Questions

Q1.
(a) In this apparatus hydrochloric acid is decomposed by passing a direct electric current through it. Chlorine and hydrogen are formed.

(i) Give the name of this process in which substances, such as hydrochloric acid, are decomposed by a direct electric current.

................................................................................................................................................................. (1)

(ii) Describe what happens when a burning splint is applied to a mixture of hydrogen and air in a test tube.

.................................................................................................................................................................................................................................................................................................................. (2)

Q3.
Dilute hydrochloric acid is decomposed into hydrogen and chlorine.
Write the word equation for this reaction.

.................................................................................................................................................................................................................................................................................................................................................................................................................................................. (1)

Q4.
(i) Water, with some dilute sulfuric acid added, can be decomposed by passing a direct electric current through it.

Complete the sentence by putting a cross ( ☒ ) in the box next to your answer.
This process is

☐ A electrolysis
☐ B heating
☐ C neutralisation
☐ D precipitation

.......................................................................................................................................................................................................................................................................................................................................................................................................................................................................................... (1)

(ii) The water decomposes to form hydrogen and oxygen.

Describe a test to show that a gas is oxygen

.......................................................................................................................................................................................................................................................................................................................................................................................................................................................................................... (2)
d) The electrolysis of hydrochloric acid can be carried out using this apparatus.

(i) Explain what is meant by the term electrolysis.

(ii) chlorine is formed at one electrode.
    Name the gas formed at the other electrode.

(iii) Describe the test to show a gas is chlorine

(e) When water is electrolysed, hydrogen is also formed at one electrode.
    Give the name of the gas formed at the other electrode.

(Total for Question is 10 marks)
Examiner's Report

Q1.

(a) (i)
Most candidates correctly identified electrolysis.

(i) Give the name of this process in which substances, such as hydrochloric acid, are decomposed by a direct electric current.

Results Plus: Examiner Comments
A rephrasing of the question is not creditworthy.

(a) (ii)
This question asked for this well known test in a slightly different way. It was well answered, with "squeaky pop" a frequent response. Some candidates just stated "squeaky pop test", which is rather lacking in detail as a description (but was credited). Some answers just mentioned "pop"; the fact that the question was worth 2 marks should indicate that this answer is insufficient. The alternatives of the hydrogen burning or water being formed (allowed in this case due to the way the question was phrased) were rarely seen.
Where the answer was incorrect there was confusion particularly with the test for oxygen - "splint relights" - or just stating that the "splint goes out".

(ii) Describe what happens when a burning splint is applied to a mixture of hydrogen and air in a test tube.

When a burning splint is applied there is a squeaky pop as the hydrogen is ignited.

Results Plus: Examiner Comments
A good, clearly written answer that even explains why a squeaky pop occurs.

Results Plus: Examiner Tip
Try to spell words correctly!

(ii) Describe what happens when a burning splint is applied to a mixture of hydrogen and air in a test tube.

The burning splint will go out.

Results Plus: Examiner Comments
The candidate has not learnt the gas tests.

Results Plus: Examiner Tip
Tests are an important part of Chemistry and often feature in exam papers.

(b) (iii)
This part was well answered. Most candidates knew that the indigestion remedy neutralised the acid (although poor terminology let some down - the remedy "breaks down" or "dissolves" the acid).

Many candidates also knew the remedy was an alkali/base or that the acid was in excess. In fact, some answers covered three or four of the available mark points. It was a pity that some answers knew about neutralisation but stated that the pH would be lowered. Incorrect responses often seemed to reflect advertising - cooling, calming or soothing the acid. Others did not read the question and referred to functions of the acid - aiding digestion/breaking up food or killing bacteria.

(iii) Explain how an indigestion remedy works when it cures acid indigestion.

An indigestion remedy is called an antacid, people take them when there is too much acid in the stomach. The antacids neutralise the excess stomach acid.

Results Plus: Examiner Comments
A well expressed answer.
(iii) Explain how an indigestion remedy works when it cures acid indigestion.

The remedy clears the body of the acid

build up

Results Plus: Examiner Comments
This answer is not worded correctly to allow credit - what do ‘clear’ and ‘build up’ mean?

Results Plus: Examiner Tip
Use scientific terminology in your answer - in this case, neutralised and excess.

(c) Many answers scored one mark for water which just needed to be transposed (although a significant minority did not include water as a product). Most candidates did not recognise that nitrates are formed from nitric acid, so naming the salt was a good discriminator. A very large number just gave "salt". Other incorrect responses included magnesium nitric, magnesium acid, nitrogen oxide, hydrogen or oxygen. Some answers gave too many products, when the answer space clearly indicated the correct number.

Results Plus: Examiner Comments
The most common answer to this question.

Results Plus: Examiner Tip
Remember that the salt formed depends on the acid used.

Results Plus: Examiner Comments
There were examples of correctly identified salts.

Results Plus: Examiner Tip
It's a pity that the candidate has completed the hard task of identifying the salt but has not read the question where water was given as the other product. The examiners give lots of clues in the questions.
Q2.

(a)(i)

This question was well answered with many candidates being able to recall that hazard symbols are there to serve as a warning. Those that did not gain credit failed to do so because their answers were too vague eg they keep you safe.

(a)(ii)

Many candidates could correctly identify the corrosive symbol. However, a large proportion confused irritant with corrosiveness and many just described what they could see on the label, eg it burns through the skin.
Here the candidate explains the use of a hazard label in part (a)(i). This answer was awarded 1 mark. In part (a)(ii) the candidate does not give the specific name of the hazard in, but instead describes the consequences of getting the concentrated acid on your skin. This response failed to gain any marks.

(d)(i)

Many candidates could not give the definition of electrolysis. Often candidates gained a mark for citing the use of electricity. However, many linked this with the separation of compounds which is ambiguous and did not gain credit. Many commented on the use of electrolysis for the extraction of metals from ores which was irrelevant in this context.

Results Plus: Examiner Comments
Many commented on the use of electrolysis for the extraction of metals from ores which was irrelevant in this context. This response was awarded 1 mark.
Here the candidate defines electrolysis as the separation of two different things. Separation is ambiguous and did not gain credit. This response was awarded 1 mark.

Many candidates lost marks here as they incorrectly stated chloride instead of chlorine.

This question was well answered and many candidates gained the full 2 marks. Those that gained just 1 mark knew what the test was but failed to describe the use of a lighted splint. Some candidates incorrectly described the limewater test for carbon dioxide.

This candidate gained just 1 mark as they failed to describe the use of a lighted splint.
Results Plus: Examiner Tip
It is important that when asked to describe a chemical test for a substance, the method of testing is given along with the result expected.

(iii) Describe the test to show a gas is hydrogen.

To test for hydrogen gas you put a lighted splint towards hydrogen and a squeaky pop sound will be made.

Results Plus: Examiner Comments
A good description of the test to show that a gas is hydrogen.

(e)

Many candidates gave chlorine as the answer here.
Q3.
No Examiner's Report available for this question

Q4.

(ii)

This question was generally well done, although candidates must give a description – ‘the squeaky pop test’ does not earn 2 marks.

The most common error was ‘using a glowing splint’, but others included:

- electrolysis
- use of limewater
- use of litmus
- unlit splints.

Candidates should note that examiners often ask for tests and these are well worth learning carefully.

Results Plus: Examiner Comments

A decent answer giving the test and the result.
## Mark Scheme

### Q1.

<table>
<thead>
<tr>
<th></th>
<th>Answer</th>
<th>Acceptable answers</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)(i)</td>
<td>electrolysis</td>
<td>Allow any phonetically correct spelling</td>
<td>(1)</td>
</tr>
<tr>
<td>(a)(ii)</td>
<td>A description including two of the following:</td>
<td>Ignore references to splint</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Burns/ ignites (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Squeaky (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- pop/explodes (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- water formed (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)(i)</td>
<td>B hydrochloric acid</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>(b)(ii)</td>
<td>C calcium carbonate</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>(b)(iii)</td>
<td>An explanation linking two of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- alkali/ base (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- (remedy) reacts with/ reduces/ removes (acid) (1)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- (that is in) excess (1)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- neutralises (acid) / pH raised/ forms water (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- pain removed/relieved (1)</td>
<td></td>
<td></td>
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<tr>
<td>(c)</td>
<td>magnesium nitrate / Mg(NO$_3$)$_2$ (1) water / H$_2$O (1)</td>
<td>Reject hydrogen oxide</td>
<td>(2)</td>
</tr>
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Q2.

<table>
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<tr>
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<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)(i)</td>
<td>to warn (of danger) / internationally recognised / so the correct precautions can be taken (1)</td>
<td>(1)</td>
</tr>
<tr>
<td>(a)(ii)</td>
<td>corrosive</td>
<td>(1)</td>
</tr>
<tr>
<td>(b)</td>
<td>B potassium hydroxide</td>
<td>(1)</td>
</tr>
<tr>
<td>(c)</td>
<td>D sodium sulfate</td>
<td>(1)</td>
</tr>
<tr>
<td>(d)(i)</td>
<td>An explanation linking decomposing / breaking down of (compounds/substances) (1) using electrical energy / electricity / d.c. (1)</td>
<td>(2)</td>
</tr>
<tr>
<td>(d)(ii)</td>
<td>chlorine</td>
<td>(1)</td>
</tr>
<tr>
<td>(d)(iii)</td>
<td>A description including use of lighted splint (1) hydrogen burns / (mixture of air and hydrogen) gives a 'pop' (1)</td>
<td>(2)</td>
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<td>(e)</td>
<td>oxygen</td>
<td>(1)</td>
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Q3.

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<th>Answer</th>
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<th>Mark</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>hydrochloric acid $\rightarrow$ hydrogen + chlorine</td>
<td></td>
<td>(1)</td>
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Q4.

<table>
<thead>
<tr>
<th>Answer</th>
<th>Acceptable answers</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>A (electrolysis)</td>
<td>(1)</td>
</tr>
<tr>
<td>(ii)</td>
<td>A description including • lighted splint / ignite gas (1) • (squeaky) pop</td>
<td>(2)</td>
</tr>
</tbody>
</table>