PEARSON EDEXCEL GCSE CHEMISTRY · 1CH0

CHEMISTRY



MARK SCHEME

TOPIC 3: CHEMICAL CHANGES (PACK 3)

SCORE	PERCENTAGE
/29	%

STEMUP

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Q1.

Candidates did not perform very well in this question, some candidates knew that an observation that would show that the reaction had finished would be that there was no more bubbling, of these only the better candidates could give another observation such no more solid dissolving. Some candidates lost marks as they tried to explain what was happening rather than stating observations.

Q2.

(i) This question was well answered overall, with most candidates correctly using the term 'excess'.

Q3. No Examiner's Report available for this question

Q4.

Part (i) was answered very well. Candidates who answered this question incorrectly mentioned that the hydrogen was flammable or ignited – which was in the question. Candidates are advised to give the standard answer of 'squeaky pop' as some answers in their own words are insufficiently clear. It was surprising on this paper to see some tests for oxygen, chlorine or carbon dioxide.

Water, acidified with sulfuric acid, is decomposed by electrolysis.
The water is decomposed to produce hydrogen and oxygen.

(i) A sample of hydrogen is mixed with air and ignited.

State what would happen.

(1)

Combustion, formation of water as hydrogen bonds with oxygen

Results Plus: Examiner Comments

Whilst the examiners were expecting 'squeaky pop', the answer is correct – water does form – so this answer was credited.

(ii) Many candidates scored 1 mark here, often recognising the 2:1 ratio, but not always stating the obvious point that the volumes increased with time. Some just quoted data from the table but did not describe how the data for the two gases was linked. A minority neatly said that 'the rate of hydrogen production was double the rate of oxygen production', scoring both marks. Some candidates did not describe the data (as required) but wasted time trying to explain it.

(ii) Throughout the experiment the volume of hydrogen and the volume of oxygen are measured at two-minute intervals.

The results are shown in Figure 2.

time in minutes	volume of hydrogen in cm^3	volume of oxygen in cm^3
0	0	0
2	4	2
4	8	4
6	12	6
8	16	8

Figure 2

Describe, using the data in Figure 2, what the results show about the volumes of hydrogen and of oxygen produced in this experiment.

(2)

Hydrogen is formed quicker than oxygen, and twice as much hydrogen was present as oxygen.

Results Plus: Examiner Comments

This is not quite as good as answer as the next one. 'Hydrogen is formed....' is really a rephrase of the information given – it would be better to explicitly say that the volumes are increasing.

Describe, using the data in Figure 2, what the results show about the volumes of hydrogen and of oxygen produced in this experiment.

(2)

The data illustrates that as hydrogen and oxygen are measured at two minute intervals the volume of hydrogen formed increases at double the rate of oxygen formed.

Results Plus: Examiner Comments

This is a good answer because it states that the volume increases over time, and gives the ratio of volumes of the two gases.

Q5.

(i)

This question was well answered on the whole with the majority of responses credited with the 1 mark available.

It was pleasing to note that most candidates scored by referring to '(squeaky) pop' as the correct observation for the test for hydrogen gas.

Very few gave the incorrect response, 'it ignites' as stated in the question. In some cases, this test was confused with the test for oxygen, namely the incorrect result 'relights a glowing splint'.

(ii)

This question was well answered overall with the majority of responses scoring at least 1 of the 2 marks available.

Of the responses scoring 1 mark only, most candidates either compared across the table, to show quantitatively that there is twice as much hydrogen as oxygen, or down the table, stating that volume of gas increasing. Very few candidates stated both these patterns together.

Many candidates simply copied numbers from the table which did not score.

(ii) Throughout the experiment the volume of hydrogen and the volume of oxygen are measured at two-minute intervals.

The results are shown in Figure 9.

time in minutes	volume of hydrogen in cm^3	volume of oxygen in cm^3
0	0	0
2	4	2
4	8	4
6	12	6
8	16	8

Figure 9

Describe, using the data in Figure 9, what the results show about the volumes of hydrogen and of oxygen produced in this experiment.

(2)

hyarogen

The volume of ~~oxygen~~ is increasing faster than oxygen and ~~is~~ the volume of hydrogen is always double the volume of oxygen.

Results Plus: Examiner Comments

This response scored both marking points.

Both the correct ideas of increasing volumes of gas with time and that the volume of hydrogen is twice that of the oxygen have been stated.

Describe, using the data in Figure 9, what the results show about the volumes of hydrogen and of oxygen produced in this experiment.

(2)

hydrogen had twice as much of Oxygen

Results Plus: Examiner Comments

This response scored 1 mark only.

The correct quantitative relationship has been stated. However, there is no comment made regarding the increase in volume of gases.

Q6. No Examiner's Report available for this question

Q7. No Examiner's Report available for this question

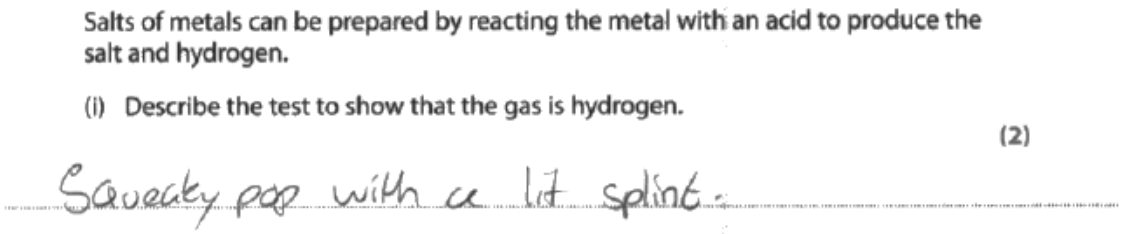
Q8.

(i)

Candidates could recall the test for hydrogen more easily than the earlier test for carbon dioxide. However, some did still leave out the method of the test.

Candidates should be taught that in every test, two components are required: what you do and what you observe for a positive result. Some did not say that they splint had to be lit or that it was glowing and so gained no credit.

In some cases, candidates simply stated the 'squeaky pop test' this was not sufficient for marks and did not gain credit.


Salts of metals can be prepared by reacting the metal with an acid to produce the salt and hydrogen.

(i) Describe the test to show that the gas is hydrogen.

(2)

Squeaky pop with a lit splint.

Results Plus: Examiner Comments

A correct response which gained both marks.

Salts of metals can be prepared by reacting the metal with an acid to produce the salt and hydrogen.

(i) Describe the test to show that the gas is hydrogen.

(2)

When there is hyarogen, when let off in air there will be a loud squeaky pop due to it reacting with the elements in the air.

Results Plus: Examiner Comments

A fair few stated that a pop would spontaneously be heard, e.g. after taking the bung out the test tube.

Salts of metals can be prepared by reacting the metal with an acid to produce the salt and hydrogen.

(i) Describe the test to show that the gas is hydrogen.

(2)

place a metal & acid in a closed flask using a tube at the top to ~~,~~ hold produced hydrogen. Simmular to simple distilation

Results Plus: Examiner Comments

In some cases, candidates described how to produce the hydrogen, by reacting an acid and a metal, rather than stating the test for the hydrogen.

(ii)

Candidates found this part quite difficult with few scoring the full two marks available.

A common misconception seen was where candidates knew that two electrons were involved in the transfer but thought that the electrons were gained rather than lost. In these cases, one mark was awarded for showing an understanding that two electrons were involved.

In other cases, candidates knew that the ion has lost electrons but did not mention how many and so did not gain the second mark.

(ii) Nickel is a metal.

Explain how the structure of a nickel atom, Ni, changes when it forms a nickel ion, Ni^{2+}.

(2)

The nickel atom loses two electrons when it creates a nickel ion ~~or~~ therefore it becomes positive.

Results Plus: Examiner Comments

A good answer that scored 2 marks.

(ii) Nickel is a metal.

Explain how the structure of a nickel atom, Ni, changes when it forms a nickel ion, Ni^{2+}.

(2)

gains 2 electrons so it has full outer shells. ~~So therefore~~

Results Plus: Examiner Comments

In this example. one mark was awarded for showing an understanding that two electrons were involved.

(ii) Nickel is a metal.

Explain how the structure of a nickel atom, Ni, changes when it forms a nickel ion, Ni^{2+}.

(2)

The structure of a nickel atom changes when it forms a nickel ion is, the nickel ion has ~~lots~~ lost an electron so it has become positive.

Results Plus: Examiner Comments

This candidate knew that the ion has lost electrons but did not mention how many and so gained just 1 mark.

Q9.

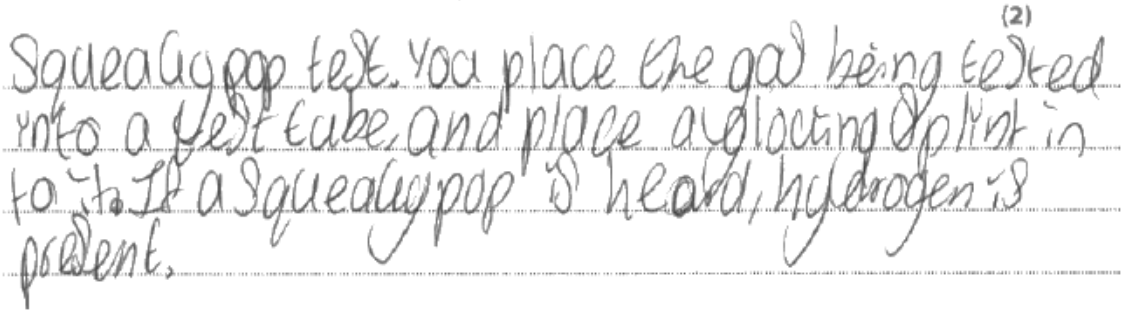
(i)

Although the overwhelming majority of candidates scored marks for a correctly described test for hydrogen, a small number wrote about using a lighted splint and hydrogen extinguishing the flame. A significant minority of candidates lost both marks for using a 'glowing' splint or describing the test for carbon dioxide. Many candidates described how to produce the hydrogen but that wasted candidates' time and answer space.

Salts of metals can be prepared by reacting the metal with an acid to produce the salt and hydrogen.

(i) Describe the test to show the gas is hydrogen.

(2)



Results Plus: Examiner Comments

Use of a glowing splint in the test was seen on many occassions. This is not the test for hydrogen and so did not score. The second marking point was dependent on the first being correct, so here 'a squeaky pop is heard' did not score. The response scored 0 marks.

Results Plus: Examiner Tip

Wrting 'Squeaky pop test' does not gain any credit. When describing the test for a gas marks are given for:

(a) how to carry out the test

(b) the positive result of the test

Salts of metals can be prepared by reacting the metal with an acid to produce the salt and hydrogen.

(i) Describe the test to show the gas is hydrogen.

(2)

the test for hydrogen is the squeaky pop test where a splint which has been in contact with hydrogen is put into a test tube if hydrogen gas is present a pop noise will occur.

Results Plus: Examiner Comments

Unfortunately there was no mention of the splint being lit so the first mark could not be awarded. Second mark was dependent on the first so no second mark either.

Results Plus: Examiner Tip

Learn the tests for all the following gases : hydrogen, oxygen, chlorine, carbon dioxide and ammonia

(ii)

This was another well-answered question with the greater majority of candidates scoring both marks, with only a few candidates failing to mention that there were two electrons lost. Just a few mentioned electrons gained or in some cases electrons being shared.

(ii) Nickel is a metal.

Explain how the structure of a nickel atom, Ni, changes when it forms a nickel ion, Ni^{2+}.

(2)

It gains 2 positive electrons on the outer shell making it 2,8,8,14

Results Plus: Examiner Comments

'Gains' and 'positive' electrons caused the loss of both marks in this answer.

Results Plus: Examiner Tip

Formation of positive ions involves loss of electrons and electrons have a negative charge.

(ii) Nickel is a metal.

Explain how the structure of a nickel atom, Ni, changes when it forms a nickel ion, Ni^{2+}.

(2)

The Nickel atom gains electrons of the outer shell. Therefore it becomes Ni^{2+} due to added electrons.

Results Plus: Examiner Comments

No marks here as electrons are not gained, and no number of electrons is stated.

Q10.

Approximately half the responses failed to score, since invariably an incorrect test and test result were given, or simply an incorrect reagent was used, as opposed to 'limewater'. Of the responses which scored, most gained the maximum 2 marks available for 'limewater' and 'milky/cloudy.

The most common misconception was that carbon dioxide would extinguish a lighted splint. This might well be the case, but it is not a unique test for carbon dioxide. Many simply confused the carbon dioxide test with those tests for either oxygen or hydrogen.

(d) When dilute hydrochloric acid is added to copper carbonate, a gas is produced.

Describe a test to show that this gas is carbon dioxide.

(2)

The test would be a lit splint test. You would have a lit splint and a test tube containing the carbon dioxide. Put the lit splint into the test tube. If the lit splint goes out, there would be carbon dioxide in there as the splint needs oxygen.

(Total for Question 2 = 8 marks)

Results Plus: Examiner Comments

This response was commonly seen by examiners. This test would work for carbon dioxide, but is not specific to carbon dioxide. Only the limewater test is acceptable, so this response did not score.

(d) When dilute hydrochloric acid is added to copper carbonate, a gas is produced.

Describe a test to show that this gas is carbon dioxide.

(2)

put some hydrochloric acid into a beaker with a delivery tube going into the acid, transporting the carbon dioxide into the hydrochloric acid and if the acid turns cloudy the gas is CO_2.

Results Plus: Examiner Comments

Although the observation, 'cloudy' is mentioned in this response, the wrong reagent, 'hydrochloric acid', has been given. The result is dependent upon using the correct test, so this response did not score.

(d) When dilute hydrochloric acid is added to copper carbonate, a gas is produced.

Describe a test to show that this gas is carbon dioxide.

(2)

Using a collecting duct that would collect the gas during the experiment. The gas would ~~be~~ then travel through the collecting duct and into a container of limewater. If the gas is carbon*

(Total for Question 2 = 8 marks)

* dioxide the limewater will go milky.

Results Plus: Examiner Comments

Both the correct reagent, 'limewater' and result, 'milky' are given, so this scored the maximum 2 marks.

Q11.

(a) (i)

Very few candidates were able to link the yellow flame to sodium.

Invariably, candidates simply copied either of the two salts given in the stem of the question, namely 'sodium sulfate' or 'potassium chloride'.

(a) (ii)

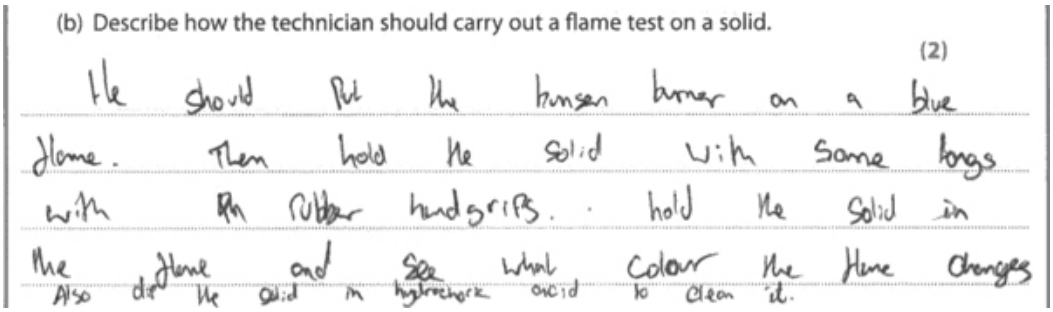
Very few candidates answered this question correctly.

It was clear that many candidates did not know the barium chloride test or correct result for sulfates. The most commonly seen incorrect responses simply mentioned 'chloride' or 'barium', perhaps confusing this with the result for the silver nitrate test for chlorides.

(b)

This was poorly answered on the whole.

Few candidates were able to recall a correct procedure for flame testing, either by the use of the wire loop or dampened splint. Invariably 1 mark was scored, due to the use of the incorrect apparatus, typically 'tongs', but correctly mentioning '**in**the flame'. Many candidates attempted to use safety / yellow flames or incorrectly mentioned holding samples 'over or under the flame'.


(b) Describe how the technician should carry out a flame test on a solid.

(2)

He should Put the bunsen burner on a blue flame. Then hold the solid with some tongs with Rn rubber handgrips. hold the solid in the flame and See what colour the flame changes Also dip the solid in hydrochloric acid to clean it.

Results Plus: Examiner Comments

This is a typical 1 mark maximum answer where the 'test' mark was scored only, since the wrong apparatus, namely 'tongs', has been used.

Results Plus: Examiner Tip

This is commonly asked question on the examination, make sure that you are able to recall the flame test accurately and the correct colours of the flames for specific metal ions.

(b) Describe how the technician should carry out a flame test on a solid.

(2)

clean a peace of wire with water, heat the wire till it glows, then get some of the solid on the wire an put it in the flame

Results Plus: Examiner Comments

A good example of a correct answer. All the three possible marking points have been mentioned, so this scored 2 marks.

(c)

Most responses failed to gain credit, since they were unable to recall either the correct colour, 'brown', and/or that a 'precipitate' was formed. Of those responses which scored, many gained 1 mark only for mentioning the correct colour, but invariably mentioning 'solution', or alternatively, correctly mentioned 'precipitate', but gave the wrong colour or a wrong combination of colours.

(c) Describe what you would **see** when sodium hydroxide solution is added to a solution containing iron(III) ions, Fe^{3+}.

(2)

you would see a brown Cabo coloured precipitate form in the solution

Results Plus: Examiner Comments

This is a typical fully correct response, where both marking points were clearly scored, namely 'brown' and 'precipitate', so this was awarded 2 marks.

(c) Describe what you would **see** when sodium hydroxide solution is added to a solution containing iron(III) ions, Fe^{3+}.

(2)

a green/brown/rust precipitate would form.

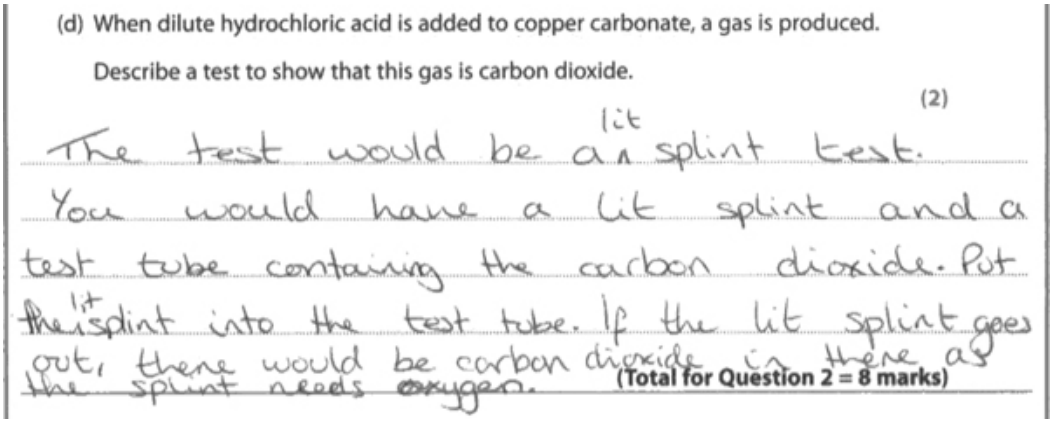
Results Plus: Examiner Comments

Unfortunately, this response mentioned precipitate, but also gave an incorrect combination of colours, since it also mentions 'green' in combination with the correct colour, brown. This was awarded 1 mark only.

(d)

Approximately half the responses failed to score, since invariably an incorrect test and test result were given, or simply an incorrect reagent was used, as opposed to 'limewater'. Of the responses which scored, most gained the maximum 2 marks available for 'limewater' and 'milky/cloudy.

The most common misconception was that carbon dioxide would extinguish a lighted splint. This might well be the case, but it is not a unique test for carbon dioxide. Many simply confused the carbon dioxide test with those tests for either oxygen or hydrogen.



(d) When dilute hydrochloric acid is added to copper carbonate, a gas is produced.

Describe a test to show that this gas is carbon dioxide.

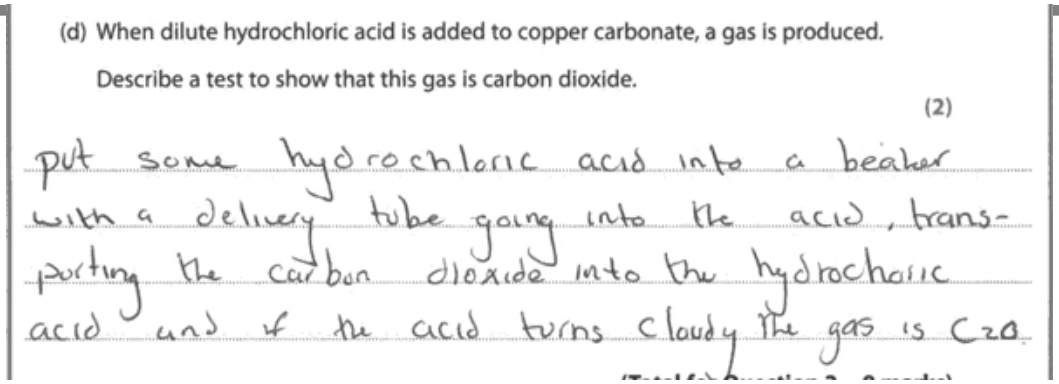
(2)

The test would be a lit splint test. You would have a lit splint and a test tube containing the carbon dioxide. Put the lit splint into the test tube. If the lit splint goes out, there would be carbon dioxide in there as the splint needs oxygen.

(Total for Question 2 = 8 marks)

Results Plus: Examiner Comments

This response was commonly seen by examiners. This test would work for carbon dioxide, but is not specific to carbon dioxide. Only the limewater test is acceptable, so this response did not score.



(d) When dilute hydrochloric acid is added to copper carbonate, a gas is produced.

Describe a test to show that this gas is carbon dioxide.

(2)

put some hydrochloric acid into a beaker with a delivery tube going into the acid, transporting the carbon dioxide into the hydrochloric acid and if the acid turns cloudy the gas is CO2.

Results Plus: Examiner Comments

Although the observation, 'cloudy' is mentioned in this response, the wrong reagent, 'hydrochloric acid', has been given. The result is dependent upon using the correct test, so this response did not score.

(d) When dilute hydrochloric acid is added to copper carbonate, a gas is produced.

Describe a test to show that this gas is carbon dioxide.

(2)

Using a Collecting duct that would collect the gas during the experiment. The gas would be then travel through the collecting duct and into a Container of limewater. If the gas is Carbon* dioxide the limewater will go Milky.

(Total for Question 2 = 8 marks)

Results Plus: Examiner Comments

Both the correct reagent, 'limewater' and result, 'milky' are given, so this scored the maximum 2 marks.

Q12.

A good proportion of candidates knew that hydrochloric acid was required, however a large number stated that chlorine should be used.

Other candidates suggested other acids they knew such as sulfuric or nitric.

Acids are used to make salts.

Give the name of the acid used to make chlorides.

(1)

hydrochloric acid

Results Plus: Examiner Comments

A correct answer that scored the mark.

Acids are used to make salts.

Give the name of the acid used to make chlorides.

(1)

Chlorine

Results Plus: Examiner Comments

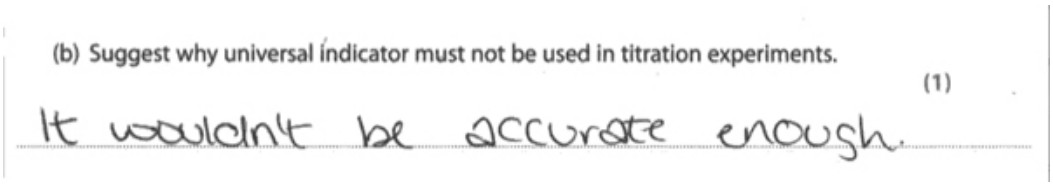
A very common answer that did not score.

Q13. No Examiner's Report available for this question

Q14. No Examiner's Report available for this question

Q15.

Many vague answers were seen to this question as candidates did not refer to the difficulty of seeing the colour change and instead wrote about the speed of the colour change. A common incorrect answer was that the indicator would contaminate the solution.


(b) Suggest why universal indicator must not be used in titration experiments.

(1)

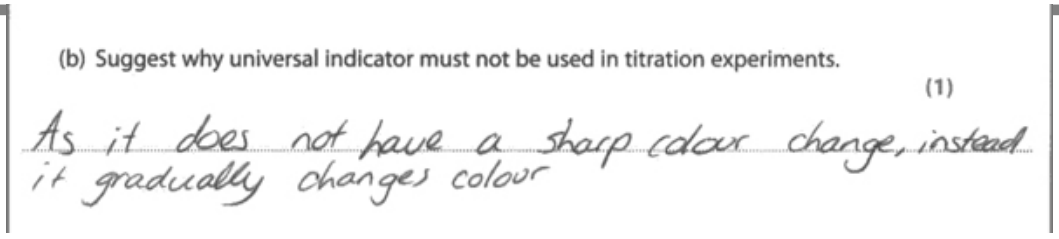
It wouldn't be accurate enough.

Results Plus: Examiner Comments

This is an example of one of the vague answers that were seen and did not score a mark.

Results Plus: Examiner Tip

Write specific answers to questions. This question is about titrations and you should know that an indicator is used to find out when the solution is neutral because it changes colour. Universal indicator has a lot of different colours and there is no sharp change in colour at the end point of the titration.


(b) Suggest why universal indicator must not be used in titration experiments.

(1)

As it does not have a sharp colour change, instead it gradually changes colour

Results Plus: Examiner Comments

This is a very good answer and scored 1 mark.

Q16.

(i)

The predictable use of a burette or measuring cylinder was seen here, but a less understandable confusion of a teat pipette and volumetric pipette was also noted. The most common second mark was for using a pipette filler. Others gave descriptions of a titration but did not direct themselves to the question.

Q17.

(i)

Many candidates were unable to recall 'burette', and simply confused a pipette with a burette.

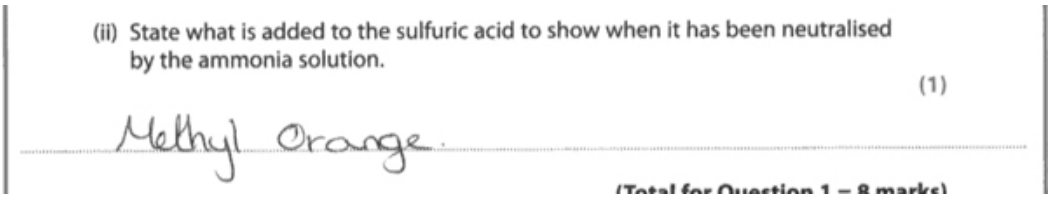
Of those candidates who gained credit for this item, invariably the word was spelled phonetically, this was in most cases sufficient to gain the 1 mark available.

(ii)

Few candidates gained the mark for this question.

Where correct answers were seen, credit was invariably for 'indicator' alone, or 'methyl orange' or 'phenolphthalein' (or a phonetic spelling which was more or less correct).

The most common incorrect answers referred to 'Universal Indicator'. It needs to be stressed to centres that Universal Indicator solution is an inappropriate indicator for titrations.


(ii) State what is added to the sulfuric acid to show when it has been neutralised by the ammonia solution.

(1)

Methyl Orange.

(Total for Question 1 = 8 marks)

Results Plus: Examiner Comments

A typical 1 mark response for a correctly named indicator, namely 'methyl orange'.

(ii) State what is added to the sulfuric acid to show when it has been neutralised by the ammonia solution.

(1)

universal indicator.

Results Plus: Examiner Comments

A very commonly seen incorrect response. 'Universal indicator' does not score.

Q18. No Examiner's Report available for this question

Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
	Any TWO from • no more bubbles / fizzing (1) • no further change in colour (1) • {solid / copper carbonate} remains at bottom of flask / no more {solid / copper carbonate} dissolves (1)	ignore references to pH allow cloudy/opaque liquid ignore no more copper carbonate will react	(2)

Q2.

Question number	Answer	Additional guidance	Mark
(i)	the acid is in excess	allow exact quantity of acid used to react with the carbonate	(1) AO3

Question number	Answer	Mark
(ii)	D 1/10 000 is the only correct answer. A, B and C are factually incorrect	(1) AO1

Q3.

Question number	Answer	Additional guidance	Mark
(i)	pH meter	allow universal indicator / pH paper ignore datalogger alone ignore pH scale / pH strip ignore indicator alone	(1)

Question number	Answer	Additional guidance	Mark
(ii)	7 / seven	allow pH7 / PH7	(1)

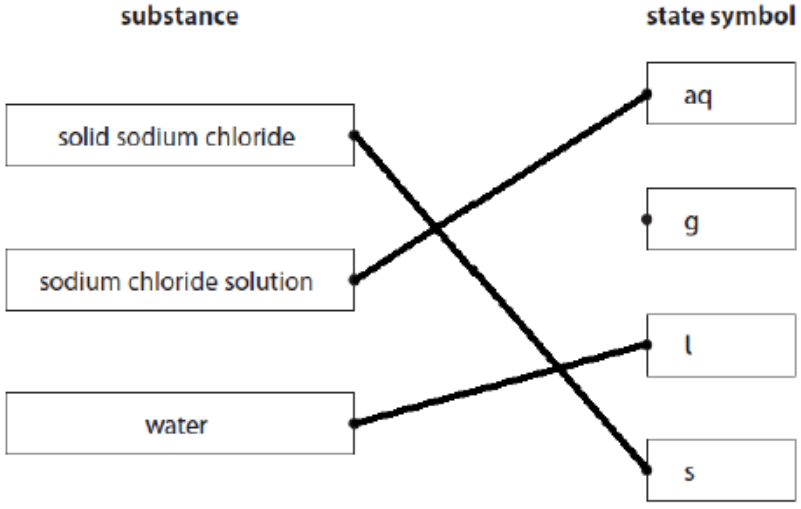
Q4.

Question number	Answer	Additional guidance	Mark
(i)	(squeaky) pop / gas burns / water forms	allow explosion / bang / flame / fire / energy released ignore reaction occurs / ignites / set alight ignore references to splints (glowing or lit)	(1)
(ii)	A description to include • *volumes going up:* (oxygen/ hydrogen/ gas) increase (with time) / volume (directly) proportional to time (1) • *quantitative comparing hydrogen and oxygen:* (volume of) hydrogen double (volume of) oxygen / ORA / 2:1 ratio (1)	allow hydrogen goes up by 4 (cm^3) each time / by 2 cm^3 per minute / equivalent for oxygen for MP1 explicit reference needed to a ratio and **not** just quoting 2 figures allow amount in place of volume throughout twice as much hydrogen produced as oxygen (1) **rate** of hydrogen production double that of oxygen (2)	(2)

Q5.

Question number	Answer	Additional guidance	Mark
(i)	(squeaky) pop / gas burns / water forms	allow explosion / bang / flame / fire / energy released ignore: reaction occurs / ignites / set alight ignore references to splints (glowing or lighted)	(1)
(ii)	A description to include • *volumes going up:* (oxygen/ hydrogen/ gas) increase (with time) / volume (directly) proportional to time (1) • *quantitative comparing hydrogen and oxygen:* (volume of) hydrogen double (volume of) oxygen / ORA / 2:1 ratio (1)	allow hydrogen goes up by 4 (cm^3) each time / by 2 cm^3 per minute / equivalent for oxygen for MP1 explicit reference needed to a ratio and **not** just quoting 2 figures allow amount in place of volume throughout twice as much hydrogen produced as oxygen (1) **rate** of hydrogen production double that of oxygen (2)	(2)

Q6.

Question Number	Answer	Mark
	 all 3 correct = 2 any 2 correct = 1 none or one correct = 0	(2)

Q7.

Question number	Answer	Additional guidance	Mark
(i)	measuring cylinder(s)	allow alternative apparatus eg graduated test-tube, burette, Hofmann voltameter, gas syringe	(1)

Question number	Answer	Additional guidance	Mark
(ii)	light bulb / lamp / ammeter	allow alternative equipment eg buzzer ignore voltmeter / data-logger alone	(1)

Q8.

Question Number	Answer	Additional guidance	Mark
(i)	A description including • apply lighted splint (1) • (squeaky) pop (1)	 allow flame / ignite gas / fire ignore 'squeaky pop test' / glowing splint second mark is dependent on first	(2) AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation linking • loss of electron(s) (1) • two electrons (1)	 allow gains two electrons for 1 mark zero marks overall if sharing of electrons / gain or loss of protons / positive electrons marks can be awarded for suitably drawn diagram / half equation	(2) AO 1 1

Q9.

Question Number	Answer	Additional guidance	Mark
(i)	A description including • apply lighted splint (1) • (squeaky) pop (1)	allow flame / ignite gas / fire ignore 'squeaky pop test' / glowing splint second mark is dependent on first	(2) AO 2 2

Question Number	Answer		Mark
(ii)	An explanation linking • loss of electron(s) (1) • two electrons (1)	allow gains two electrons for 1 mark zero marks overall if sharing of electrons / gain or loss of protons / positive electrons marks can be awarded for suitably drawn diagram / half equation	(2) AO 1 1

Q10.

	Answer	Acceptable answers	Mark
	A description including (pass gas into) { limewater / calcium hydroxide solution} (1) which turns {milky / cloudy / white precipitate} (1)	2nd mark dependent on 1st MP ignore : puts out a flame	(2)

Q11.

	Answer	Acceptable answers	Mark
(a)(i)	sodium	Na^+ or Na	(1)
(a)(ii)	sulfate	SO_4^{2-} or SO_4	(1)

(b)	A description including two points from CLEAN • clean (flame test) wire with (hydrochloric) acid (1) SAMPLE • put (wire) into solid (1) TEST • hold (wire) in (Bunsen) flame (1)	• moisten splint • put splint into solid • hold splint in (Bunsen) flame ignore : hold <u>over</u> flame use of tongs / spatula etc for equipment, max 1 if yellow flame, max 1	**(2)**	
(c)	A description including red-brown (1) precipitate / solid (1)	brown / red / orange or combinations of these (1) ppt (1)	**(2)**	
(d)	A description including (pass gas into) { limewater / calcium hydroxide solution} (1) which turns {milky / cloudy / white precipitate} (1)	2nd mark dependent on 1st MP ignore : puts out a flame	**(2)**	

Q12.

Question Number	Answer	Additional guidance	Mark
	hydrochloric (acid)	allow HCl ignore HCL, hCl, HCL_2 etc	**(1)** AO 2 1

Q13.

Question Number	Answer	Mark
	D cathode	**(1)**

Q14.

Question Number	Answer	Mark
	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (1 mark) • acid is diluted 10 times (1) • causes increase in pH by 1 / pH of diluted solution is 2 (1)	**(2)**

Q15.

	Answer	**Acceptable answers**	**Mark**
	Any one from • no {sharp/clear/distinct} change in colour • gradual colour change • there are too many different colours	ignore not as accurate/reliable allow too difficult to see when it is {neutral/reaction is complete} ignore speed of colour change	**(1)**

Q16.

Question Number	Answer	Acceptable answers	Mark
(i)	A description linking • **pipette** (1) • one practical point eg draw liquid up to line/ use pipette filler/ rinse first / read at eye level (1)	**ignore** burette etc for 1st mpt if using measuring cylinder/ burette allow suitable practical point eg read at eye level/ add dropwise from burette near 25 cm^3 (1) ignore as 2nd point: transfer liquid to flask / safety precautions	**(2)**

Question Number	Answer	Acceptable answers	Mark
(ii)	**D** 25.20 cm^3		**(1)**

Q17.

	Answer	**Acceptable answers**	**Mark**
(i)	burette		**(1)**
(ii)	indicator / any named acid-base indicator	ignore Universal indicator	**(1)**

Q18.

Question number	**Answer**	**Mark**
	B	**(1)**