



IGCSE Chemistry

ACIDS, BASES & SALTS

MCQ

2026 EDITION

Q1

0620/23/O/N/21/Q20

Acid Definition - Easy

20 Which row describes an acid and an oxidising agent?

	acid	oxidising agent
A	proton acceptor	electron acceptor
B	proton acceptor	electron donor
C	proton donor	electron acceptor
D	proton donor	electron donor

Q2

0620/21/O/N/21/Q17

Acid Definition - Easy

17 Which row describes the properties of an acid?

	property 1	property 2
A	proton acceptor	pH less than 7
B	proton acceptor	pH more than 7
C	proton donor	pH less than 7
D	proton donor	pH more than 7

Q3

0620/22/M/J/22/Q22

Acid Definition - Easy

22 Which statement about acids is correct?

- A** Acids are proton acceptors.
- B** Acids transfer electrons to bases in aqueous solution.
- C** Hydrochloric acid reacts with ammonium hydroxide to produce ammonia.
- D** Ethanoic acid partially ionises in aqueous solution.

Q4

0620/22/M/J/23/Q16

Acid Definition - Easy

16 What is the definition of a strong acid?

- A** a proton acceptor that is completely dissociated in aqueous solution
- B** a proton acceptor that is partially dissociated in aqueous solution
- C** a proton donor that is completely dissociated in aqueous solution
- D** a proton donor that is partially dissociated in aqueous solution

Q5

0620/23/O/N/22/Q18

Acid Definition - Hard

18 Ethanoic acid reacts with water to produce an acidic solution.

Which row describes the roles of ethanoic acid and water in this reaction?

	ethanoic acid	water
A	accepts a proton	donates a proton
B	accepts an electron	donates an electron
C	donates a proton	accepts a proton
D	donates an electron	accepts an electron

Q6

0620/22/F/M/21/Q21

Strong Acid - Easy

21 Which statements about strong acids are correct?

- 1 They have a high concentration of OH^- ions.
- 2 They have a pH value of 1.
- 3 They completely ionise in water.
- 4 They turn red litmus blue.

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

Q7

0620/23/O/N/24/Q21

Strong Acid - Easy

21 Which statement about dilute hydrochloric acid is correct?

- A** It is a strong acid as it fully dissociates.
- B** It is a strong acid as it partially dissociates.
- C** It is a weak acid as it fully dissociates.
- D** It is a weak acid as it partially dissociates.

Q8

0620/21/M/J/22/Q17

Strong Acid - Hard

17 Which statement about acids is correct?

- A A strong acid has a higher pH than a weak acid of the same concentration.
- B A strong acid is a proton acceptor.
- C A weak acid is a proton donor.
- D A weak acid is fully ionised in aqueous solution.

Q9

0620/23/M/J/23/Q19

Strong Acid - Hard

19 Four statements about strong acids are listed.

- 1 They react with carbonates to form carbon dioxide.
- 2 They completely dissociate in aqueous solution.
- 3 They react with ammonium salts to form ammonia.
- 4 They are proton acceptors.

Which statements are correct?

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

Q10

0620/22/M/J/25/Q19

Strong Acid - Hard

- 19 Which row shows the equations for the dissociation of hydrochloric acid and of ethanoic acid in aqueous solution?

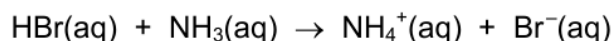
	hydrochloric acid	ethanoic acid
A	$\text{HCl(aq)} \rightarrow \text{H}^+(\text{aq}) + \text{Cl}^-(\text{aq})$	$\text{CH}_3\text{COOH(aq)} \rightleftharpoons \text{H}^+(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq})$
B	$\text{HCl(aq)} \rightleftharpoons \text{H}^+(\text{aq}) + \text{Cl}^-(\text{aq})$	$\text{CH}_3\text{COOH(aq)} \rightleftharpoons \text{H}^+(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq})$
C	$\text{HCl(aq)} \rightarrow \text{H}^+(\text{aq}) + \text{Cl}^-(\text{aq})$	$\text{CH}_3\text{COOH(aq)} \rightarrow \text{H}^+(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq})$
D	$\text{HCl(aq)} \rightleftharpoons \text{H}^+(\text{aq}) + \text{Cl}^-(\text{aq})$	$\text{CH}_3\text{COOH(aq)} \rightarrow \text{H}^+(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq})$

Q11

0620/22/O/N/25/Q22

Strong Acid - Hard

- 22 The equation shows the reaction between aqueous hydrogen bromide and aqueous ammonia.



Which statement describes the role of aqueous hydrogen bromide?

- A** It is a catalyst.
- B** It is a reducing agent.
- C** It is a proton acceptor.
- D** It is a proton donor.

Q12

0620/22/F/M/23/Q20

Weak Acid - Easy

20 Butanoic acid partially dissociates in aqueous solution.

Which row about butanoic acid is correct?

	pH	effect on thymolphthalein
A	3	turns blue
B	5	turns colourless
C	8	turns blue
D	10	turns colourless

Q13

0620/21/O/N/23/Q17

Weak Acid - Easy

17 Which statement about acids is correct?

- A** A weak acid partially dissociates in aqueous solution.
- B** An acid accepts protons when added to water.
- C** Ethanoic acid acts as a strong acid when added to water.
- D** Hydrochloric acid is a strong acid that ionises in water to form H^+ ions.

Q14

0620/23/O/N/23/Q20

Weak Acid - Easy

- 20 Which statement about aqueous weak acids is correct?
- A Weak acids are always dilute aqueous solutions.
 - B Weak acids dissociate fully in aqueous solution.
 - C When a weak acid is added to blue litmus paper, it stays blue.
 - D When a weak acid is added to solid magnesium, effervescence is seen.

Q15

0620/21/O/N/25/Q20

Weak Acid - Easy

- 20 Which statement describes a property of ethanoic acid?
- A It does **not** produce carbon dioxide when added to sodium carbonate.
 - B It does **not** produce hydrogen when added to magnesium.
 - C It only donates some of its protons when added to excess aqueous sodium hydroxide.
 - D It only partially dissociates when added to water.

Q16

0620/22/F/M/22/Q23

Weak Acid - Hard

23 Aqueous ethanoic acid is a weak acid.

Aqueous sodium hydroxide is a strong base.

Aqueous ethanoic acid is neutralised by aqueous sodium hydroxide.

Which statements are correct?

- 1 Aqueous ethanoic acid accepts protons from hydroxide ions.
- 2 The aqueous ethanoic acid used is fully dissociated into ions.
- 3 The aqueous sodium hydroxide used is fully dissociated into ions.
- 4 The reaction produces a salt and water.

A 1 and 2

B 1 and 3

C 2 and 4

D 3 and 4

Q17

0620/22/M/J/24/Q19

Weak Acid - Hard

- 19 Two acids, P and Q, with the same concentration and volume are reacted separately with the same mass of magnesium ribbon.

The reactions produce the same total volume of hydrogen gas but acid Q reacts much more slowly than acid P.

Which explanation for the difference between P and Q is correct?

- A Acid P has a higher pH than acid Q.
- B Acid P has a lower concentration of hydrogen ions.
- C Acid Q is partially dissociated and acid P is fully dissociated.
- D Acid Q is a proton acceptor.

Q18

0620/21/M/J/25/Q18

Weak Acid - Hard

- 18 Two experiments involving acids R or S are done.

- 0.10 mol of acid R completely dissolves in 500 cm³ of water. 0.0048 mol of acid R is dissociated in the solution.
- 0.10 mol of acid S completely dissolves in 500 cm³ of water. 0.0179 mol of acid S is dissociated in the solution.

Which statement about acids R and S is correct?

- A Acid R is a strong acid, and acid S is a weak acid.
- B Acid R is a weak acid, and acid S is a strong acid.
- C Acid R and acid S are both strong acids.
- D Acid R and acid S are both weak acids.

Q19

0620/23/O/N/25/Q21

Base Definition - Easy

21 Which statement describes a base?

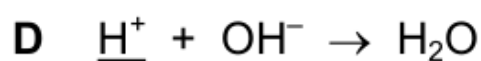
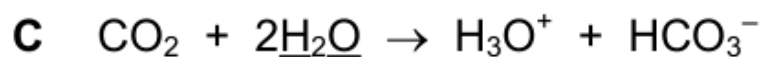
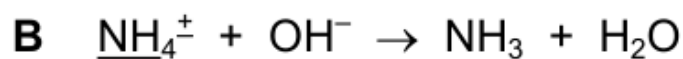
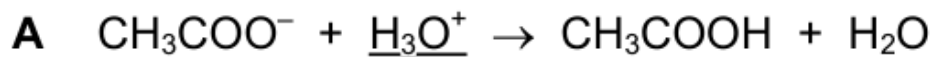
- A** It reacts with ammonium chloride to produce ammonia gas.
- B** It reacts with calcium carbonate to produce carbon dioxide gas.
- C** It reacts with copper to produce hydrogen gas.
- D** It turns blue litmus red.

Q20

0620/21/M/J/21/Q21

Base Definition - Hard

21 In which equation is the underlined reactant acting as a base?

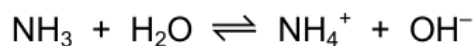


Q21

0620/23/M/J/25/Q19

Base Definition - Hard

19 Aqueous ammonia forms an equilibrium with water.



In this equilibrium, which particle acts as an acid and which particle acts as a base?

	acid	base
A	NH_3	H_2O
B	NH_3	OH^-
C	H_2O	NH_3
D	H_2O	NH_4^+

Q22

0620/22/M/J/24/Q36

pH Scale - Easy

36 Which statements about aqueous ethanoic acid are correct?

- 1 It contains the functional group -COOH .
- 2 It reacts with carbonates to produce hydrogen.
- 3 It turns universal indicator paper blue.
- 4 It has a pH lower than pH 7.

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

Q23

0620/21/O/N/24/Q18

pH Scale - Easy

18 Information about the solubility in water of four oxides is shown.

Which oxide, when added to water, gives a solution with a pH less than pH 7?

	name of oxide	solubility in water
A	nitrogen dioxide	soluble
B	copper(II) oxide	insoluble
C	silicon(IV) oxide	insoluble
D	barium oxide	soluble

Q24

0620/22/O/N/25/Q21

pH Scale - Easy

21 Phosphorus is an element in Group V of the Periodic Table.

It burns in air to form an oxide that dissolves in water to form a solution with a pH of 1.

Which row describes this oxide of phosphorus?

	metal oxide	non-metal oxide	acidic oxide	basic oxide
A	✓	x	✓	x
B	✓	x	x	✓
C	x	✓	✓	x
D	x	✓	x	✓

key

✓ = yes

x = no

Q25

0620/22/F/M/25/Q22

pH Scale - Hard

22 Some information about two dilute acids is shown.

dilute acid	acid concentration in mol/dm ³	pH
nitric acid	0.1	1.0
propanoic acid	0.4	2.6

Three statements about the acids are listed.

- 1 Nitric acid has a lower pH because it dissociates more than propanoic acid.
- 2 Propanoic acid has a lower concentration of hydrogen ions than nitric acid.
- 3 Propanoic acid has a higher pH because it has a higher concentration.

Which statements are correct?

- A** 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

Q26

0620/23/M/J/23/Q22

pH Scale - Hard

22 A sample of ethanoic acid and a sample of hydrochloric acid have the same concentration.

How do the hydrogen ion concentration and pH of ethanoic acid compare to those of hydrochloric acid?

	ethanoic acid compared to hydrochloric acid	
	hydrogen ion concentration	pH
A	higher	higher
B	higher	lower
C	lower	higher
D	lower	lower

Q27

0620/23/O/N/23/Q15

pH Scale - Hard

15 Statements about four different acids are listed.

- A 0.0100 mol/dm^3 solution of hydrochloric acid has a pH of 2.
- A 0.0100 mol/dm^3 solution of ethanoic acid has a pH of 3.4.
- Hydrobromic acid, HBr, is a strong acid.
- Ethanoic acid is a slightly stronger acid than trimethylethanoic acid.

What are the pH values of 0.0100 mol/dm^3 HBr and 0.0100 mol/dm^3 trimethylethanoic acid?

	pH of 0.0100 mol/dm^3 HBr	pH of 0.0100 mol/dm^3 trimethylethanoic acid
A	2	3.3
B	2	3.5
C	3.4	3.3
D	3.4	3.5

Q28

0620/22/F/M/22/Q20

Indicator Colour Change - Easy

20 Methyl orange is added to dilute hydrochloric acid and to aqueous sodium hydroxide.

What is the colour of the methyl orange in each solution?

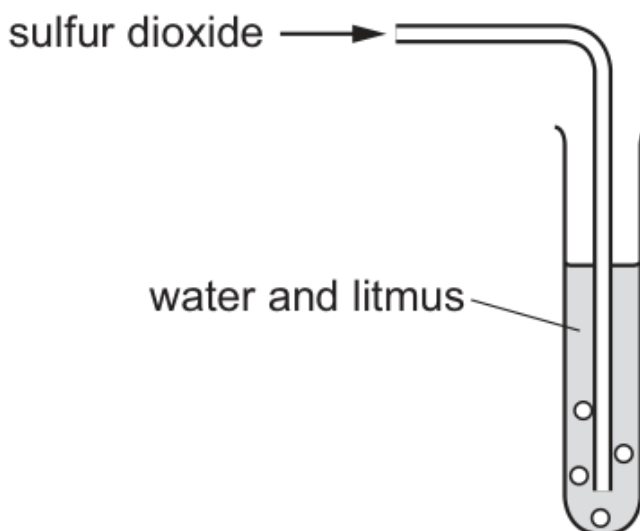
	colour in dilute hydrochloric acid	colour in aqueous sodium hydroxide
A	orange	red
B	red	yellow
C	red	orange
D	yellow	red

Q29

0620/23/M/J/22/Q17

Indicator Colour Change - Easy

17 Sulfur dioxide is bubbled through water containing litmus.



Which row describes and explains what happens to the litmus?

	observation	explanation
A	it turns blue	sulfur dioxide is a basic oxide
B	it turns blue	sulfur dioxide is an acidic oxide
C	it turns red	sulfur dioxide is an acidic oxide
D	it turns red	sulfur dioxide is a basic oxide

Q30

0620/22/M/J/24/Q18

Indicator Colour Change - Easy

18 What is the colour of thymolphthalein in dilute hydrochloric acid?

- A** blue
- B** red
- C** yellow
- D** colourless

Q31

0620/21/O/N/24/Q17

Indicator Colour Change - Easy

17 Which colours are seen when litmus and methyl orange are added to separate samples of aqueous sodium hydroxide?

	litmus	methyl orange
A	blue	orange
B	blue	yellow
C	purple	orange
D	purple	yellow

Q32

0620/22/O/N/24/Q20

Indicator Colour Change - Easy

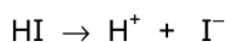
- 20** Which substance turns methyl orange red?
- A** aqueous ammonia
 - B** dilute hydrochloric acid
 - C** aqueous sodium hydroxide
 - D** distilled water

Q33

0620/22/F/M/24/Q19

Indicator Colour Change - Hard

19 Hydrogen iodide is dissolved in water.



Which row describes the final colours seen when the solution is tested with damp red litmus paper and with acidified aqueous potassium manganate(VII)?

	damp red litmus paper	acidified aqueous potassium manganate(VII)
A	blue	brown
B	blue	colourless
C	red	brown
D	red	colourless

Q34

0620/21/M/J/23/Q23

Acid + Metal - Easy

- 23** Which gas is made when powdered zinc is added to dilute hydrochloric acid?
- A** carbon dioxide
 - B** chlorine
 - C** hydrogen
 - D** oxygen

Q35

0620/22/F/M/21/Q24

Acid + Metal - Hard

24 The metal beryllium does not react with cold water.

It reacts with hydrochloric acid but cannot be extracted from its ore by using carbon.

Where is beryllium placed in the reactivity series?

magnesium

A

zinc

B

iron

C

copper

D

Q36

0620/22/M/J/22/Q25

Acid + Metal - Hard

25 The reactions of metals P, Q, R and S are shown.

metal	reaction with water	reaction with hydrochloric acid	reduction of the metal oxide with carbon
P	no reaction	no reaction	reduced
Q	slow	vigorous	no reaction
R	vigorous	vigorous	no reaction
S	very slow	vigorous	reduced

What is the order of reactivity of the metals?

	least reactive				most reactive
A	P	S	Q		R
B	P	Q	S		R
C	R	S	Q		P
D	R	Q	S		P

Q37

0620/21/O/N/23/Q25

Acid + Metal - Hard

25 When a piece of aluminium foil is added to dilute hydrochloric acid, no effervescence is seen.

Which statement explains why no effervescence is seen?

- A Aluminium does not make a gas when it reacts with an acid.
- B Aluminium has a surface layer of aluminium oxide.
- C Aluminium is less reactive than hydrogen.
- D Aluminium only reacts with concentrated acid.

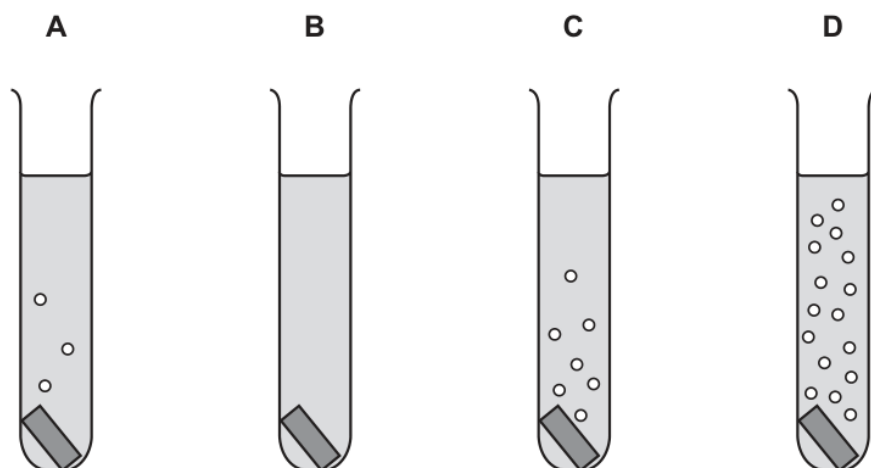
Q38

0620/23/M/J/25/Q25

Acid + Metal - Hard

- 25 Four test-tubes contain dilute hydrochloric acid. Each test-tube has one piece of a different metal added to it. The metals are copper, iron, magnesium and zinc.

Which test-tube contains iron and dilute hydrochloric acid?



Q39

0620/23/O/N/25/Q28

Acid + Metal - Hard

28 Some information about four metals P, Q, R and S is listed.

Metal P does **not** react with dilute hydrochloric acid.

Metal Q is more reactive than magnesium.

Metal R reacts rapidly with cold water to produce hydrogen.

Metal S reacts with dilute hydrochloric acid to produce hydrogen.

Which row identifies P, Q, R and S?

	P	Q	R	S
A	gold	aluminium	sodium	copper
B	copper	potassium	calcium	magnesium
C	silver	calcium	iron	zinc
D	magnesium	sodium	potassium	iron

Q40

0620/21/M/J/21/Q18

Acid + Metal Oxide - Easy

18 Element X forms an oxide, XO, that neutralises sulfuric acid.

Which row describes X and XO?

	element X	nature of oxide, XO
A	metal	acidic
B	metal	basic
C	non-metal	acidic
D	non-metal	basic

Q41

0620/23/M/J/24/Q20

Acid + Metal Oxide - Easy

20 Element E is in Group II of the Periodic Table.

Which row describes element E and its oxide?

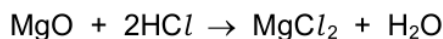
	element E	oxide of E
A	metal	acidic
B	metal	basic
C	non-metal	acidic
D	non-metal	basic

Q42

0620/23/O/N/23/Q7

Acid + Metal Oxide - Easy

- 7** The equation represents the reaction between solid magnesium oxide and dilute hydrochloric acid to form magnesium chloride and water.



Which row shows the state symbols for hydrochloric acid, magnesium chloride and water?

	HCl	MgCl ₂	H ₂ O
A	(aq)	(aq)	(l)
B	(aq)	(l)	(l)
C	(l)	(aq)	(aq)
D	(l)	(l)	(aq)

Q43

0620/23/O/N/21/Q19

Acid + Metal Oxide - Hard

19 Four solid oxides are added to dilute hydrochloric acid and aqueous sodium hydroxide.

Which row describes an amphoteric oxide?

	hydrochloric acid	sodium hydroxide
A	✓	✓
B	x	✓
C	✓	x
D	x	x

key

✓ = reacts

x = does not react

Q44

0620/21/M/J/24/Q26

Acid + Metal Oxide - Hard

26 Four statements about the reactions of oxides with dilute hydrochloric acid and with aqueous sodium hydroxide are listed.

- 1 Aluminium oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide.
- 2 Calcium oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide.
- 3 Copper(II) oxide reacts with dilute hydrochloric acid but **not** with aqueous sodium hydroxide.
- 4 Sulfur dioxide does **not** react with either dilute hydrochloric acid or aqueous sodium hydroxide.

Which statements are correct?

A 1 and 2

B 1 and 3

C 2 and 4

D 3 and 4

Q45

0620/22/O/N/24/Q21

Acid + Metal Oxide - Hard

21 Which row describes zinc oxide and calcium oxide?

	zinc oxide	calcium oxide
A	basic	acidic
B	acidic	basic
C	amphoteric	acidic
D	amphoteric	basic

Q46

0620/23/O/N/25/Q34

Acid + Metal Carbonate - Easy

- 34** Which statement about aqueous ethanoic acid is correct?
- A** It reacts with magnesium to form oxygen gas.
 - B** It reacts with sodium carbonate to form carbon dioxide gas.
 - C** It turns red litmus paper blue.
 - D** It turns methyl orange yellow.

Q47

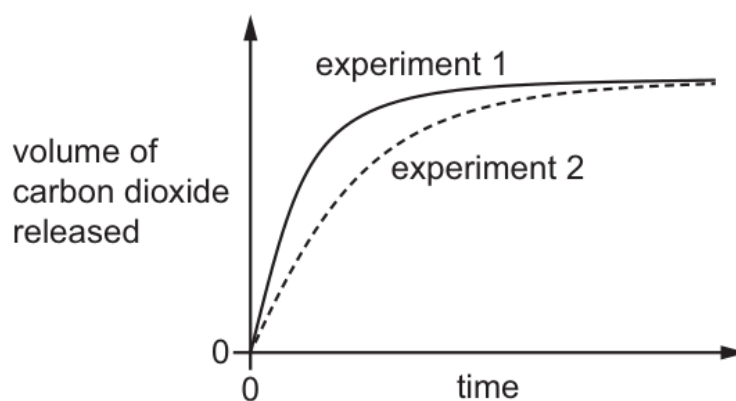
0620/22/F/M/24/Q16

Acid + Metal Carbonate - Hard

16 In experiment 1, small lumps of limestone are added to dilute ethanoic acid at 40 °C.

The volume of carbon dioxide released is measured at regular time intervals.

A graph of the results is shown.



Which changes give the results shown in experiment 2?

	limestone	temperature / °C
A	large lumps	40
B	powder	40
C	powder	60
D	small lumps	60

Q48

0620/21/O/N/22/Q19

Acid + Ammonia - Easy

19 Aqueous ammonium sulfate is made by reacting aqueous ammonia with dilute sulfuric acid.

How is solid ammonium sulfate obtained from the resulting solution?

- A crystallisation
- B distillation
- C filtration
- D solvent extraction

Q49

0620/22/F/M/23/Q16

Acid + Ammonia - Easy

16 Ammonium sulfate is used as a fertiliser.

It is made from ammonia and sulfuric acid.

The 1..... is made by the 2..... process in which 3..... is used as a catalyst.

Which words complete gaps 1, 2 and 3?

	1	2	3
A	ammonia	Contact	iron
B	ammonia	Haber	vanadium(V) oxide
C	sulfuric acid	Contact	vanadium(V) oxide
D	sulfuric acid	Haber	iron

Q50

0620/22/O/N/21/Q22

Salt Solubility - Easy

22 All metal nitrates are soluble in water.

All metal chlorides are soluble except silver and lead.

All metal carbonates are insoluble except sodium and potassium.

Which aqueous solutions produce a precipitate when mixed together?

- 1 silver nitrate + sodium carbonate
- 2 silver nitrate + sodium chloride
- 3 barium nitrate + potassium chloride

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

Q51

0620/22/F/M/22/Q22

Salt Solubility - Hard

22 Information about some silver compounds is shown.

compound	formula	solubility in water
silver carbonate	Ag_2CO_3	insoluble
silver chloride	AgCl	insoluble
silver nitrate	AgNO_3	soluble
silver oxide	Ag_2O	insoluble

Which equation shows a reaction which **cannot** be used to make a silver salt?

- A $\text{AgNO}_3(\text{aq}) + \text{HCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{HNO}_3(\text{aq})$
- B $\text{Ag}_2\text{O}(\text{s}) + 2\text{HNO}_3(\text{aq}) \rightarrow 2\text{AgNO}_3(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- C $\text{Ag}_2\text{CO}_3(\text{s}) + 2\text{HNO}_3(\text{aq}) \rightarrow 2\text{AgNO}_3(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
- D $2\text{Ag}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow 2\text{AgCl}(\text{s}) + \text{H}_2(\text{g})$

Q52

0620/22/M/J/21/Q19

Salt Solubility - Hard

19 Information about the solubility of salts is shown.

salt	solubility
chlorides	soluble (except for lead(II) chloride and silver chloride)
nitrates	soluble
sulfates	soluble (except for barium sulfate and lead(II) sulfate)

Aqueous solutions of which two compounds would produce a precipitate when added together?

- A $\text{Ba}(\text{NO}_3)_2$ and CaCl_2
- B CuSO_4 and $\text{Zn}(\text{NO}_3)_2$
- C KCl and Na_2SO_4
- D $\text{Pb}(\text{NO}_3)_2$ and MgSO_4

Q53

0620/22/O/N/22/Q20

Salt Solubility - Hard

20 Copper(II) sulfate is a soluble salt.

Calcium sulfate is an insoluble salt.

Which row shows suitable reactants for preparing a pure sample of the named salt?

	salt	reactants
A	calcium sulfate	calcium carbonate + dilute sulfuric acid
B	calcium sulfate	aqueous calcium chloride and aqueous sodium sulfate
C	copper(II) sulfate	copper + dilute sulfuric acid
D	copper(II) sulfate	aqueous copper(II) chloride and aqueous sodium sulfate

Q54

0620/23/O/N/24/Q39

Salt Solubility - Hard

39 Some information about solid silver chloride and solid sodium chloride is shown.

- Silver chloride and sodium chloride do **not** dissolve in kerosene.
- Silver chloride is insoluble in water, but sodium chloride is soluble in water.
- The boiling point of silver chloride is 1547 °C and the boiling point of sodium chloride is 1413 °C.

Which processes are used to separate a mixture of solid silver chloride and solid sodium chloride?

- A** add kerosene, stir and then filter
- B** add water, stir and then filter
- C** add water, stir and then leave to crystallise
- D** add water, stir and then perform fractional distillation

Q55

0620/21/M/J/21/Q19

Excess Method - Easy

19 Copper(II) sulfate is prepared by adding excess copper(II) oxide to warm dilute sulfuric acid.

Which purification methods are used to obtain pure solid copper(II) sulfate from the reaction mixture?

- 1 crystallisation
- 2 filtration
- 3 chromatography
- 4 distillation

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

Q56

0620/21/M/J/22/Q19

Excess Method - Easy

19 An acid is neutralised by adding an excess of an insoluble solid base.

A soluble salt is formed.

How is the pure salt obtained from the reaction mixture?

- A** crystallisation → evaporation → filtration
- B** evaporation → crystallisation → filtration
- C** filtration → crystallisation → evaporation
- D** filtration → evaporation → crystallisation

Q57

0620/23/M/J/22/Q19

Excess Method - Easy

19 An acid is neutralised by adding an excess of an insoluble solid base.

A soluble salt is formed.

How is the pure salt obtained from the reaction mixture?

A crystallisation → evaporation → filtration

B evaporation → crystallisation → filtration

C filtration → crystallisation → evaporation

D filtration → evaporation → crystallisation

Q58

0620/22/F/M/23/Q21

Excess Method - Easy

21 Copper(II) sulfate is prepared by adding excess copper(II) carbonate to sulfuric acid.

Why is an **excess** of copper(II) carbonate added?

A to ensure all the copper(II) carbonate has reacted

B to ensure all the sulfuric acid has reacted

C to increase the rate of reaction

D to increase the amount of copper(II) sulfate produced

Q59

0620/21/O/N/21/Q19

Excess Method - Easy

- 19 Copper(II) chloride crystals are made by adding solid copper(II) carbonate to dilute hydrochloric acid until no more dissolves.

Which process is used to obtain pure copper(II) chloride crystals from the mixture?

- A distillation of the mixture
- B evaporation of the mixture
- C filtration followed by drying of the residue
- D filtration followed by evaporation of the filtrate

Q60

0620/21/O/N/23/Q18

Excess Method - Easy

- 18 Copper(II) sulfate is formed by reacting excess solid copper(II) carbonate with dilute sulfuric acid.

Which processes are part of the preparation of solid copper(II) sulfate?

- 1 crystallisation
- 2 distillation
- 3 filtration
- 4 titration

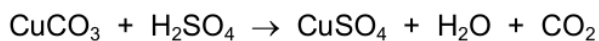
- A 1 and 3 B 1 and 4 C 2 and 3 D 2 and 4

Q61

0620/21/O/N/24/Q19

Excess Method - Hard

19 Copper(II) sulfate is made when copper(II) carbonate reacts with dilute sulfuric acid.



Pure copper(II) sulfate crystals are obtained.

Which reagent is in excess and how are the crystals obtained?

	reagent in excess	how the crystals are obtained
A	copper(II) carbonate	filter and evaporate the solution to dryness
B	copper(II) carbonate	filter, evaporate the solution to crystallising point and then cool
C	dilute sulfuric acid	evaporate the solution to dryness
D	dilute sulfuric acid	evaporate the solution to crystallising point and then cool

Q62

0620/21/M/J/23/Q39

Titration Method - Easy

39 The concentration of acids and alkalis can be determined by titration.

Which pieces of equipment are needed to perform a titration?

1



2



3



4

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

Q63

0620/23/M/J/23/Q38

Titration Method - Easy

38 Dilute hydrochloric acid is titrated into a conical flask containing sodium hydroxide solution and a few drops of methyl orange indicator.

Which piece of apparatus is used to add the hydrochloric acid?

- A** beaker
- B** burette
- C** measuring cylinder
- D** pipette

Q64

0620/23/M/J/24/Q37

Titration Method - Easy

37 What is used to identify the end-point of an acid–base titration?

- A** balance
- B** measuring cylinder
- C** indicator
- D** volumetric pipette

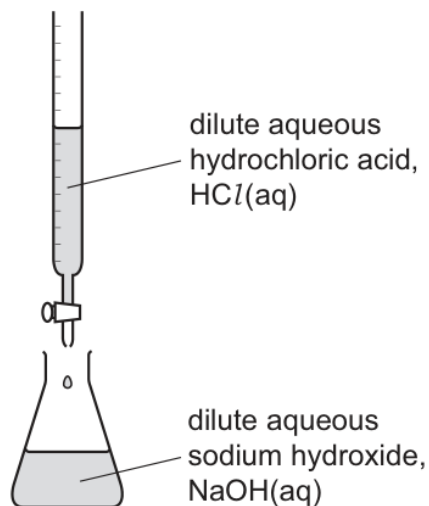
Q65

0620/22/M/J/23/Q8

Titration Method - Hard

- 8 The concentration of a sample of dilute aqueous sodium hydroxide is found by titration.

The apparatus used is shown.



Which information is needed to calculate the concentration of the dilute aqueous sodium hydroxide in mol/dm^3 ?

	concentration of HCl	volume of HCl used	molar mass of HCl	volume of NaOH used	molar mass of NaOH
A	✓	✓	✓	✓	✓
B	✓	✓	x	✓	x
C	x	✓	✓	✓	x
D	✓	x	x	x	✓

key

✓ = needed

x = not needed

Q66

0620/22/O/N/23/Q39

Titration Method - Hard

39 An acid–base titration is described.

- 25.0 cm³ 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?

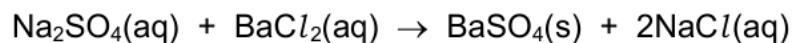
- A** The 25.0 cm³ of aqueous alkali is measured using a volumetric pipette.
- B** The 25.0 cm³ of aqueous alkali is measured using the lines on the conical flask.
- C** The volume of acid is measured using a measuring cylinder.
- D** The volume of acid is measured using a volumetric pipette.

Q67

0620/23/M/J/21/Q19

Precipitation Method - Easy

19 Aqueous solutions of sodium sulfate and barium chloride are mixed.



Which process is used to separate a sample of barium sulfate from the reaction mixture?

- A precipitation
- B filtration
- C evaporation
- D distillation

Q68

0620/23/M/J/24/Q21

Precipitation Method - Easy

21 Lead(II) iodide is formed as a precipitate in the reaction shown.



Which method is used to separate the lead(II) iodide from the mixture?

- A crystallisation
- B distillation
- C evaporation
- D filtration

Q69

0620/21/M/J/25/Q19

Precipitation Method - Easy

19 Lead(II) sulfate is an insoluble salt.

Which process is **not** used to prepare a pure sample of this salt?

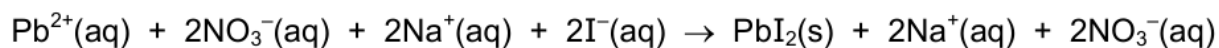
- A crystallisation
- B drying
- C filtration
- D precipitation

Q70

0620/21/O/N/23/Q19

Precipitation Method - Easy

19 Which type of reaction is represented by the equation shown?



- A addition
- B redox
- C neutralisation
- D precipitation

Q71

0620/22/O/N/23/Q21

Precipitation Method - Easy

- 21** Which method is used to produce insoluble salts?
- A** addition of excess insoluble base to an acid
 - B** addition of excess metal to an acid
 - C** precipitation using two aqueous solutions
 - D** titration using an acid and an alkali

Q72

0620/21/M/J/23/Q17

Precipitation Method - Hard

17 Which method produces the salt copper(II) carbonate?

- A Add copper(II) oxide to water, then add excess aqueous sodium carbonate. Filter off the precipitate.
- B Add copper(II) oxide to dilute sulfuric acid, then add excess aqueous sodium carbonate. Filter off the precipitate.
- C Add copper to dilute hydrochloric acid, then add aqueous sodium carbonate. Filter off the precipitate.
- D Add copper(II) oxide to excess aqueous sodium carbonate. Filter off the precipitate.

Q73

0620/22/M/J/23/Q20

Precipitation Method - Hard

20 Lead(II) sulfate is an insoluble salt.

Which reaction produces a mixture from which lead(II) sulfate is obtained by filtration?

- A adding solid lead(II) carbonate to dilute sulfuric acid
- B adding solid lead(II) hydroxide to dilute sulfuric acid
- C adding metallic lead to dilute sulfuric acid
- D adding aqueous lead(II) nitrate to dilute sulfuric acid

Q74

0620/22/F/M/25/Q24

Precipitation Method - Hard

24 Lead(II) sulfate is an insoluble salt.

Which method is suitable for obtaining pure solid lead(II) sulfate?

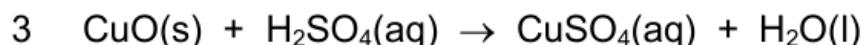
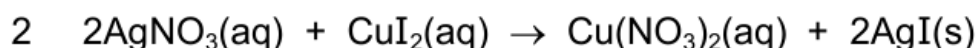
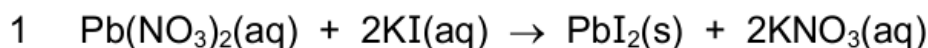
- A Mix aqueous lead(II) nitrate and aqueous potassium sulfate, heat to evaporate all of the water, collect the solid and then wash and dry it.
- B Mix aqueous lead(II) nitrate and aqueous potassium sulfate, filter, collect the filtrate, crystallise, then wash and dry the crystals.
- C Mix aqueous lead(II) nitrate and dilute sulfuric acid, filter, then wash and dry the residue.
- D Titrate aqueous lead(II) hydroxide with dilute sulfuric acid, crystallise, then wash and dry the crystals.

Q75

0620/23/O/N/24/Q23

Precipitation Method - Hard

23 The equations for three reactions are shown.



Which reactions are suitable for making a salt by precipitation?

- A** 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

Q76

0620/22/O/N/25/Q20

Precipitation Method - Hard

20 Which method is used to prepare a pure, dry sample of lead(II) chloride?

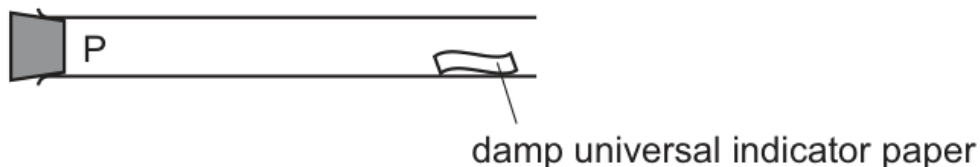
- A** mix aqueous lead(II) nitrate and dilute hydrochloric acid → filter → crystallise and dry the filtrate
- B** mix aqueous lead(II) nitrate and dilute hydrochloric acid → filter → wash and dry the residue
- C** mix solid lead(II) hydroxide and aqueous sodium chloride → filter → crystallise and dry the filtrate
- D** mix solid lead(II) hydroxide and aqueous sodium chloride → filter → wash and dry the residue

Q77

0620/21/M/J/21/Q1

Identification of Gases - Easy

- 1 A gas is released at point P in the apparatus shown.



Which gas turns the damp universal indicator paper red most quickly?

- A ammonia, NH_3
- B chlorine, Cl_2
- C hydrogen chloride, HCl
- D sulfur dioxide, SO_2

Q78

0620/21/M/J/24/Q24

Identification of Gases - Easy

- 24 Which gas is produced when ammonium chloride is warmed with aqueous sodium hydroxide?

- A ammonia
- B chlorine
- C hydrogen
- D nitrogen

Q79

0620/22/M/J/25/Q18

Identification of Gases - Easy

- 18** A farmer incorrectly adds two substances to the soil at the same time. They react together to form a gas which turns damp red litmus paper blue. What are the two substances?
- A** a basic oxide and a potassium salt
 - B** a basic oxide and an ammonium salt
 - C** an acidic oxide and a potassium salt
 - D** an acidic oxide and an ammonium salt

Q80

0620/22/M/J/22/Q28

Identification of Gases - Hard

28 Three metal compounds, J, K and L, are heated using a Bunsen burner.

The results are shown.

J colourless gas produced, which relights a glowing splint

K colourless gas produced, which turns limewater milky

L no reaction

Which row identifies J, K and L?

	J	K	L
A	magnesium carbonate	potassium carbonate	potassium nitrate
B	magnesium carbonate	potassium nitrate	potassium carbonate
C	potassium nitrate	magnesium carbonate	potassium carbonate
D	potassium nitrate	potassium carbonate	magnesium carbonate

Q81

0620/23/M/J/22/Q28

Identification of Gases - Hard

28 Three metal compounds, J, K and L, are heated using a Bunsen burner.

The results are shown.

J colourless gas produced, which relights a glowing splint

K colourless gas produced, which turns limewater milky

L no reaction

Which row identifies J, K and L?

	J	K	L
A	magnesium carbonate	potassium carbonate	potassium nitrate
B	magnesium carbonate	potassium nitrate	potassium carbonate
C	potassium nitrate	magnesium carbonate	potassium carbonate
D	potassium nitrate	potassium carbonate	magnesium carbonate

Q82

0620/22/M/J/23/Q40

Identification of Gases - Hard

40 When acid is added to salt X, a gas is produced which turns limewater milky.

When sodium hydroxide is added to salt X, a gas is produced which turns litmus paper blue.

What is X?

A CaCO_3

B $(\text{NH}_4)_2\text{CO}_3$

C NH_4NO_3

D ZnCO_3

Q83

0620/21/O/N/21/Q28

Identification of Gases - Hard

28 Which statements about the thermal decomposition of copper(II) nitrate are correct?

- 1 A brown gas is given off.
- 2 A gas which relights a glowing splint is given off.
- 3 The solid residue is an acidic oxide.

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

Q84

0620/23/M/J/24/Q40

Flame Test - Easy

40 A student carries out a flame test on a sample.

The flame colour observed is light green.

Which ion is present in the sample?

A Ba^{2+}

B Ca^{2+}

C Li^{+}

D K^{+}

Q85

0620/23/O/N/24/Q40

Flame Test - Easy

40 Which statement describes how a flame test is done?

- A** The tip of a clean wire is dipped into the substance and the wire is placed in a blue Bunsen burner flame.
- B** The tip of a clean wire is dipped into the substance and the wire is placed in a yellow Bunsen burner flame.
- C** A wooden splint is lit and is placed above a test-tube containing the gas being tested.
- D** A wooden splint is lit, blown out and the glowing splint put into a test-tube of the gas being tested.

Q86

0620/22/F/M/23/Q40

Flame Test - Hard

40 A student tests an unknown compound M.

The compound:

- produces a lilac flame using a flame test
- produces a gas which turns limewater cloudy when dilute hydrochloric acid is added.

What is M?

- A sodium sulfate
- B sodium carbonate
- C potassium sulfate
- D potassium carbonate

Q87

0620/21/O/N/25/Q39

Flame Test - Hard

39 The results of flame tests on three metal salts, X, Y and Z, are shown.

metal salt	flame test colour
X	yellow
Y	lilac
Z	blue-green

Which row identifies the cations present in X, Y and Z?

	X	Y	Z
A	potassium	sodium	calcium
B	potassium	sodium	copper
C	sodium	potassium	calcium
D	sodium	potassium	copper

MARKING SCHEME - ACID DEFINITION - EASY

Q	Ans	Paper reference
Q1	C	0620/23/O/N/21/Q20
Q2	C	0620/21/O/N/21/Q17
Q3	D	0620/22/M/J/22/Q22
Q4	C	0620/22/M/J/23/Q16

MARKING SCHEME - ACID DEFINITION - HARD

Q	Ans	Paper reference
Q5	C	0620/23/O/N/22/Q18

MARKING SCHEME - STRONG ACID - EASY

Q	Ans	Paper reference
Q6	C	0620/22/F/M/21/Q21
Q7	A	0620/23/O/N/24/Q21

MARKING SCHEME - STRONG ACID - HARD

Q	Ans	Paper reference
Q8	C	0620/21/M/J/22/Q17
Q9	A	0620/23/M/J/23/Q19
Q10	A	0620/22/M/J/25/Q19
Q11	D	0620/22/O/N/25/Q22

MARKING SCHEME - WEAK ACID - EASY

Q	Ans	Paper reference
Q12	B	0620/22/F/M/23/Q20
Q13	A	0620/21/O/N/23/Q17
Q14	D	0620/23/O/N/23/Q20
Q15	D	0620/21/O/N/25/Q20

MARKING SCHEME - WEAK ACID - HARD

Q	Ans	Paper reference
Q16	D	0620/22/F/M/22/Q23
Q17	C	0620/22/M/J/24/Q19
Q18	D	0620/21/M/J/25/Q18

MARKING SCHEME - BASE DEFINITION - EASY

Q	Ans	Paper reference
Q19	A	0620/23/O/N/25/Q21

MARKING SCHEME - BASE DEFINITION - HARD

Q	Ans	Paper reference
Q20	C	0620/21/M/J/21/Q21
Q21	C	0620/23/M/J/25/Q19

MARKING SCHEME - PH SCALE - EASY

Q	Ans	Paper reference
Q22	C	0620/22/M/J/24/Q36
Q23	A	0620/21/O/N/24/Q18
Q24	C	0620/22/O/N/25/Q21

MARKING SCHEME - PH SCALE - HARD

Q	Ans	Paper reference
Q25	A	0620/22/F/M/25/Q22
Q26	C	0620/23/M/J/23/Q22
Q27	B	0620/23/O/N/23/Q15

MARKING SCHEME - INDICATOR COLOUR CHANGE - EASY

Q	Ans	Paper reference
Q28	B	0620/22/F/M/22/Q20
Q29	C	0620/23/M/J/22/Q17
Q30	D	0620/22/M/J/24/Q18
Q31	B	0620/21/O/N/24/Q17
Q32	B	0620/22/O/N/24/Q20

MARKING SCHEME - INDICATOR COLOUR CHANGE - HARD

Q	Ans	Paper reference
Q33	C	0620/22/F/M/24/Q19

MARKING SCHEME - ACID + METAL - EASY

Q	Ans	Paper reference
Q34	C	0620/21/M/J/23/Q23

MARKING SCHEME - ACID + METAL - HARD

Q	Ans	Paper reference
Q35	A	0620/22/F/M/21/Q24
Q36	A	0620/22/M/J/22/Q25
Q37	B	0620/21/O/N/23/Q25
Q38	A	0620/23/M/J/25/Q25
Q39	B	0620/23/O/N/25/Q28

MARKING SCHEME - ACID + METAL OXIDE - EASY

Q	Ans	Paper reference
Q40	B	0620/21/M/J/21/Q18
Q41	B	0620/23/M/J/24/Q20
Q42	A	0620/23/O/N/23/Q7

MARKING SCHEME - ACID + METAL OXIDE - HARD

Q	Ans	Paper reference
Q43	A	0620/23/O/N/21/Q19
Q44	B	0620/21/M/J/24/Q26
Q45	D	0620/22/O/N/24/Q21

MARKING SCHEME - ACID + METAL CARBONATE - EASY

Q	Ans	Paper reference
Q46	B	0620/23/O/N/25/Q34

MARKING SCHEME - ACID + METAL CARBONATE - HARD

Q	Ans	Paper reference
Q47	A	0620/22/F/M/24/Q16

MARKING SCHEME - ACID + AMMONIA - EASY

Q	Ans	Paper reference
Q48	A	0620/21/O/N/22/Q19
Q49	C	0620/22/F/M/23/Q16

MARKING SCHEME - SALT SOLUBILITY - EASY

Q	Ans	Paper reference
Q50	A	0620/22/O/N/21/Q22

MARKING SCHEME - SALT SOLUBILITY - HARD

Q	Ans	Paper reference
Q51	D	0620/22/F/M/22/Q22
Q52	D	0620/22/M/J/21/Q19
Q53	B	0620/22/O/N/22/Q20
Q54	B	0620/23/O/N/24/Q39

MARKING SCHEME - EXCESS METHOD - EASY

Q	Ans	Paper reference
Q55	B	0620/21/M/J/21/Q19
Q56	D	0620/21/M/J/22/Q19
Q57	D	0620/23/M/J/22/Q19
Q58	B	0620/22/F/M/23/Q21
Q59	D	0620/21/O/N/21/Q19
Q60	A	0620/21/O/N/23/Q18

MARKING SCHEME - EXCESS METHOD - HARD

Q	Ans	Paper reference
Q61	B	0620/21/O/N/24/Q19

MARKING SCHEME - TITRATION METHOD - EASY

Q	Ans	Paper reference
Q62	D	0620/21/M/J/23/Q39
Q63	B	0620/23/M/J/23/Q38
Q64	C	0620/23/M/J/24/Q37

MARKING SCHEME - TITRATION METHOD - HARD

Q	Ans	Paper reference
Q65	B	0620/22/M/J/23/Q8
Q66	A	0620/22/O/N/23/Q39

MARKING SCHEME - PRECIPITATION METHOD - EASY

Q	Ans	Paper reference
Q67	B	0620/23/M/J/21/Q19
Q68	D	0620/23/M/J/24/Q21
Q69	A	0620/21/M/J/25/Q19
Q70	D	0620/21/O/N/23/Q19
Q71	C	0620/22/O/N/23/Q21

MARKING SCHEME - PRECIPITATION METHOD - HARD

Q	Ans	Paper reference
Q72	B	0620/21/M/J/23/Q17
Q73	D	0620/22/M/J/23/Q20
Q74	C	0620/22/F/M/25/Q24
Q75	A	0620/23/O/N/24/Q23
Q76	B	0620/22/O/N/25/Q20

MARKING SCHEME - IDENTIFICATION OF GASES - EASY

Q	Ans	Paper reference
Q77	C	0620/21/M/J/21/Q1
Q78	A	0620/21/M/J/24/Q24
Q79	B	0620/22/M/J/25/Q18

MARKING SCHEME - IDENTIFICATION OF GASES - HARD

Q	Ans	Paper reference
Q80	C	0620/22/M/J/22/Q28
Q81	C	0620/23/M/J/22/Q28
Q82	B	0620/22/M/J/23/Q40
Q83	B	0620/21/O/N/21/Q28

MARKING SCHEME - FLAME TEST - EASY

Q	Ans	Paper reference
Q84	A	0620/23/M/J/24/Q40
Q85	A	0620/23/O/N/24/Q40

MARKING SCHEME - FLAME TEST - HARD

Q	Ans	Paper reference
Q86	D	0620/22/F/M/23/Q40
Q87	D	0620/21/O/N/25/Q39