Experimental Techniques – 2023 June IGCSE Chemistry 0620

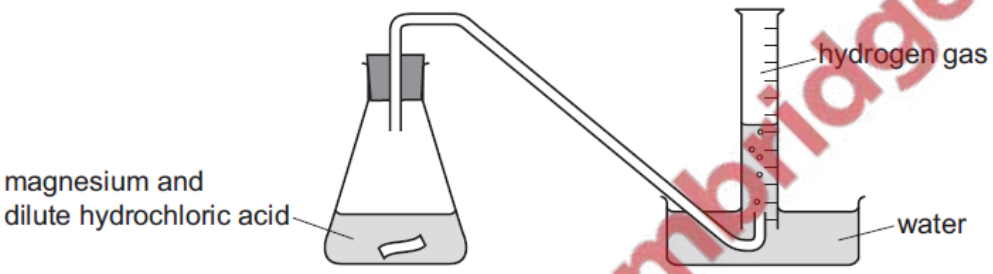
1. Nov/2023/Paper_0620/11/No.35

What is the approximate volume of nitrogen in 200 cm^3 of air?

A 20 cm^3 **B** 40 cm^3 **C** 80 cm^3 **D** 160 cm^3

2. Nov/2023/Paper_0620/11/No.36

The apparatus used to investigate the rate at which hydrogen gas is given off when a piece of magnesium reacts with dilute hydrochloric acid is shown.



Which additional piece of apparatus is needed to determine the rate of reaction?

A balance

B burette

C stop-watch

D volumetric pipette

3. Nov/2023/Paper_0620/11/No.39

The equation for the reaction of aqueous calcium nitrate and aqueous sodium hydroxide is shown.

$$Ca(NO_3)_2(aq) + 2NaOH(aq) \rightarrow Ca(OH)_2(s) + 2NaNO_3(aq)$$

Which process is used to remove calcium hydroxide from the mixture?

A chromatography

B crystallisation

C distillation

D filtration

4. Nov/2023/Paper_0620/11/No.40

The results of two tests on aqueous compound X are given.

test	result
warm with aluminium foil and aqueous sodium hydroxide	ammonia is produced
aqueous sodium hydroxide	brown precipitate

What is X?

A iron(III) nitrate

B iron(II) nitrate

C iron(III) sulfate

D iron(II) sulfate

5. Nov/2023/Paper_0620/12/No.38

An acid–base titration is described.

- 25.0 cm^3 of dilute aqueous alkali is put into a conical flask.
- Indicator is added to the flask.
- Dilute acid is added to the aqueous alkali until the indicator changes colour.
- The volume of acid used is then recorded.

Which use of apparatus is correct?

A The 25.0 cm^3 of aqueous alkali is measured using a volumetric pipette.

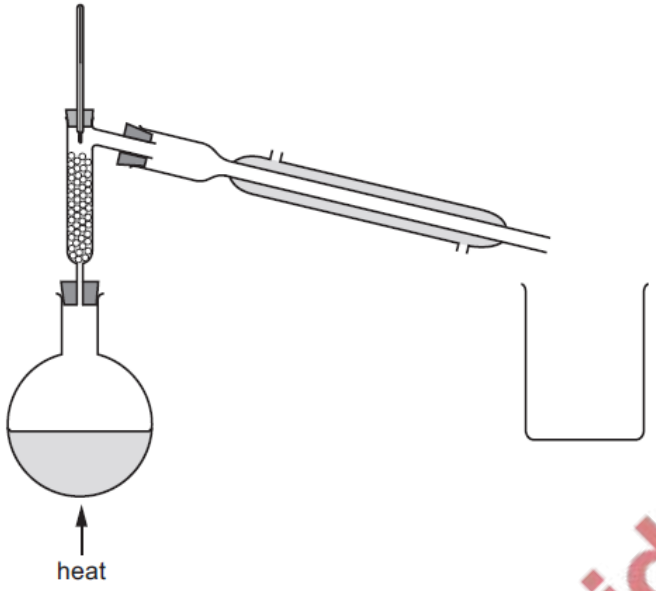
B The 25.0 cm^3 of aqueous alkali is measured using the lines on the conical flask.

C The volume of acid is measured using a measuring cylinder.

D The volume of acid is measured using a volumetric pipette.

6. Nov/2023/Paper_0620/12/No.39

The apparatus shown is used to separate a mixture.



What is the mixture?

A anhydrous copper(II) sulfate and hydrated copper(II) sulfate

B sodium chloride and sand

C ethanol and methanol

D iron and steel

7. Nov/2023/Paper_0620/12/No.40

The results of tests on three gases, X, Y and Z, are shown.

test	X	Y	Z
aqueous potassium manganate(VII)	purple to colourless	no change	no change
damp red litmus paper	no change	turns blue	no change
lighted splint	no change	no change	pops

What are X, Y and Z?

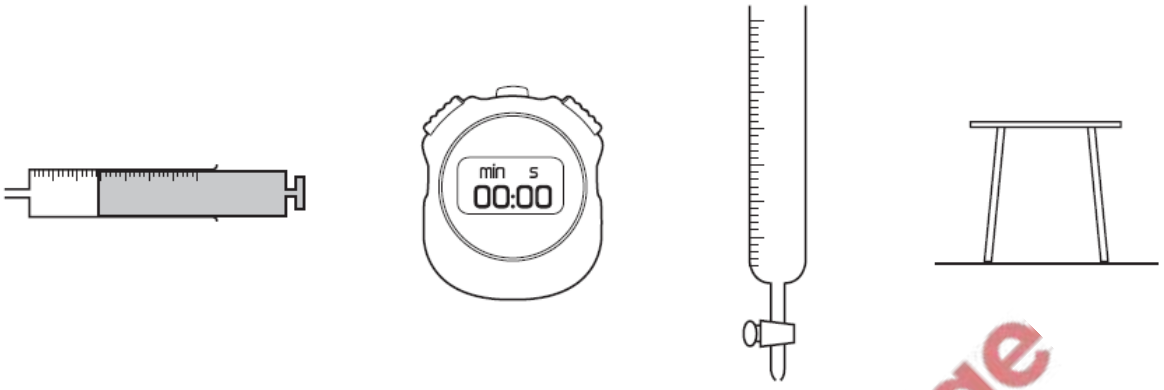
	X	Y	Z
A	chlorine	sulfur dioxide	hydrogen
B	chlorine	sulfur dioxide	oxygen
C	sulfur dioxide	ammonia	oxygen
D	sulfur dioxide	ammonia	hydrogen

8. Nov/2023/Paper_0620/13/No.38

Magnesium reacts with dilute hydrochloric acid to produce hydrogen gas.

Which pieces of apparatus are needed to determine the rate of this reaction?

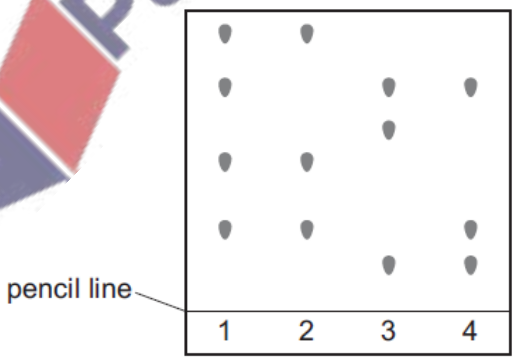
1 2 3 4



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

9. Nov/2023/Paper_0620/13/No.39

The chromatograms of four different dyes are shown.



How many different colours are present in the four dyes?

A 4 **B** 5 **C** 6 **D** 13

10. Nov/2023/Paper_0620/13/No.40

The results of some tests on an aqueous solution of substance X are listed.

1 A cream precipitate is produced when adding aqueous silver nitrate.

2 Adding aqueous sodium hydroxide produces a green precipitate which dissolves in excess alkali.

3 Adding aqueous ammonia produces a green precipitate which is insoluble in excess ammonia.

What is substance X?

A chromium(III) bromide

B chromium(III) chloride

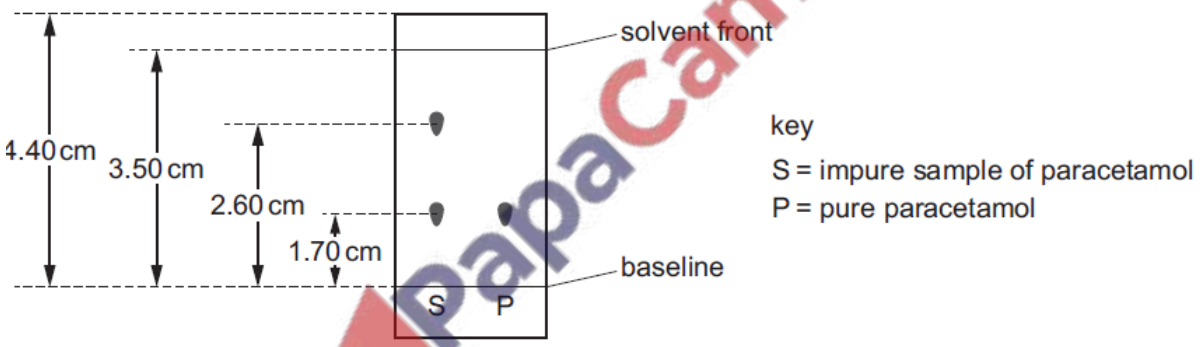
C iron(II) bromide

D iron(II) chloride

11. Nov/2023/Paper_0620/21/No.38

The painkiller paracetamol is synthesised from 4-aminophenol.

Chromatography is done on an impure sample of paracetamol. The results are shown. The diagram is not drawn to scale.



The sample of paracetamol is contaminated with 4-aminophenol only.

What is the R_f value of 4-aminophenol?

A 0.49 **B** 0.65 **C** 0.74 **D** 1.35

12. Nov/2023/Paper_0620/21/No.39

The equation for the reaction of aqueous calcium nitrate and aqueous sodium hydroxide is shown.

$$Ca(NO_3)_2(aq) + 2NaOH(aq) \rightarrow Ca(OH)_2(s) + 2NaNO_3(aq)$$

Which process is used to remove calcium hydroxide from the mixture?

A chromatography

B crystallisation

C distillation

D filtration

13. Nov/2023/Paper_0620/21/No.40

The results of two tests on aqueous compound X are given.

test	result
warm with aluminium foil and aqueous sodium hydroxide	ammonia is produced
aqueous sodium hydroxide	brown precipitate

What is X?

A iron(III) nitrate

B iron(II) nitrate

C iron(III) sulfate

D iron(II) sulfate

14. Nov/2023/Paper_0620/22/No.39

An acid–base titration is described.

- 25.0 cm^3 of dilute aqueous alkali is put into a conical flask.
- Indicator is added to the flask.
- Dilute acid is added to the aqueous alkali until the indicator changes colour.
- The volume of acid used is then recorded.

Which use of apparatus is correct?

A The 25.0 cm^3 of aqueous alkali is measured using a volumetric pipette.

B The 25.0 cm^3 of aqueous alkali is measured using the lines on the conical flask.

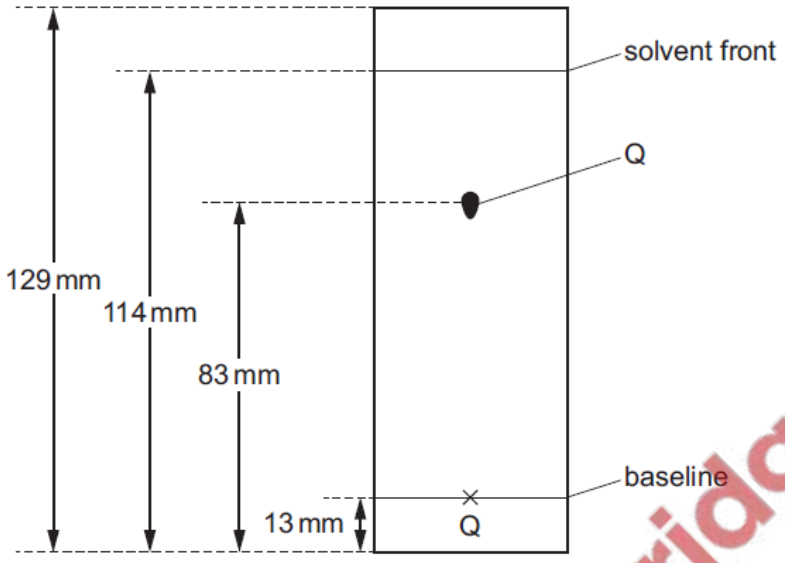
C The volume of acid is measured using a measuring cylinder.

D The volume of acid is measured using a volumetric pipette.

15. Nov/2023/Paper_0620/22/No.40

Substance Q is investigated using chromatography.

The chromatogram is shown. The diagram is not drawn to scale.



What is the R_f value of Q?

A 0.60 **B** 0.64 **C** 0.69 **D** 0.72

16. Nov/2023/Paper_0620/23/No.39

R_f values are used to identify unknown substances using paper chromatography.

Which statements about R_f values are correct?

1 R_f values are always less than 1.0.

2 R_f value = distance travelled by solvent ÷ distance travelled by unknown substance.

3 The higher the R_f value, the further the unknown substance travels.

4 R_f values are **not** affected by the solubility of the unknown substance.

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

17. Nov/2023/Paper_0620/23/No.40

The results of some tests on an aqueous solution of substance X are listed.

1 A cream precipitate is produced when adding aqueous silver nitrate.

2 Adding aqueous sodium hydroxide produces a green precipitate which dissolves in excess alkali.

3 Adding aqueous ammonia produces a green precipitate which is insoluble in excess ammonia.

What is substance X?

A chromium(III) bromide

B chromium(III) chloride

C iron(II) bromide

D iron(II) chloride

18. Nov/2023/Paper_0620/33/No.1(f)

A list of substances is shown.

ammonia
calcium oxide
carbon monoxide
cobalt(II) chloride
ethane
ethanol
ethene
oxygen
potassium oxide
sodium sulfate
sulfuric acid
water

Answer the following questions using only the substances from the list.
Each substance may be used once, more than once or not at all.

Give the name of the substance that:

(f) is used to test for water.

..... [1]

19. Nov/2023/Paper_0620/43/No.1(a, b)

A list of substances is shown.

barium nitrate
carbon monoxide
hydrated cobalt(II) chloride
copper(II) oxide
anhydrous copper(II) sulfate
ethane
potassium iodide
propene
sodium bromide
sulfur dioxide
zinc oxide

Answer the following questions using only the substances from the list.
Each substance may be used once, more than once or not at all.

Give the name of the substance that:

(a) gives a lilac colour in a flame test

..... [1]

(b) forms a cream precipitate when its aqueous solution reacts with acidified aqueous silver nitrate

..... [1]