

ACIDS, BASES & TITRATION 4

Q1. The table shows the ions in sodium chloride solution.

Positive ions	Negative ions
hydrogen	chloride
sodium	hydroxide

In industry, some of the waste from the electrolysis of sodium chloride solution is alkaline and has to be neutralised.

(i) Which ion makes the waste alkaline?

(1 mark)

(ii) This waste must be neutralised.

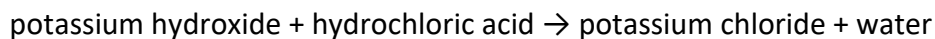
Write the ionic equation for the neutralisation reaction.

(1 mark)

Q2.

(a) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate. The salt called potassium chloride is made when potassium hydroxide solution reacts

with hydrochloric acid.



Describe a method for making crystals of potassium chloride from potassium hydroxide solution and hydrochloric acid.

In this method you should:

(b) Ammonium nitrate is another salt.

Ammonium nitrate is made when ammonia solution is neutralised with an acid. Name the acid to complete the word equation.

ammonia + acid → ammonium nitrate

(1 mark)

(c) Read the information.

Ammonium nitrate – good or bad?

Some farmers put a lot of ammonium nitrate on their farmland.

Many people are worried about this use of ammonium nitrate.

Rainwater can wash the ammonium nitrate off the farmland and into rivers and lakes. The ammonium nitrate may get into drinking water supplies and could be harmful to health.

(i) Why do some farmers put ammonium nitrate on their farmland?

(1 mark)

(ii) Which **one** of the questions in the table cannot be answered by science alone?

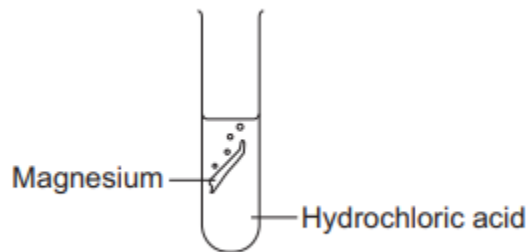
Tick (✓) one question.

Question	Tick (✓)
How much ammonium nitrate is in drinking water?	
Should farmers stop using ammonium nitrate on their farmland?	
Is ammonium nitrate soluble in rainwater?	

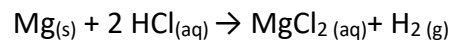
Give two reasons why this question cannot be answered by science alone.

(3 marks)

Q3. A student investigated the reaction between magnesium and hydrochloric acid.



The equation for the reaction is:



Give two observations the student could make during the reaction.

(2 marks)

Q4. Ammonia dissolves in water to produce an alkaline solution.

(i) Which ion makes ammonia solution alkaline?

(1 mark)

(ii) Name the type of reaction between aqueous ammonia solution and an acid.

(1 mark)

(iii) Name the acid needed to produce ammonium nitrate.

(1 mark)

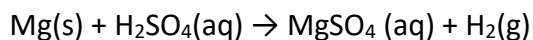
(iv) The reaction of ammonia with sulfuric acid produces ammonium sulfate.

Write the formula of ammonium sulfate.

(1 mark)

Q5. Magnesium sulfate is a salt of magnesium.

It can be prepared by the reaction of magnesium metal with an acid. The equation for the reaction of magnesium with this acid is:



(i) Name the acid used to make magnesium sulfate.

(1 mark)

(ii) Use the equation to help you to describe what you would observe when magnesium reacts with the acid.

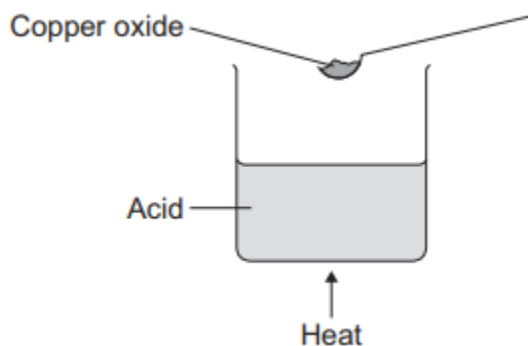
(2 marks)

Q6. A student added copper oxide to an acid to make copper sulfate.

The student heated the acid.

The student added copper oxide until no more reacted.

The diagram shows the first stage in the experiment.



(i) Complete the word equation.

Copper oxide + acid → copper sulfate + water

(1 mark)

(ii) Which one of these values could be the pH of the acid?

Draw a ring around the correct answer.

1 7 11

(1 mark)

(iii) Why is the acid heated?

(1 mark)

(iv) After the reaction is complete, some solid copper oxide remains. Why?

(1 mark)

Q7. This label was taken from a cola drink.



The pH of this drink is 2.5.

(a)(i) Which one of the ingredients in the cola drink causes the low pH?

(1 mark)

(ii) Draw a ring around the name of the ion that gives the cola drink its low pH.

chloride

hydrogen

hydroxide

sodium

(1 mark)

(b) Reaction A is a neutralisation reaction.

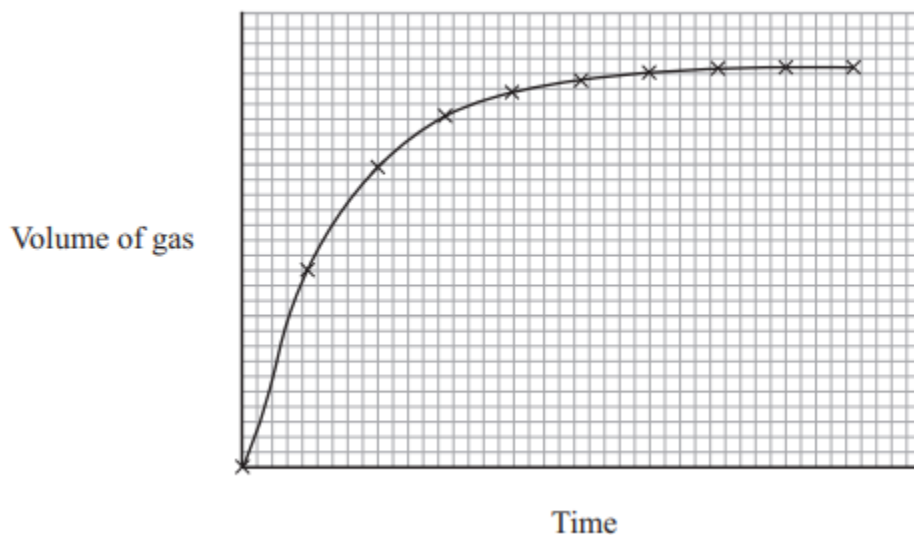
Complete the equation by writing the formula of the product.



(1 mark)

Q8. Pieces of zinc react with dilute acid to form hydrogen gas.

The graph shows how the volume of hydrogen gas produced changes with time.



Describe, as fully as you can, how the volume of gas produced changes with time.

(2 marks)

Q9. Sulfuric acid reacts with metals to produce salts.

(i) A student concluded that potassium would not be a suitable metal to react with sulfuric acid. Explain why.

(2 marks)

(ii) A student reacted zinc metal with sulfuric acid to produce a salt and another product.

Complete the equation for this reaction.



(2 marks)

Total marks (35)