**Identifying organic substances**

**2021**

1. Explain how you could distinguish between the following pairs of compounds using their chemical

properties.

Include observations and the structural formulae of any organic product(s).

Chemical identification is limited to the use of bromine water solution, Br2(*aq*), OR aqueous acidified

potassium permanganate, KMnO4 / H+(*aq*).

(i) propan-1-ol and 3-chloropentane

(ii) propan-1-ol and pent-1-ene (CH2= CH CH2CH2CH3)

**2.** Devise a procedure you could use to distinguish between ethanol, propan-1-ol, and pent-1-ene, using

only their physical properties.

Physical identification is limited to differences in melting point, boiling point, or solubility.

All three substances are liquids at room temperature.

**2020**

**1.** The labels have fallen off bottles of three colourless liquids. They are known to be ethanol, hexene, and

propanoic acid.

Explain how you would identify the liquids, using a solution of sodium hydrogen carbonate,

NaHCO3(aq), and your knowledge of the physical and chemical properties of the compounds.

In your answer you should:

• state any observations

• link your observations to chemical or physical properties of the organic molecule

• write chemical equations for any reactions that occur, including the structural formula of organic products.

**2.** Explain how you could use an alternative reagent to do a **chemical test** that would allow you to

distinguish between hexene and propanoic acid.

In your answer you should:

• identify a reagent

• state the observations that would allow you to distinguish the compounds

• identify any reaction type occurring.

**2019**

Explain how acidified potassium permanganate solution, KMnO4 / H+(*aq*), can be used to distinguish

between compounds A (an alkene) and B (an alkane).

In your answer you should:

• identify the type of reaction

• describe any relevant observations.

**2.** Each circled functional group is found in different organic molecules commonly used in school laboratories:



(i) Using the list below, choose a reagent and describe the observations that could identify each of these functional groups.

• red litmus paper • blue litmus paper

• bromine water, Br2(*aq*) • acidified dichromate solution, H+/ Cr2O72–(*aq*)

(ii) Describe an alternative method to distinguish between functional groups **B** and **C**.

Identify the reagent needed, the expected observations, and explain the type of reaction occurring.

**2018**

(a) Two bottles of different colourless organic liquids are unlabelled. They are known to be propan-1-

amine, CH3CH2CH2NH2, and ethanoic acid, CH3COOH.

Explain how you could identify these two liquids using only solid sodium hydrogen carbonate,

NaHCO3(*s*).

(b) Three more unlabelled bottles of colourless organic liquids are known to contain hexane, hex-1-ene,

and ethanol.

Write a procedure to identify each of these liquids using only bromine water, Br2(*aq*), and water, H2O.

In your answer you should explain any observations that would be made.

You do not need to include equations in your answer.

(c) *edited*

Elaborate on chemical tests that could be used to identify the functional groups in propan-2-ol and propene.

In your answer, you should:

• identify chemicals and conditions required

• describe any observations

• state the type of reaction occurring

• explain why potassium permanganate solution, KMnO4(*aq*), cannot be used

**2015**

Four separate colourless organic liquids are known to be:

• ethanol

• ethanoic acid

• hex-2-ene

• hexan-1-amine (1-aminohexane).

Write a procedure to identify each of these organic liquids using **only** the reagents listed below.

• acidified dichromate solution, Cr2O72– / H+(*aq*)

• bromine water, Br2(*aq*)

• sodium carbonate solution, Na2CO3(*aq*).

In your answer, you should:

• identify the test reagents used

• describe any observations that would be made

• identify the type of reaction that occurs

• identify the organic product of any reaction. You do not need to include equations in your answer.

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