Education Scotland
Foghlam Alba

National 5 Chemistry

Relevant Past Paper Questions from SQA Standard Grade Credit and Intermediate 2 papers

Unit 1: Chemical Changes and Structure

March 2014

N5 Chemistry Past Paper Questions

This resource has been produced in response to the requests from practitioners who attended the National Qualifications Sciences events at Hampden Stadium in December 2013 which Education Scotland organised in partnership with the SQA.

The questions in this resource relate to the Chemical Changes and Structure Unit for National 5 Chemistry and have been taken from the 2011, 2012 and 2013 Standard Grade and Intermediate 2 Past Papers.

For Chemical Changes and Structure (Unit 1), the mandatory course key areas are as follows:

- Rates of reaction
- Atomic structure and bonding related to properties of materials
- Formulae and reaction quantities
- Acids and bases

In cases where the questions relate to more than one of the National 5 Units, the constituent parts of the question have been separated into their respective key areas. The stem of the question has been retained to give the context of the question. If practitioners require the full integrated question, they should refer to the original past paper on the SQA website.

Past paper questions for the other two National 5 Units, Nature's Chemistry and Chemistry in Society, are also available from Education Scotland's National Qualifications Glow portal: http://www.educationscotland.gov.uk/nqcoursematerials/ (cut and paste link into your browser).

Education Scotland would like to acknowledge the support of the SQA in helping us produce this resource. We hope it proves helpful to practitioners across Scotland and assists with the implementation of the national qualifications.

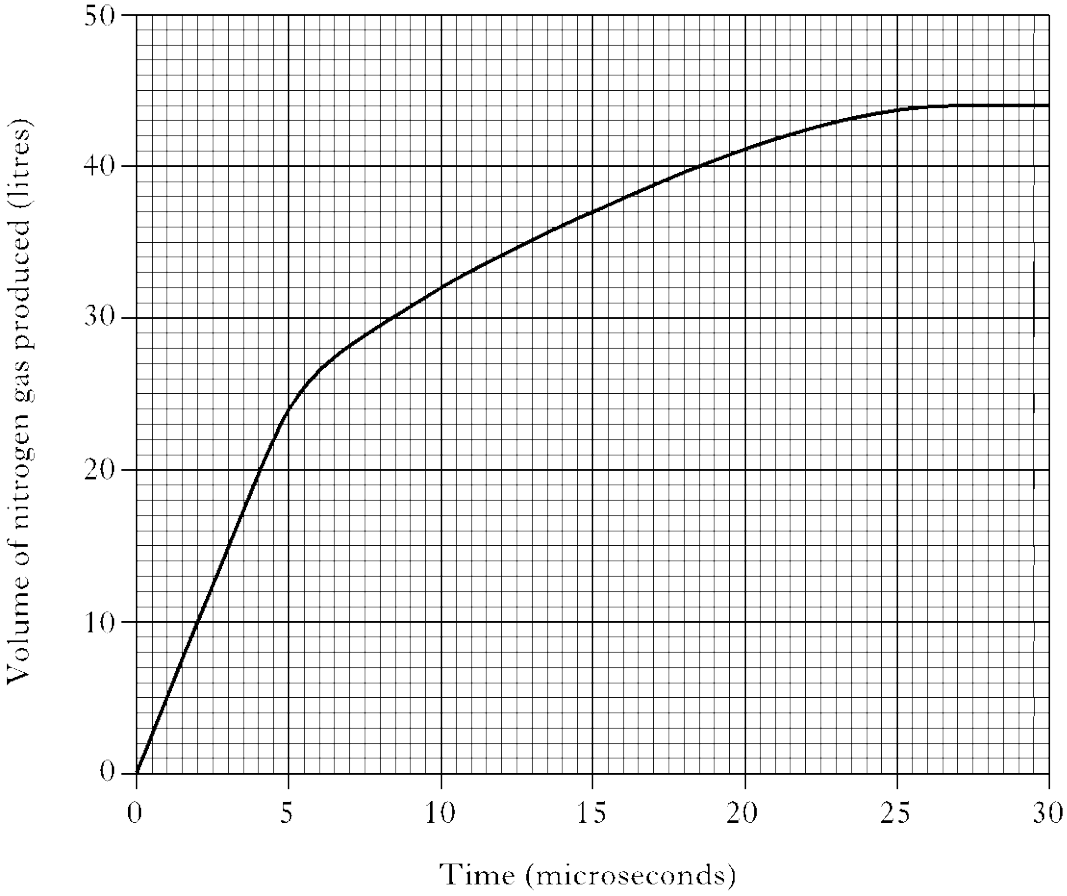
Rates of reaction

Chemical changes and structure
Rates of reaction

Int 2 2012 — Marks

2 Rapid inflation of airbags in cars is caused by the production of nitrogen gas.

The graph gives information on the volume of gas produced over 30 microseconds.



(a) (i) Calculate the average rate of reaction between 2 and 10 microseconds. 1

_____ litres per microsecond

Answer $\frac{32 - 10}{8}$

= 2.75 (2.8, 3 must have working)

or 2.75 on its own

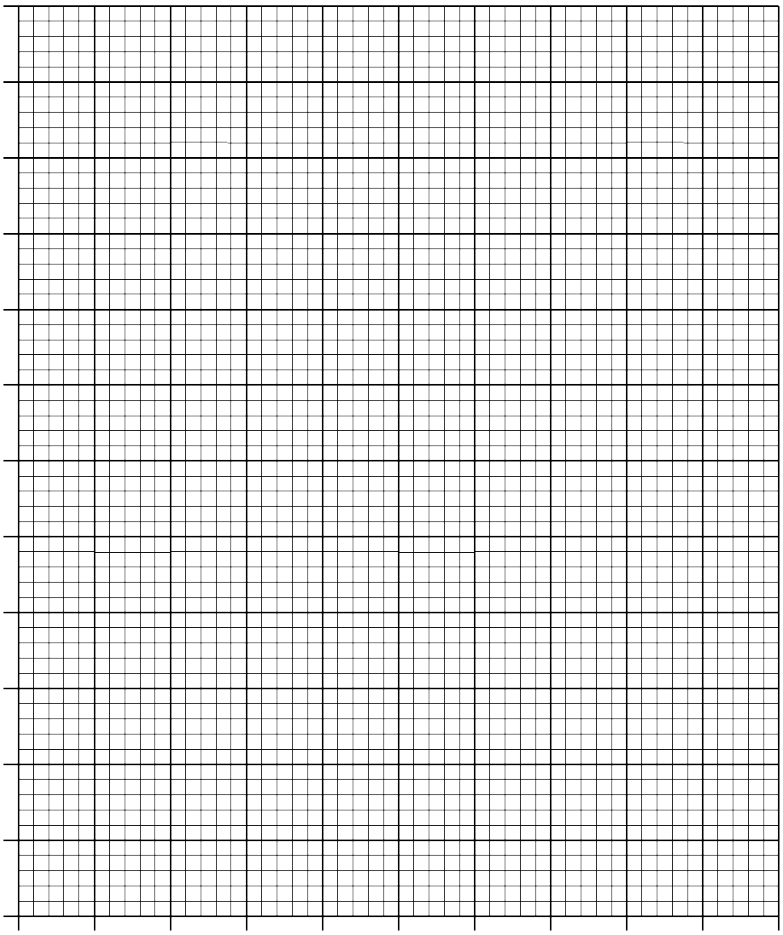
Chemical changes and structure
Rates of reaction

Int 2 2012 11 — Marks

(c) Egg shells are made up mainly of calcium carbonate. A pupil carried out an experiment to react egg shells with dilute hydrochloric acid. A gas was produced. The volume of gas produced during the reaction was measured. 3

Time (min)	Volume of gas (cm^3)
0	0
2	47
4	92
6	114
8	118
10	118

Plot these results as a line graph.



Answer

Correct labels and units 1
Scale on X and Y axis 1
Correct plotting and joining of points 1

-1 if not at least half the graph paper
-1 if line not through origin

Max of 2 marks if bar or spike graph (labels, units and scale) or if both scales taken from the table

Allow ½ box tolerance on plotting points
Allow one plotting error

Axes can be reversed
0,0 doesn't need to be marked on scale but line must go through origin

Chemical changes and structure

Rates of reaction

Higher

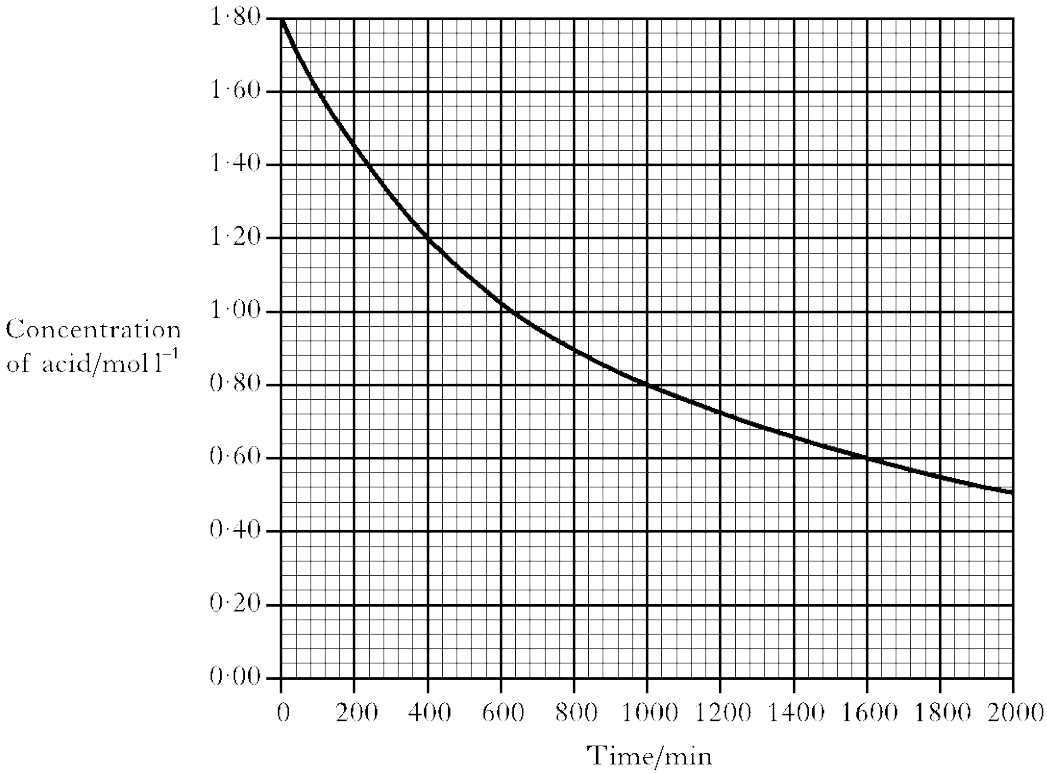
2011

Marks

1 Chloromethane, CH3Cl, can be produced by reacting methanol solution with dilute hydrochloric acid using a solution of zinc chloride as a catalyst.

$$CH_3OH(aq) + HCl(aq) \xrightarrow{ZnCl_2(aq)} CH_3Cl(aq) + H_2O(\ell)$$

(b) (i) The graph shows how the concentration of the hydrochloric acid changed over a period of time when the reaction was carried out at 20 °C. 1



Calculate the average rate, in mol l–1 min–1, in the first 400 minutes.

Answer **(b) (i)** Answer 0·0015 **1**

Units not required. (Incorrect units -½)

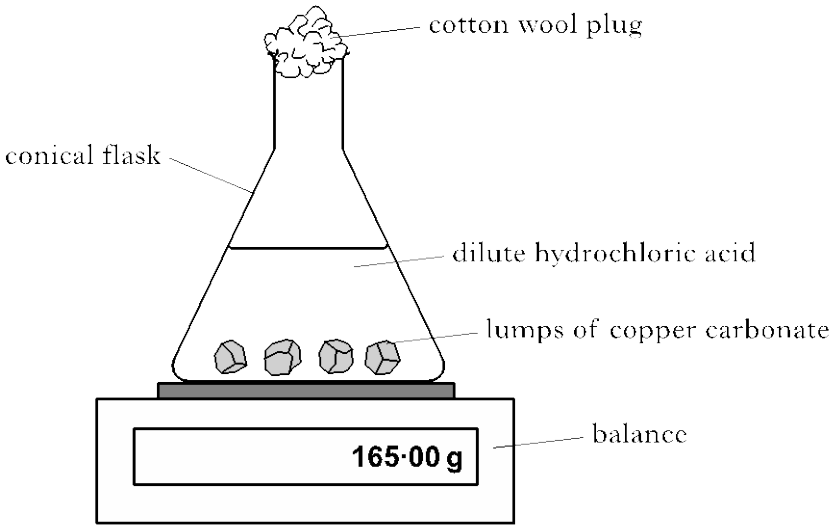
Chemical changes and structure
Rates of reaction

Higher 2012 Marks

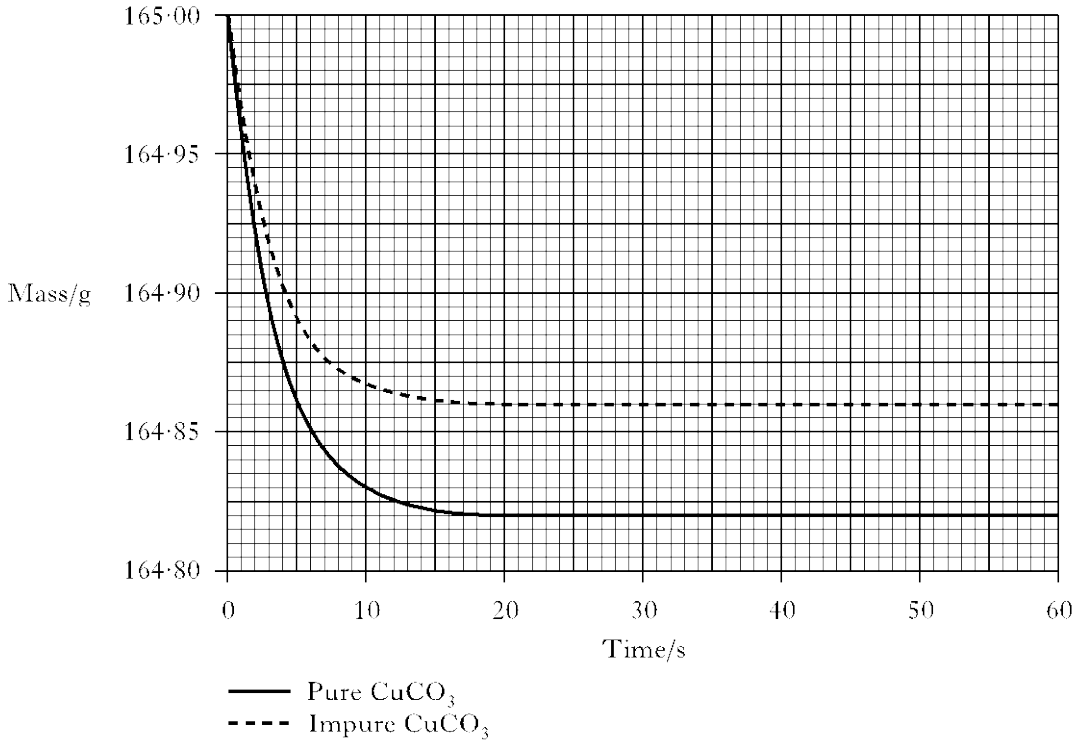
2 Copper (II) carbonate reacts with dilute hydrochloric acid as shown.

$$CuCO_3(s) + 2HCl(aq) \rightarrow CuCl_2(aq) + H_2O(\ell) + CO_2(g)$$

A student used the apparatus shown below to follow the progress of the reaction.



(b) The experiment was carried out using 0·50 g samples of both pure and impure copper (II) carbonate. The graph below shows the results obtained.



(i) For the sample of pure copper(II) carbonate, calculate the average reaction rate, in g s^{-1}, over the first 10 seconds. 1

Answers

(i) 0.017 — 1 mark

Units not required

Deduct ½ mark for incorrect units

Atomic structure and bonding related to properties of materials

Chemical changes and structure
Atomic structure and bonding related to properties of materials

Int 2 2011 — Marks

1 The properties of a substance depend on its type of bonding and structure.

There are four types of bonding and structure.

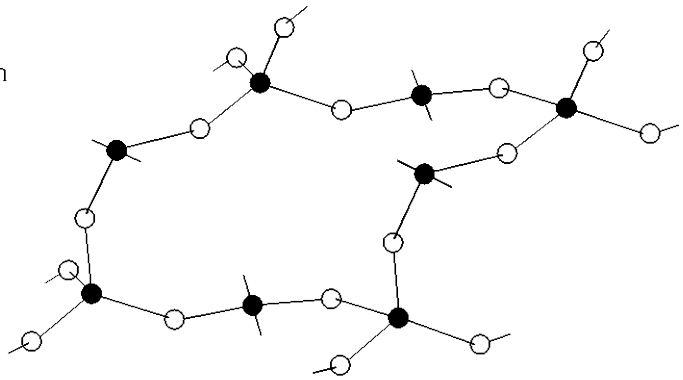
Discrete covalent molecular	Covalent network	Ionic lattice	Metallic lattice

(a) Complete the table to match up each type of bonding and structure with its properties. 4

Bonding and structure type	Properties
	do not conduct electricity and have high melting points
	have high melting points and conduct electricity when liquid but not when solid
	conduct electricity when solid and have a wide range of melting points
	do not conduct electricity and have low melting points

(b) A section of a covalent network compound is shown below. 1

● = silicon
○ = oxygen



Write the formula for this covalent network compound.

_____

Answers

(a)

1st – covalent network (accept covalent lattice)

2nd – ionic lattice

3rd – metallic lattice

4th – discrete covalent/covalent molecular
1 mark each
Accept abbreviations if obvious

(b)

$Si0_2$
O_2Si
Simplest Ratio

Chemical changes and structure
Atomic structure and bonding related to properties of materials

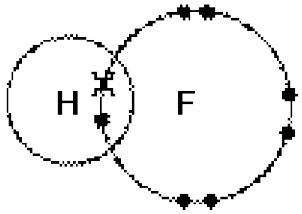
Int 2 2011 — Marks

2 Information on some two-element molecules is shown in the table.

Name	Formula	Shape of molecule
hydrogen fluoride	HF	
water	H_2O	
ammonia	NH_3	

(a) Complete the table to show the shape of a molecule of ammonia. 1

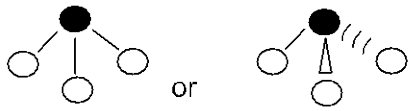
(b) The hydrogen fluoride molecule can be represented as: 1



Showing all outer electrons, draw a similar diagram to represent a molecule of water, H_2O.

Answers

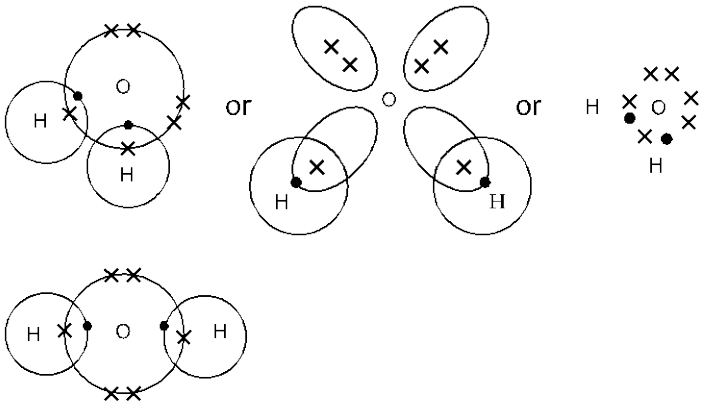
(a)



Use professional judgement to establish pyramidal shape

Accept symbols, colours other way around

(b)



At least one of the symbols must be shown
Mixture of dots and crosses are acceptable
All dots or crosses acceptable
Accept Lewis dot diagram
Ignore inner electrons on oxygen
Allow for 1 slip for misplaced electron (professional judgement)
Accept electron pair on line of touching circles
Non shared electrons do not need to be in pairs

Chemical changes and structure

Atomic structure and bonding related to properties of materials

Int 2 2011 4 — Marks

Research is being carried out into making chemicals that can be used to help relieve the side effects of chemotherapy.

Part of the process is shown.

chemical **A** + hydrogen $\xrightarrow{\text{catalyst}}$ chemical **B**

(a) (ii) Write the formula for ruthenium (II) chloride. 1

Answer $RuCl_2$ $Ru^{2+}(Cl^-)_2$ Cl_2Ru Ru_1Cl_2

If ionic formula used it must be fully correct

Chemical changes and structure
Atomic structure and bonding related to properties of materials

Int 2 2011 15 — Marks

Fizzy drinks contain acids.

These acids can attack the compound calcium hydroxyapatite which is found in tooth enamel.

The equation for the reaction is:

$$\underset{\text{calcium hydroxyapatite}}{Ca_{10}(PO_4)_6(OH)_2(s)} + 8H^+(aq) \longrightarrow 6CaHPO_4(s) + 4Ca^{2+}(aq) + 2\,H_2O(\ell)$$

(b) Fluoride prevents tooth decay by replacing the hydroxide ions of calcium hydroxyapatite with fluoride ions to form hard wearing calcium fluoroapatite. — 1

$$\underset{Ca_{10}(PO_4)_6(OH)_2}{\text{calcium hydroxyapatite}} \xrightarrow{\text{fluoride ions}} \text{calcium fluoroapatite}$$

Write the formula for calcium fluoroapatite.

Answer

$Ca_{10}(PO_4)_6F_2$
F can be in brackets($F)_2$
Accept any order of symbols
Ignore charges
Use professional judgment for size of numbers in formula

Chemical changes and structure
Atomic structure and bonding related to properties of materials

Int 2 2013 — Marks

4 Tritium is a naturally occurring isotope of hydrogen. It can be represented as

$$^{3}_{1}\mathbf{H}$$

(a) Complete the table to show the number of particles in an atom of tritium. 1

Type of particle	Number of particles
proton	
neutron	
electron	

(b) Hydrogen has three isotopes. 1

Isotope of hydrogen	Mass number
protium	1
deuterium	2
tritium	3

The relative atomic mass of hydrogen is 1.

Which isotope of hydrogen is the most abundant?

_____

Answers (a)

Proton = 1
Neutron = 2
Electron = 1

All 3 for 1 mark

(b)

Protium/
Top one/
1

Chemical changes and structure
Atomic structure and bonding related to properties of materials

Int 2 2013 Marks

6 Dishwasher tablets contain many different types of chemicals.

(c) Phosphate ions, present in some types of dishwasher tablets, react with calcium ions in water forming calcium phosphate. 1
Write the formula for calcium phosphate.

_____

Answer $Ca_3(PO_4)_2$

$(Ca^{2+})_3(PO_4^{3-})_2$

$(Ca^{2+})_3(PO_4)_2$

$Ca_3(PO_4^{3-})_2$

Chemical changes and structure

Atomic structure and bonding related to properties of materials

S Gr 2013 10

Marks

The nuclide notation for an isotope of hydrogen is $^{1}_{1}\mathbf{H}$.

(a) An isotope of copper has atomic number 29 and mass number 63.

(i) Write the nuclide notation for this isotope of copper. 1

(ii) How many neutrons are present in this isotope of copper? 1

(b) A sample of copper was found to contain equal amounts of two isotopes. One has mass number 63 and the other has mass number 65. 1

What is the relative atomic mass of this sample of copper?

_____

Answers (a) i $^{63}_{29}Cu$

(a) ii 34

(b) 64

Chemical changes and structure
Atomic structure and bonding related to properties of materials

S Gr 2013 Marks

11 The table shows information about some useful compounds.

Compound	Formula
Y	Na_3PO_4
ammonia	NH_3
ammonium nitrate	NH_4NO_3

(a) (i) Name compound Y. 1

_____

Answer: Sodium phosphate

Chemical changes and structure
Atomic structure and bonding related to properties of materials

S Gr 2013			Marks
16		Metals can be extracted from their ores by different methods.	
	(b)	Mercury can be extracted from the ore cinnabar, HgS.	
	(ii)	Write the formula for the mercury ion in cinnabar.	1

Answer

Hg^{2+}
$Hg^{2+}S^{2-}$
$Hg^{2+}S$

Ignore state symbols

Chemical changes and structure

Atomic structure and bonding related to properties of materials

S Gr 2013 | | | Marks

17 Nitrogen trifluoride, NF3, is used in the manufacture of plasma screens.

(a) Draw a diagram showing all outer electrons to represent a molecule of nitrogen trifluoride. 1

(b) The atoms in nitrogen trifluoride are held together by covalent bonds. 1

(Circle) the correct words to complete the sentence.

A covalent bond forms when two { positive / negative / neutral } nuclei are held together by their common attraction for a shared pair of { protons / neutrons / electrons }.

Answer (a) Any suitable diagram showing symbols N,F and **all outer electrons** not just the shared pairs

Cross dot (with or without circles) or similar type of diagram, lobes or petals

2 non-bonding electrons need to be shown on N, but not in an overlap area
Non-bonding electrons needn't be in pairs
N and F symbols can be missed

(b) positive electrons

Chemical changes and structure

Atomic structure and bonding related to properties of materials

S Gr 2012 13 — Marks

Hydrogen gas is made up of diatomic molecules.

(a) Draw a diagram to show how the electrons are arranged in a molecule of hydrogen, H_2. — 1

Answer

Any suitable diagram showing two hydrogen atoms with two electrons in the overlapped area

Chemical changes and structure

Atomic structure and bonding related to properties of materials

S Gr 2012 15 — Marks

Potassium hydroxide reacts with sulphuric acid to form potassium sulphate, which can be used as a fertiliser.

$$KOH(aq) + H_2SO_4(aq) \longrightarrow K_2SO_4(aq) + H_2O(\ell)$$

(d) Ammonium phosphate is also used as a fertiliser. Write the ionic formula for ammonium phosphate. 1

Answer $(NH_4^+)_3PO_4^{3-}$

Chemical changes and structure
Atomic structure and bonding related to properties of materials

S Gr 2012 18 — Marks

A student investigated how the concentration of sodium chloride in water affected the freezing point.

(a) What type of bond is broken in sodium chloride when it dissolves in water? 1

_____

1

b) The table shows information about the freezing point of different sodium chloride solutions.

Concentration of sodium chloride solution (mol/l)	0	0·09	0·18	0·27	0·37	0·46
Freezing point (°C)	0	−0·2	−0·5	−0·8	−1·1	−1·5

Describe the relationship between the concentration and freezing point.

(c) Predict the freezing point of a 0·55 mol/l sodium chloride solution. 1

_____ °C

Answer (a)
Ionic
Ionic lattice
Ionic network

(b)
As concentration increases/decreases freezing point decreases/increases

The freezing point decreases/increases as concentration increases/decreases

As concentration increases freezing point gets colder

(c)
-1.8 to -2.0 inclusive

Chemical changes and structure
Atomic structure and bonding related to properties of materials

S Gr 2011 12 — Marks

Ethanol, for alcoholic drinks, can be made from glucose.

(b) The table below shows the relationship between the percentage of ethanol and the density of alcoholic drinks.

Percentage of ethanol (%)	40	50	60	70	80
Density of alcoholic drink (g/cm^3)	0·928	0·907	0·886	0·865	0·844

(i) Write a general statement describing how the percentage of ethanol affects the density of the alcoholic drink. 1

(ii) The density of a particular brand of alcoholic drink is 0·970g/cm^3. 1
Predict the percentage of ethanol in this alcoholic drink.

_____%

Answer (b) i

As the percentage increases…the density decreases

As the percentage decreases…the density increases

Density increases as percentage decreases

Density decreases as percentage increases

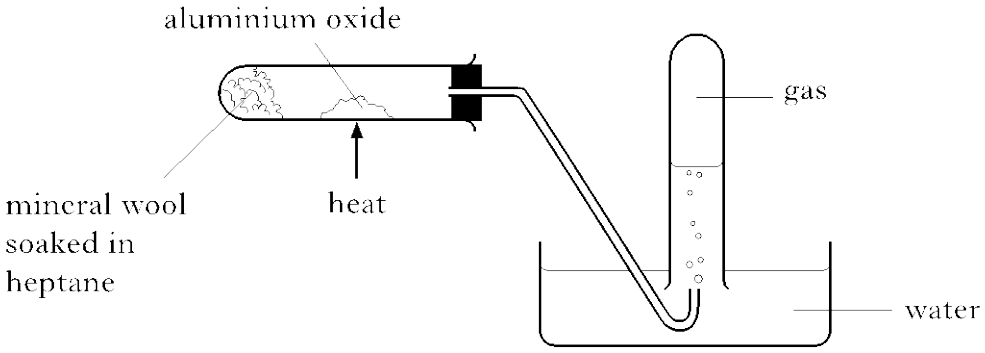
etc

(b) ii 20

Chemical changes and structure
Atomic structure and bonding related to properties of materials

S Gr 2011 16 — Marks

Heptane can be cracked as shown.



One of the reactions which takes place is:

$$C_7H_{16} \longrightarrow C_4H_{10} + C_3H_6$$

(b) Aluminium oxide is used as a catalyst to speed up the reaction.

(ii) Write the formula for aluminium oxide. 1

Answer Al_2O_3

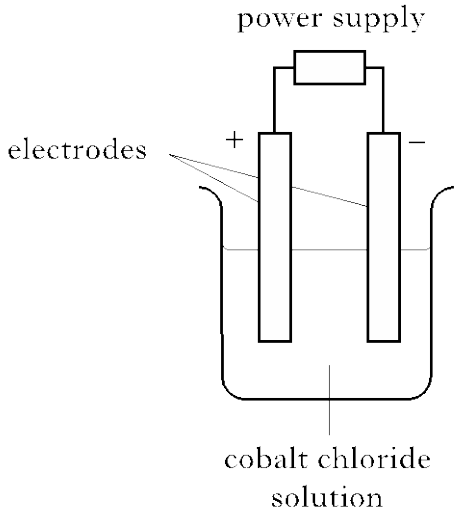
If ion charges are shown all must be correct

$(Al^{3+})_2\ (O^{2-})_3$ / $Al_2^{3+}\ O_3^{2-}$

Chemical changes and structure
Atomic structure and bonding related to properties of materials

S Gr 2011 18 — Marks

A student set up the following experiment to electrolyse cobalt chloride solution.



(c) The formula for cobalt chloride is $CoCl_2$. 1

What is the charge on the cobalt ion in $CoCl_2$?

Answer Two positive, 2+, Co^{2+}

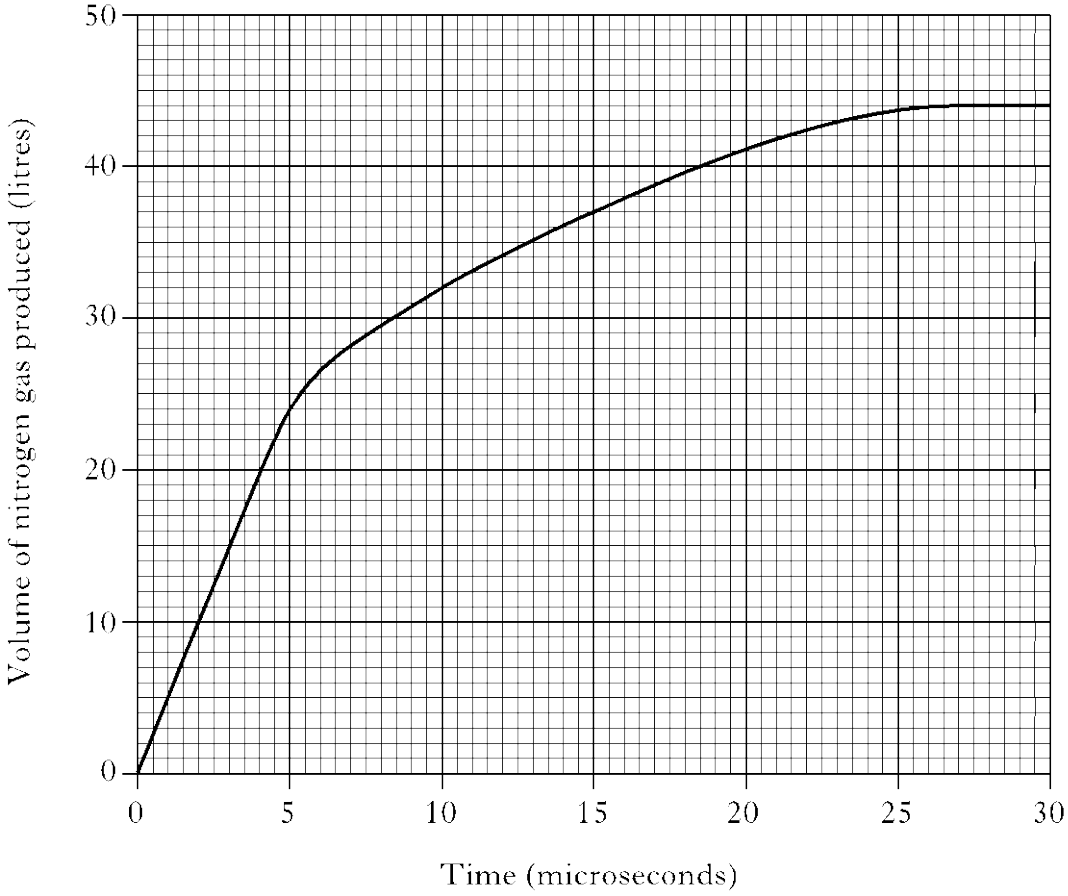
Formulae and reaction quantities

Chemical changes and structure
Formulae and reaction quantities

Int 2 2012 — Marks

2 Rapid inflation of airbags in cars is caused by the production of nitrogen gas.

The graph gives information on the volume of gas produced over 30 microseconds.



(b) In some types of airbag, electrical energy causes sodium azide, NaN3, to decompose producing sodium metal and nitrogen gas. — 1

Write a formula equation for this reaction.

Answer $NaN_3 \rightarrow Na + N_2$

Ignore state symbols and attempts to balance.

Allow electricity over the arrow.

Chemical changes and structure

Formulae and reaction quantities

Int 2 2012 15 — Marks

Rust, iron (III) oxide, that forms on cars can be treated using rust remover which contains phosphoric acid.

When painted on, rust remover changes iron (III) oxide into iron (III) phosphate.

$$Fe_2O_3 + 2H_3PO_4 \longrightarrow 2FePO_4 + 3H_2O$$

(a) The rust remover contains 250 cm^3 of 2 mol l^{-1} phosphoric acid.

(i) Calculate the number of moles of phosphoric acid in the rust remover. — 2

_____mol

(ii) Using your answer in part (i), calculate the mass of iron (III) oxide that will be removed by 250 cm^3 of 2 mol l^{-1} phosphoric acid. — 2

_____ grams

Answer

(i)

2 x 0.25	1
= 0.5	1
0.5 no working	2

(ii)

GFM Fe_2O_3 =160	1
Moles of Fe_2O_3 = 0.5/2 = 0.25	
Or mole ratio stated	1
Fe_2O_3 :H_3PO_4	
1: 2	
Mass of Fe_2O_3 = 0.25 x 160	1
= 40	1
Or 40 on its own	(4)

Allow follow through using number of moles from part (i) if show working
If atomic number used instead of mass- max 2 marks

If use ratio 1:1 80g 3 marks if show working

Chemical changes and structure
Formulae and reaction quantities

Int 2 2011 3 — Marks

Hydrogen peroxide is a useful bleaching agent and is contained in many hair dyes. Over time, the hair dye becomes less effective as the hydrogen peroxide decomposes forming water and oxygen.

The equation for the decomposition of hydrogen peroxide is:

$$H_2O_2(aq) \longrightarrow O_2(g) + H_2O(\ell)$$

(a) Balance this equation. 1

(d) When 34g of hydrogen peroxide decomposes, 12 litres of oxygen is produced. 1

Calculate the volume of oxygen produced when 1·7g of hydrogen peroxide decomposes.

_____litres

Answer (a) $2H_2O_2(aq) \rightarrow O_2(g) + 2H_2O(\ell)$

or any multiple
ignore state symbols in transcription

(d)

34 g → 12 l
1·7 g → 1.7/34 x 12 — 1 mark

= 0.6 — 1 mark

0.6 on its own – 2 marks

OR

No moles = 1.7/34 = 0.05
Vol = 0.05 x 12 — 1 mark
= 0.6 — 1 mark

OR

34/ 1.7 = 20, then 12 /20 — 1 mark
= 0.6 — 1 mark

Chemical changes and structure
Formulae and reaction quantities

S Gr 2011 17 — Marks

Urea reacts with water, breaking down to form carbon dioxide and ammonia.

$$\underset{\text{urea}}{H_2NCONH_2} + H_2O \longrightarrow CO_2 + 2NH_3$$

(b) Calculate the mass of ammonia produced, in grams, when 90 g of urea breaks down. 2

_____ grams

Answers

1 mol — 2 mol (½ mark)

60 — 34 (½ mark)

90 — $\frac{90 \times 34}{60}$ = 51 (1 mark)

51 on its own = 2 marks

$\frac{90}{60}$ = 1·5 mol (½ mark)

1 mol ⟶ 2 mol (½ mark)
1·5 mol ⟶ 3 mol (½ mark)

Mass = 3 × 17 = 51 (½ mark)

Use of atomic numbers max 1 mark – Must have working

Deduct (½) mark for arithmetic error

Also accept 50·4, 50·9, 51·3 on its own = 2 marks

Chemical changes and structure

Formulae and reaction quantities

S Gr 2011 20 — Marks

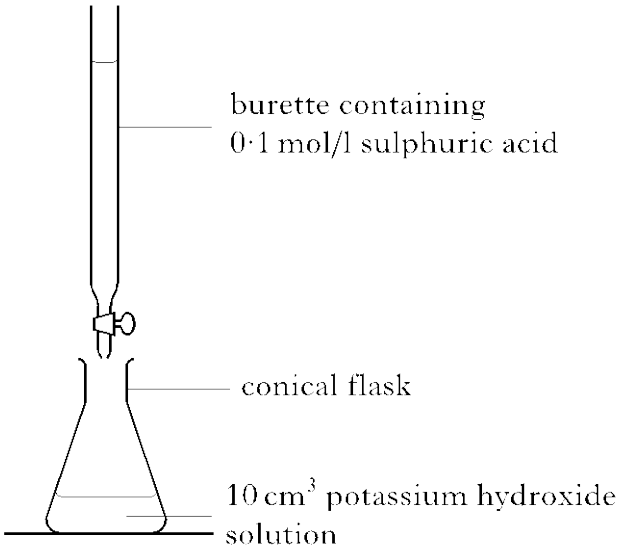
Metal salts can be produced by different methods.

(a) Lead (II) iodide can be produced by reacting lead(II) nitrate solution with sodium iodide solution.
The equation for this reaction is:

$$Pb(NO_3)_2(aq) + NaI(aq) \longrightarrow PbI_2(s) + NaNO_3(aq)$$

(i) Balance the above equation. 1

(c) Potassium sulphate can be produced by titrating potassium hydroxide solution with dilute sulphuric acid.



(ii) The average volume of sulphuric acid used in the titration is 20 cm^3. 1

Calculate the number of moles of sulphuric acid used.

_____ mol

Answers

(a) i $Pb(NO_3)_2(aq) + 2NaI(aq) \longrightarrow PbI_2(s) + 2NaNO_3(aq)$

Or correct multiples

Moles n = c × v (½ mark)

= 0·1 × 0·02 moles (if 20 used max ½ mark)

= 0·002 moles (½ mark)

0·002 on its own 1 mark

(c) ii

Moles n = c × v (½ mark)

= 0·1 × 0·02 moles (if 20 used max ½ mark)

= 0·002 moles (½ mark)

0·002 on its own 1 mark

Chemical changes and structure
Formulae and reaction quantities

S Gr 2012 15 — Marks

Potassium hydroxide reacts with sulphuric acid to form potassium sulphate, which can be used as a fertiliser.

$$KOH(aq) + H_2SO_4(aq) \longrightarrow K_2SO_4(aq) + H_2O(\ell)$$

(a) Balance the above equation. 1

Answers

(a) $2KOH + H_2SO_4 \rightarrow K_2SO_4 + 2H_2O$

Or correct multiples

Chemical changes and structure

Formulae and reaction quantities

S Gr 2012			Marks
17		A solution of 0·1 mol/l hydrochloric acid has a pH of 1.	
	(b)	Calculate the number of moles of hydrochloric acid in 50cm^3 of 0·1 mol/l hydrochloric acid solution.	1

Answer n= c x v

n = 0.1 x 0.05 (1 mark)

n = 0.005 moles (1 mark)

0.005 on its own 1 mark

Deduct 1 if 50 cm^3 is not in litres

Chemical changes and structure
Formulae and reaction quantities

S Gr 2012 21 — Marks

Aluminium is extracted from the ore bauxite.

(c) The composition of a 250 g magnet is shown.

Metal	aluminium	nickel	cobalt	copper	titanium	iron
% by mass	10	25	20	4	1	40

(i) Calculate the mass, in grams, of aluminium in the magnet. 1
Show your working clearly.

_____ g

(ii) Using your answer to (c)(i), calculate the number of moles of aluminium in the magnet. 2

Show your working clearly.

_____mol

Answer (i) 25g

(ii)

(allow follow through from (c)(i))

(25/27 =) 1 mark 0.926/0.93 1 mark

0.926, 0.93 or 0.9 on its own (1 mark)

If atomic numbers used (1.9) maximum 1 mark

Chemical changes and structure
Formulae and reaction quantities

S Gr 2013 — Marks

17 Nitrogen trifluoride, NF3, is used in the manufacture of plasma screens.

(c) The equation for the formation of nitrogen trifluoride, NF3 , is: 2

$$N_2 + 3F_2 \longrightarrow 2NF_3$$

Calculate the mass of nitrogen trifluoride produced from 7 g of nitrogen.

Show your working clearly.

_____ g

Answers (c)

1 mole N_2 = 28 g

7/28 = 0·25 moles (½)

0·25 to 0·5 (1 mole to 2 moles) (½)

1 mole NF_3 = 71 g (½ for **both** formula masses)

71 x 0·5 = <u>35·5</u> (½)

35·5 on its own 2 marks

1 : 2 (½)
28 : 142 (½)

1 ⟶ 142/28 (½)

7 ⟶ 142 x 7/28 = <u>35·5</u> (½)

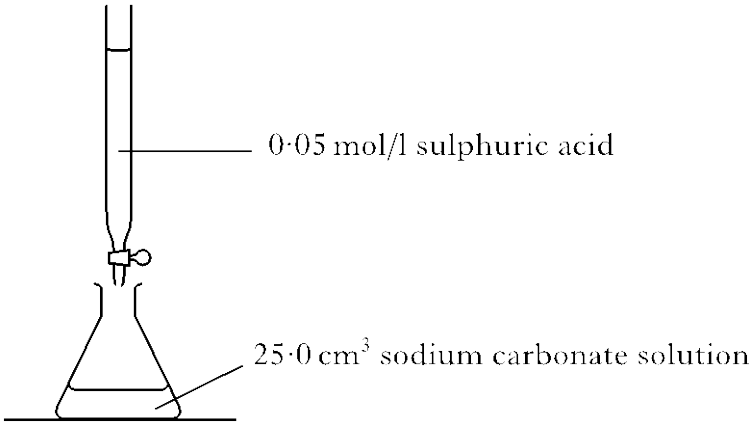
or any other acceptable method

Chemical changes and structure
Formulae and reaction quantities

S Gr 2013 Marks

18 A student investigated the reaction between dilute sulphuric acid and sodium carbonate.

(b) Another experiment involved determining the concentration of sodium carbonate solution by titration.



The results showed that 20cm^3 of sulphuric acid was required to neutralise the sodium carbonate solution.

(i) Calculate the number of moles of sulphuric acid in this volume. 1

_____ mol

Answer

(n = c x V)
n = 0·05 x 0·02 (1)
n = 0·001 (1)

If 20 cm^3 used in place of 0·02 (-1)
Using wrong substance i.e. 0·025 (-1)

Acids and bases

Chemical changes and structure
Acids and bases

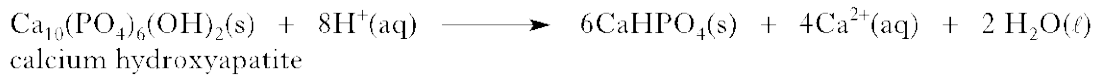
Int 2 2011 15

Marks

Fizzy drinks contain acids.

These acids can attack the compound calcium hydroxyapatite which is found in tooth enamel.

The equation for the reaction is:



(a) What will happen to the pH as the tooth enamel is attacked by the acids? 1

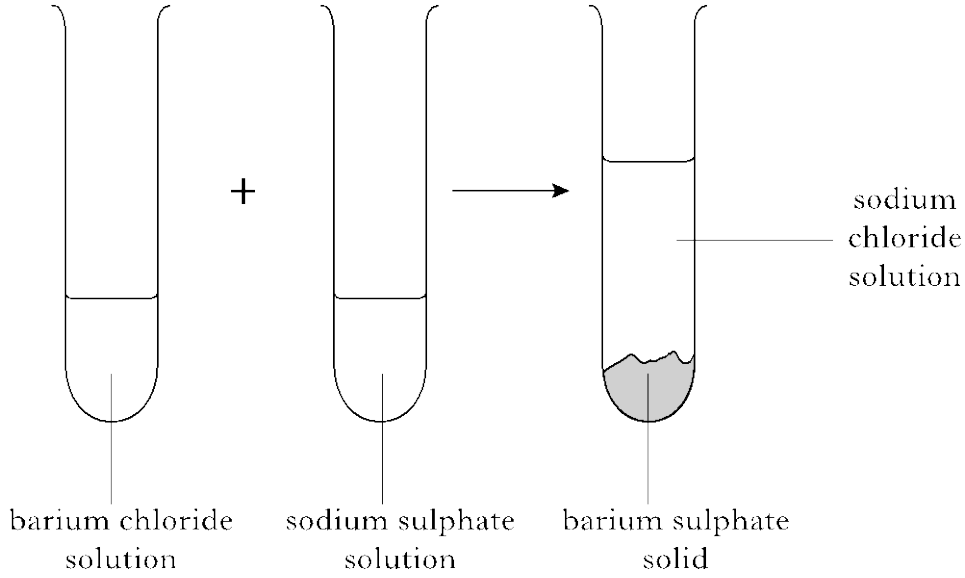
Answers (a)

(pH) will rise towards 7/
(pH) will rise/
(pH) becomes less acidic/
increases/
becomes neutral

Chemical changes and structure
Acids and bases

Int 2 2012 — Marks

13 A student carried out the following experiment.



(b) The equation for the reaction is

$$Ba^{2+}(aq) + 2Cl^{-}(aq) + 2Na^{+}(aq) + SO_4^{2-}(aq) \longrightarrow Ba^{2+}SO_4^{2-}(s) + 2Cl^{-}(aq) + 2Na^{+}(aq)$$

(i) Rewrite the equation showing only the ions which react. 1

(ii) What term is used to describe the ions which do not react? 1

Answer (i) $Ba^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)} \longrightarrow Ba^{2+}SO_4^{2-}{}_{(s)}$

State symbols not required

(ii) Spectator (ions)/spectate

Chemical changes and structure
Acids and bases

S Gr 2011 14

Marks

(a) When sulphur dioxide dissolves in water in the atmosphere “acid rain” is produced.

Circle the correct phrase to complete the sentence. 1

Compared with pure water, acid rain contains { a higher / a lower / the same } concentration of hydrogen ions.

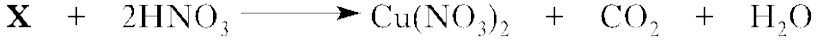
Answer: a higher

Chemical changes and structure
Acids and bases

S Gr 2011 20 — Marks

Metal salts can be produced by different methods.

(b) The salt copper (II) nitrate can be produced as shown. — 1



Name substance X.

Answer Copper carbonate $CuCO_3$

Chemical changes and structure
Acids and bases

S Gr 2012 15 — Marks

Potassium hydroxide reacts with sulphuric acid to form potassium sulphate, which can be used as a fertiliser.

$$KOH(aq) + H_2SO_4(aq) \longrightarrow K_2SO_4(aq) + H_2O(\ell)$$

(b) Name the type of chemical reaction taking place. 1

Answer: neutralisation

Chemical changes and structure

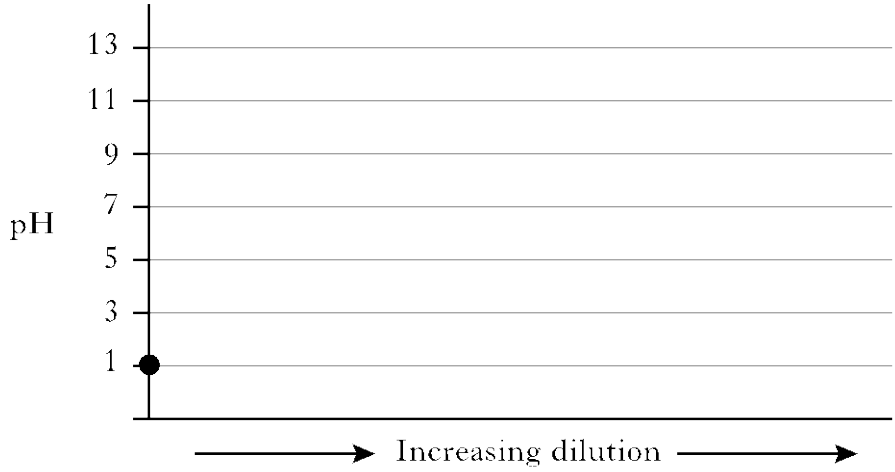
Acids and bases

S Gr 2012 — Marks

17 A solution of 0·1 mol/l hydrochloric acid has a pH of 1.

(a) (i) What colour would universal indicator turn when added to a solution of hydrochloric acid? — 1

(ii) Starting at pH 1, draw a line to show how the pH of this acid changes when diluted with water. — 1



Answer (i) Red, pink, orange, yellow

(ii) Line must be increasing
Line stops at pH7 or below } or 0