use the features listed to draw the structural formula and name the alcohol. Justify your answer.

**2008**

Propan-1-ol is oxidised and two different products are collected. Discuss how to test each of these products to demonstrate that they are different from each other AND different from the original starting substance, propan-1-ol. Include the observations that would allow each substance to be identified as a result of these tests.

**2007**

Lactic acid is able to form a condensation polymer in the presence of dilute sulfuric acid



Compound **Z** is an isomer of lactic acid that has a much lower boiling point than lactic acid. A water

solution of Compound **Z** does not change the colour of blue litmus. When Compound **Z** is reacted with

acidified dichromate solution, the resulting organic compound shows no acidic properties, and it is not a

cyclic molecule.

Draw the structural formula for Compound **Z** and justify your answer using the information given above.

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