Organic chemistry – 2020 O Level

1. Nov/2021/Paper_11/No.1

A student needs to measure 17.60 cm^3 of hydrochloric acid. The student has access to the apparatus commonly found in a school laboratory.

Which piece of equipment should be used to measure the 17.60 cm^3 of hydrochloric acid?

A a burette

B a gas syringe

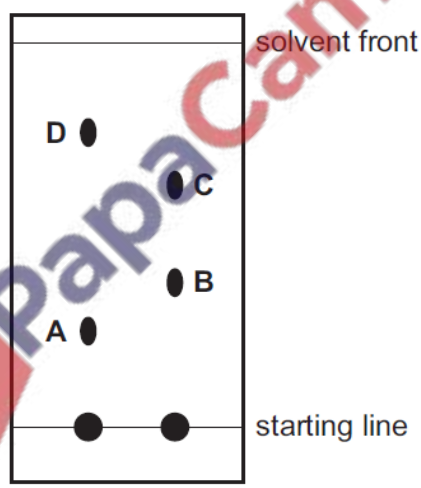
C a measuring cylinder

D a pipette

2. Nov/2021/Paper_11/No.3

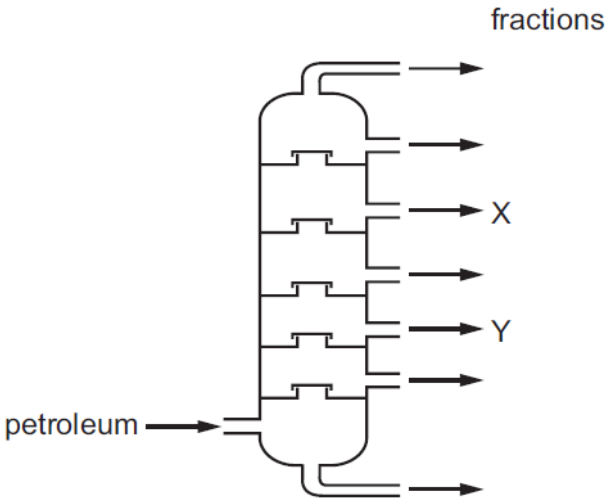
Some substances may be separated using paper chromatography. The diagram shows the results of running two mixtures in a suitable solvent.

Which spot has an R_f value of 0.37?



3. Nov/2021/Paper_11/No.4

Petroleum (crude oil) is separated into useful fractions by fractional distillation. The positions at which fractions X and Y are collected from the fractionating column are shown.



Which statement is correct?

A The temperature increases up the column.

B X condenses at a lower temperature than Y.

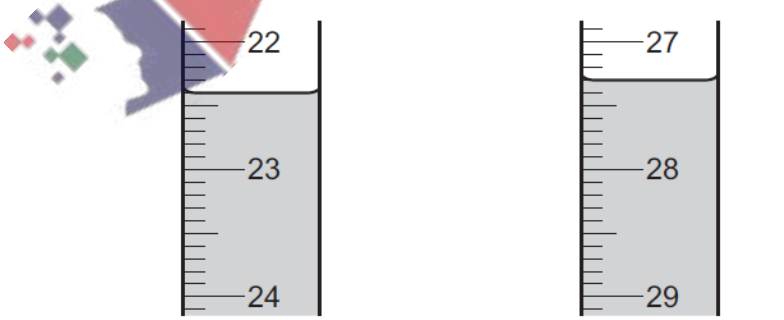
C X has a higher boiling point than Y.

D X has longer chain molecules than Y.

4. Nov/2021/Paper_12/No.1

During a titration experiment, an acid is transferred into a burette.

The diagrams show part of the burette at the start of the titration and at the end-point.



start of titration / cm^3

end-point of titration / cm^3

What is the volume of acid used during the titration?

A 3.7 cm^3 **B** 4.9 cm^3 **C** 5.1 cm^3 **D** 6.3 cm^3

5. Nov/2021/Paper_12/No.3

Chromatography can be used to separate and identify dyes present in a mixture.

Which statement is correct?

A A dye with an R_f value of 1.2 can be present in a mixture.

B A dye could have a different R_f value if a different solvent was used.

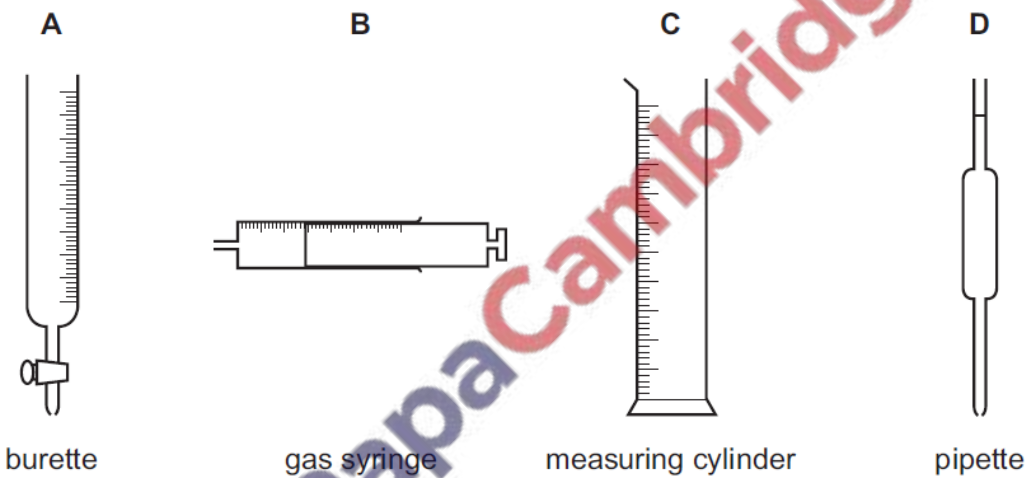
C All blue dyes have the same R_f value.

D Chromatography can only be used for coloured substances such as dyes.

6. Jun/2020/Paper_11/No.1

The diagram shows four pieces of apparatus that are used to measure the volume of a gas or liquid.

Which piece of apparatus should always be filled to the same level?



7. Jun/2020/Paper_11/No.2

Copper(II) sulfate is prepared by reacting excess copper(II) carbonate with dilute sulfuric acid.

$$CuCO_3(s) + H_2SO_4(aq) \rightarrow CuSO_4(aq) + CO_2(g) + H_2O(l)$$

Which two pieces of apparatus are needed to obtain copper(II) sulfate crystals by this reaction?

1 thermometer

2 evaporating basin

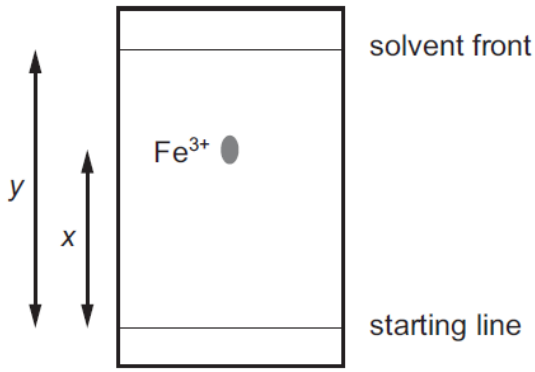
3 filter funnel

4 gas syringe

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

8. Jun/2020/Paper_11/No.3

A paper chromatography experiment is carried out to find an R_f value for $Fe^{3+}(aq)$. The result is shown.



To make the spot containing $Fe^{3+}(aq)$ more visible, the paper is sprayed with aqueous sodium hydroxide so that a precipitate of iron(III) hydroxide forms.

Under the conditions of the experiment, the R_f of $Fe^{3+}(aq)$ is given by .....1..... and the colour of the precipitate is .....2..... .

Which row correctly completes gaps 1 and 2?

	gap 1	gap 2
A	$\frac{x}{y}$	red-brown
B	$\frac{x}{y}$	green
C	$\frac{y}{x}$	red-brown
D	$\frac{y}{x}$	green

9. Jun/2020/Paper_11/No.5

Which statement about methods of purification and analysis is correct?

A A liquid that boils over a range of temperatures may still be 100% pure.

B An insoluble substance may be separated from water by crystallisation.

C Chromatography may only be used to separate coloured substances.

D Liquid air can be fractionally distilled, giving oxygen as one of the products.

10. Jun/2020/Paper_12/No.1

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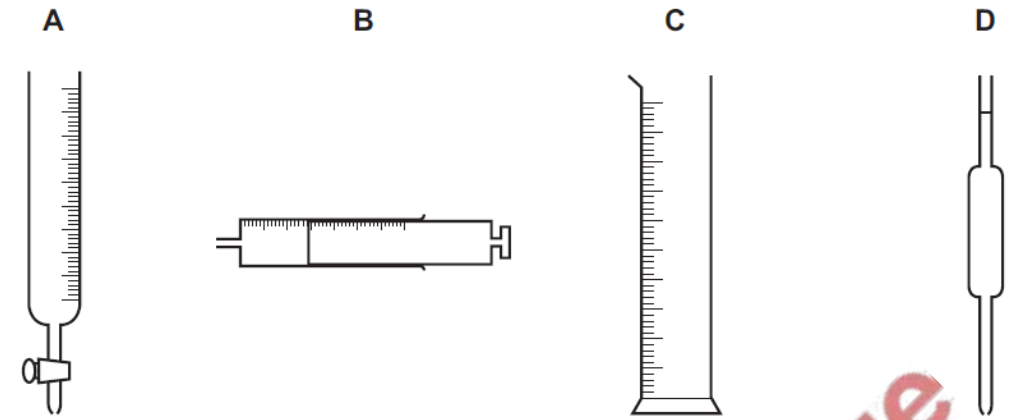


11. Jun/2020/Paper_12/No.2

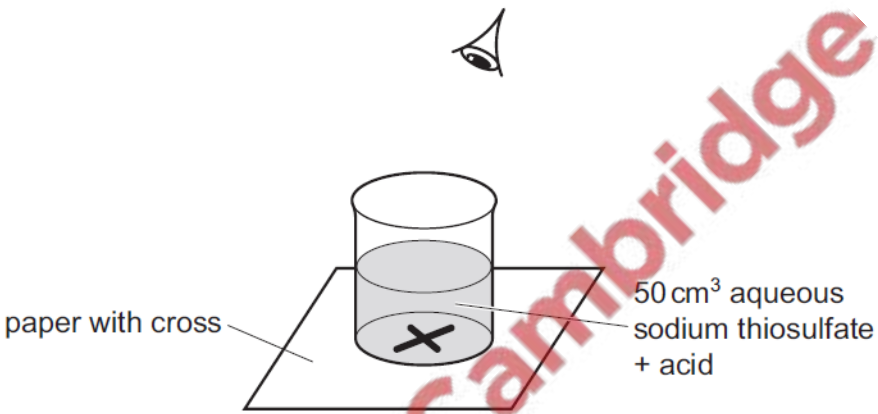
Aqueous sodium thiosulfate reacts with acid to make a precipitate of sulfur.

$$Na_2S_2O_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + SO_2(g) + S(s)$$

A student investigates the effect of temperature on the rate of this reaction.

The student:

- places a piece of paper with a cross on it below the reaction mixture as shown in the diagram
- measures the time taken for the cross to no longer be seen
- repeats the reaction at different temperatures.



Which apparatus is needed for this investigation?

A balance, pipette, stop-clock

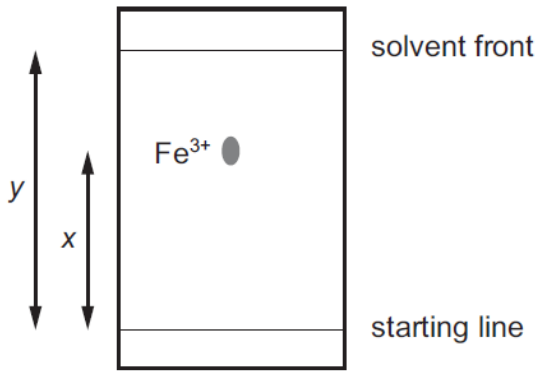
B balance, stop-clock, thermometer

C burette, gas syringe, thermometer

D measuring cylinder, stop-clock, thermometer

12. Jun/2020/Paper_12/No.3

A paper chromatography experiment is carried out to find an R_f value for $Fe^{3+}(aq)$. The result is shown.



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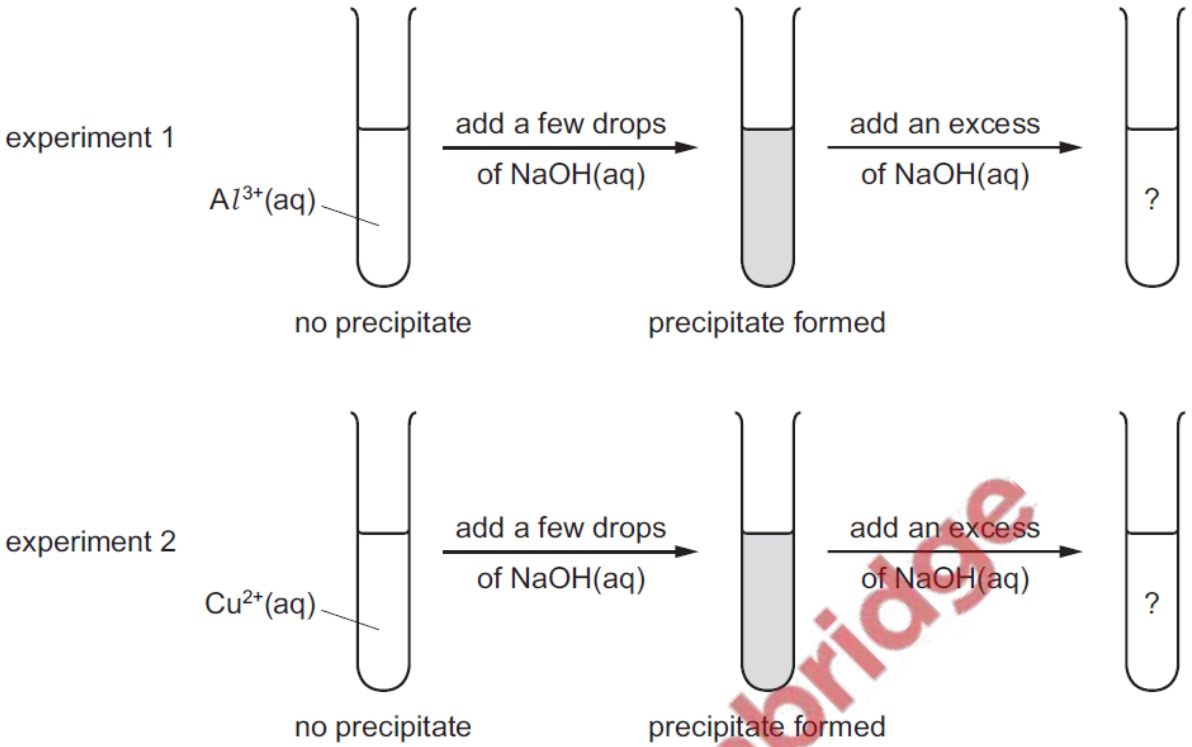
C	$\frac{y}{x}$	red-brown
D	$\frac{y}{x}$	green

13. Jun/2020/Paper_12/No.4

The diagram shows two experiments.



What are the results of adding an excess of NaOH(aq) in each experiment?

	experiment 1	experiment 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = precipitate remains

✗ = precipitate dissolves

14. Jun/2020/Paper_12/No.1

Which methods of separation require a change of state from liquid to gas?

1 paper chromatography

2 crystallisation

3 distillation

4 filtration

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 and 4