# Sec1 Sci C7c EQ 2010 to 1995 Acids and Alkalis 70marks TestB 7E

**Q1.**          pH paper is used to show whether a solution is acidic, neutral or alkaline.

          One type of pH paper shows the following range of colours.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **colour of pH paper** | red | orange | yellow | green | blue | purple |
| **pH value** | 0 - 4 | 5 | 6 | 7 | 8 - 10 | 11 - 14 |

          Some solutions were tested with pH Paper. The results are shown below.

(a)     Complete the following table by placing a tick in the correct column for each substance.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **substance** | **colour of pH paper** | **acidic** | **neutral** | **alkaline** |
| **orange juice** | red |   |   |   |
| **egg white** | blue |   |   |   |
| **oven cleaner** | purple |   |   |   |
| **milk** | yellow |   |   |   |

 4 marks

(b)     Which substance was the most alkaline?

.....................................................................................................................

1 mark

(c)     Equal amounts of egg white and milk are mixed. What is the most likely pH of the mixture?

Tick the correct box.

              pH2          pH6          pH7         pH14

                      

1 mark

**Q2.**          (a)     Vinegar is sometimes put on chips. It has a sharp, sour taste.

          What does the taste tell you about vinegar?

          Tick the correct box.

It contains salt.              

It contains sugar.          

It is an acid.                   

It has turned bad.          

1 mark

(b)     Washing soda crystals react with acid to give off carbon dioxide.

          If you added some washing soda crystals to vinegar,what would you **see** happening?

.....................................................................................................................

1 mark

(c)     Red cabbage can be used to test for acids and alkalis. It is bright red in acids and purple in alkalis.

(i)      What colour is it in lemon juice?

.............................................................................................................

1 mark

(ii)     Complete the sentence below.

         Substances which change colour when you add acid or alkali are

         called ..............................

1 mark

(d)     The labels have fallen off two bottles. The labels say ‘Distilled Water’ and ‘Sulphuric Acid’.



(i)      Why should you **not** taste the liquids to see which is which?

.............................................................................................................

.............................................................................................................

1 mark

(ii)     You can use some washing soda crystals to find out what is in each bottle. Describe what you would **do** and what you would **see** in each case.

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.............................................................................................................

2 marks

Maximum 7 marks

**Q3.**          (a)     Neutral litmus paper is:

         purple in neutral solutions;

red in acids;

blue in alkalis.

          Use this information to answer the questions.

(i)      A piece of neutral litmus paper turned red in some grapefruit juice.  What does this show about the grapefruit juice?

.............................................................................................................

1 mark

(ii)     Gwen added drops of sodium hydroxide solution to the grapefruit juice. The litmus paper soon turned blue. What does the blue colour show about the sodium hydroxide solution?

.............................................................................................................

1 mark

(iii)     Gwen then tested some water with a new piece of neutral litmus paper. The pH of the water was 7. What colour was the litmus paper in the water.

.............................................................................................................

1 mark

(b)     What name is given to the reaction between an acid and an alkali?

          Tick the correct box.

distillation                                

neutralisation                          

precipitation                            

separation                              

1 mark

Maximum 4 marks

**Q4.**          Dilute acids react with many things.

Tick the **four** boxes by the correct descriptions.

Tick no more than **four** boxes.

|  |  |
| --- | --- |
| Acids always dissolve glass. |  |
| Acids can be burned as fuels. |  |
| Acids damage teeth. |  |
| Acids react with metals such as magnesium. |  |
| Acids turn universal indicator solution blue. |  |
| Acids may harm your skin. |  |
| Acids react with limestone. |  |
| Acids are always poisonous. |  |

4 marks

**Q5.**          The chart is taken from a bottle of *Johnson’s pH5.5 Facial Wash*.



(a)     From the information in the chart give:

(i)      a substance which is almost neutral.

.............................................................................................................

1 mark

(ii)     the substance which is most alkaline.

.............................................................................................................

1 mark

(b)     Tick **one** box to describe Johnson’s facial wash.

|  |  |
| --- | --- |
| It is very alkaline. |  |
| It is slightly alkaline. |  |
| It is neutral. |  |
| It is slightly acidic. |  |

1 mark

(c)     A bee sting is acidic. Which **one** of the substances given in the chart would be best to neutralise the sting?

....................................................................................................................

1 mark

**Q6.**          The table below gives information about four gases. It shows the volume of each gas that will dissolve in 1000 cm3 of water at two different temperatures.



Use the information in the table to answer the following questions.

(a)     (i)      Which **one** of the four gases is the most soluble at 60°C?

.............................................................................................................

1 mark

(ii)     Which **one** of the four gases is the least soluble at 20°C?

.............................................................................................................

1 mark

 (b)     How does a rise in temperature affect the amount of gas which will dissolve?

......................................................................................................................

......................................................................................................................

1 mark

(c)     The table below shows the pH of a solution of each of the four gases.



Which gas dissolves in water to form:

(i)      an acid? ..............................................................................................

1 mark

(ii)     an alkali? ............................................................................................

1 mark

(iii)     a neutral solution? ..............................................................................

1 mark

**Q7.**          Owen used litmus paper to find out if six different liquids were **acidic**, **alkaline** or **neutral**. He dipped pieces of litmus paper into each liquid.

He wrote some of his results in the table below. Complete the table of results.



5 marks

**Q8.**          The table shows the pH of five soil samples.

|  |  |
| --- | --- |
| **soil sample** | **pH of soil** |
| A | 6.0 |
| B | 7.5 |
| C | 7.0 |
| D | 4.5 |
| E | 8.0 |

          Use letters from the table to answer questions (a), (b) and (c).

(a)     Which soil sample is neutral? ............................

1 mark

(b)     (i)      Most types of heather grow better in acidic soil.

In which of the soil samples should heather grow well? .........................

1 mark

(ii)     Cabbage grows better in alkaline soil. In which

of the soil samples should cabbage grow well? ......................................

1 mark

(c)     Lime is an alkaline substance which is sometimes put onto acidic soils.

What type of reaction takes place between the lime and the acid?

.............................................................

1 mark

Maximum 4 marks

**Q9.**          (a)     Sunil picked yellow, red and purple primula flowers from his garden.

He dipped the different flower petals into water and into two different solutions.

The pH of one solution was 1 and the pH of the other was 10.

The table shows the results.

|  |  |  |  |
| --- | --- | --- | --- |
| **colour of****flower petals** | **in solutions of****pH 1** | **in water****pH 7** | **in solution of****pH 10** |
| yellow | stayed yellow | stayed yellow | stayed yellow |
| red | stayed red | stayed red | turned green |
| purple | turned pink | stayed purple | turned blue |

          Which colour of flower petal would be most useful to make an indicator for **both** acids **and** alkalis?  Explain your answer.

......................................................................................................................

......................................................................................................................

......................................................................................................................

2 marks

          Sunil crushed petals from each flower separately in some liquid and poured off the coloured solutions. Then he put drops of each coloured solution into the middle of different pieces of filter paper.



          The solutions spread out on the filter paper. The diagrams show his results.



(b)     What is the name of this method of investigating coloured substances?

..................................................................

1 mark

(c)     Sunil made notes on his experiment. Some words are missing.

Complete the sentences.

|  |
| --- |
| When I crushed a flower in a liquid it produced a coloured solution.This is because a coloured substance had ......................……….. in theliquid. This shows that the liquid is a .............................................. for thesecoloured substances.My experiment shows that one of the flowers probably contained twocoloured substances. This was the ......................……….. flower. |

3 marks

**Q10.**          (a)     Many chemicals are dangerous if not used carefully.

Read the **two** hazard descriptions. Look at the hazard labels.

Draw a line from each description to the correct label.



2 marks

(b)     The label on a bottle of kitchen cleaner says:

**It leaves kitchen and bathroom surfaces bright and shiny.**

          Another part of the label says:

                             **Contains sulphamic acid**

                            **Irritating to eyes and skin**

                          **Keep out of reach of children**

(i)      The chart shows the colour of universal indicator in different solutions.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **type of solution** | strongly acidic | weakly acidic | neutral | weakly alkaline | strongly alkaline |
| **colour of universal indicator** | red | orange | green | blue | purple |

         What colour will the kitchen cleaner turn universal indicator?

..................................................................……….

1 mark

(ii)     Which hazard label do you expect to see on the bottle?

Write the correct letter from the list above.

............................................…

1 mark

**Q13.**          Water from red cabbage can be used to find out if a liquid is acidic, alkaline or neutral.

|  |  |
| --- | --- |
| **Type of liquid added to****the cabbage water** | **colour of****the cabbage water** |
| acidic | red |
| alkaline | blue |
| neutral | purple |

          John added three different liquids to the cabbage water.

(a)     Use the information above to complete the table below.

|  |  |  |
| --- | --- | --- |
| **Liquid added to the****cabbage water** | **colour of****the cabbage water** | **Is the liquid****acidic, alkaline or****neutral?** |
| water | purple |   |
| lemon juice |   | acidic |
| washing up liquid | blue |   |

3 marks

(b)     What word describes chemicals which change colour in acids or alkalis?

Tick the correct box.

filters                              indicators   

liquids                             solids          

1 mark

**Q14.**         The diagrams show two different types of apparatus for measuring volumes of liquid.

Each piece of apparatus contains some dilute hydrochloric acid.



*not to scale*

(a)     What is the name of apparatus B?

……………………………………………………………………………………….

1 mark

(b)     What is the volume of dilute hydrochloric acid in:

(i)      apparatus A?       …………..….. cm3

1 mark

(ii)     apparatus B?       ..…………….. cm3

1 mark

(c)     (i)      Wayne wants to add exactly 3 cm3 of dilute hydrochloric acid to some chalk in a beaker.

         How can he remove exactly 3 cm3 of the acid from apparatus A?

…………………………………………………………………………………

…………………………………………………………………………………

2 marks

(ii)     Wayne adds the acid to the chalk. He sees bubbles.

Which **two** things does this show? Tick **two** boxes.

|  |  |  |  |
| --- | --- | --- | --- |
| A gas is produced. |  | Chalk is a gas. |  |
| Chalk is an acid. |  | The acid reacts with the chalk. |  |
| The acid is boiling. |  |   |   |

2 marks

**Q15.**          Bees and wasps are both insects which use a sting as part of their defence.

The pH values of their stings are shown on the diagrams.

                 

bee                                                                 wasp

bee sting, pH 2                                               wasp sting, pH 10

(a)     Complete the table below to show whether the stings are acidic or alkaline and what colour they would turn universal indicator paper.



2 marks

(b)     The table below shows five household substances and the pH of each substance

|  |  |
| --- | --- |
| **name of substance** | **pH of substance** |
| bicarbonate toothpaste | 8 |
| lemon juice | 3 |
| vinegar | 4 |
| washing soda | 11 |
| water | 7 |

          Give the name of **one** substance in the table which would neutralise each sting.

(i)      bee sting .............................................................................................

1 mark

(ii)     wasp sting ...........................................................................................

1 mark

**Q17.**          Ben put a beaker weighing 50 g on a balance. He added 50 g of dilute hydrochloric acid and

2.5 g of calcium carbonate to the beaker.

The total mass of the beaker and its contents was 102.5 g.



(a)     The hydrochloric acid reacted with the calcium carbonate. How could Ben tell that a chemical reaction was taking place in the beaker?

.....................................................................................................................

1 mark

(b)     The word equation for the reaction which took place is:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| hydrochloricacid | + | calciumcarbonate |  | calciumchloride | + | carbondioxide | + | water |

          When the reaction stopped, the total mass had decreased from 102.5 g to 101.4 g.

Some water had evaporated from the beaker.What else caused the drop in mass?

Use the word equation to help you answer the question.

.....................................................................................................................

1 mark

(c)     When the reaction stopped, Ben tested the contents of the beaker with universal indicator paper. The calcium carbonate had neutralised the acid. What is the colour of universal indicator paper in a neutral solution?

..........................................

1 mark

(d)     Which **two** materials in the list below are mainly calcium carbonate?

Tick the **two** correct **boxes.**

|  |  |
| --- | --- |
| coal |  |
| glass |  |
| limestone |  |
| marble |  |
| sandstone |  |

2 marks

(e)     Metals react with acids.

What gas is produced when a metal reacts with an acid?

.....................................................

1 mark

Maximum 6 marks

**Q18.**          The pH scale shown below is used to measure how acidic or alkaline a solution is.



          The graph below shows how the pH of the liquid in Barry's mouth changed as he ate a meal.



(a)     (i)      Use the **graph** to give the pH of the liquid in Barry's mouth before he started to eat.

pH  ..................

1 mark

(ii)     What does this pH tell you about the liquid in Barry's mouth before he started to eat?

         Use the **pH scale** above to help you.

Tick the correct box.

    It was acidic.         It was alkaline.     It was colourless.     It was neutral.

                                                              

1 mark

(b)     Look at the **graph** above.

What happened to the pH of the liquid in Barry's mouth as he ate the meal?

.....................................................................................................................

1 mark

(c)     Barry chews special chewing gum after each meal. The chewing gum neutralises the liquid in his mouth.

          What type of substance neutralises an acid?

Tick the correct box.

an acid                                 an alkali     

            an indicator                                   a solid     

1 mark

Maximum 4 marks

**Q19.**          A pupil used a sensor to record the change in pH of 10 cm3 of an acid solution when an alkali solution was added a little at a time. The concentrations of the alkali and acid solutions were fixed.

                   

          His results are shown in the table below.

|  |  |
| --- | --- |
| **volume of alkali added (cm3)** | **pH of resulting mixture** |
| 0.0 | 5.0 |
| 2.0 | 5.0 |
| 4.0 | 5.0 |
| 6.0 | 5.5 |
| 8.0 | 6.0 |
| 10.0 | 7.0 |
| 12.0 | 8.0 |
| 14.0 | 8.5 |
| 16.0 | 9.0 |
| 18.0 | 9.0 |
| 20.0 | 9.0 |

 (a)     Use his results to draw a graph on the grid below.

•     Label the axes.

•     Plot the points.

•     Draw a smooth curve.



4 marks

(b)     Look at the graph.

What would be the likely pH of the solution if the pupil added a further 2 cm3 of alkali solution?

...............

1 mark

**Q20.**          Hydrochloric acid is a strong acid.

(a)     Winston used universal indicator solution to find the pH of some hydrochloric acid.

(i)      Suggest the **colour** of the mixture of universal indicator solution and the hydrochloric acid.

...........................................................

1 mark

(ii)     Suggest the **pH** of the hydrochloric acid.

...............

1 mark

(b)     Indigestion can be caused when too much hydrochloric acid is produced in the stomach.

Magnesium carbonate can be used to treat indigestion.

          Winston crushed some indigestion tablets containing magnesium carbonate. He added them to hydrochloric acid in a test-tube. The mixture fizzed.

                             

          The word equation for the reaction is shown below.

          magnesium + hydrochloric → magnesium + carbon + water

  carbonate          acid                 chloride      dioxide

(i)      Use the word equation to explain why the mixture fizzed when the reaction took place.

.............................................................................................................

.............................................................................................................

1 mark

(ii)     Winston continued to add crushed tablets to the acid until the mixture stopped fizzing.

Why did the fizzing stop?

.............................................................................................................

.............................................................................................................

1 mark

(c)     When magnesium carbonate reacts with hydrochloric acid, magnesium chloride is formed.

          Which **two** words describe magnesium chloride?

Tick the **two** correct boxes.

a compound                     a mixture    

an element                       a salt          

a metal                             a solvent     

2 marks

(d)     It is important that the hydrochloric acid in the stomach is **not** completely neutralised by indigestion tablets.

          Why is hydrochloric acid needed in the stomach?

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.....................................................................................................................

1 mark

**Q21.**          A scientist compared the acidity of four gases to see which gas might cause acid rain.

She used four balloons to collect the gases.

She then bubbled the gases, in turn, through a fresh sample of green, neutral,

universal indicator solution.



(a)     Three of the gases caused the indicator to change colour.

The scientist added drops of alkali to the indicator until the indicator changed back to green.

Her results are shown in the table below.

|  |  |  |
| --- | --- | --- |
| **gases****collected** | **change in colour****of indicator** | **number of drops of alkali needed to change the indicator back to green** |
| exhaust gasesfrom a car | green to red | 31 |
| carbon dioxide | green to red | 160 |
| air | no change | 0 |
| human breath | green to yellow | 10 |

          Use information in the table to answer part (i) and part (ii) below.

(i)      Which gas dissolved to form the most acidic solution?

...........................................................

         Explain your choice.

.............................................................................................................

1 mark

(ii)     Which gas formed a neutral solution?

...........................................................

         Explain your choice.

.............................................................................................................

1 mark

(iii)     What effect does an alkali have on an acid?

.............................................................................................................

1 mark

(b)     Some metals react with acids in the air.

Complete the word equation for the reaction between zinc and hydrochloric acid.

zinc + hydrochloric → ........................................ + ........................................

      acid

2 marks

**Q22.**          Molly used a pH sensor to test different liquids. She dipped the probe of the sensor

into each liquid and recorded the pH value in a table.

                        

(a)     In the table below, tick **one** box for each liquid to show whether it is **acidic**,

**neutral** or **alkaline**. One has been done for you.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **liquid** | **pH value** | **acidic** | **neutral** | **alkaline** |
| alcohol | 7 |   |   |   |
| dilute hydrochloric acid | 2 |  |   |   |
| distilled water | 7 |   |   |   |
| vinegar | 3 |   |   |   |
| sodium hydroxide solution | 11 |   |   |   |

2 marks

(b)     Between each test Molly dipped the probe into distilled water.

(i)      Why did she do this?

.............................................................................................................

1 mark

(ii)     Which other liquid in the table could Molly use between tests to have the

same effect as distilled water?

.............................................................................................................

1 mark

(c)     Molly put a piece of magnesium into a test-tube containing 20 cm3 of vinegar.

She put another piece of magnesium into a test-tube containing 20 cm3 of dilute

hydrochloric acid.



(i)      Molly thought that magnesium would react more vigorously with

hydrochloric acid than with vinegar.

What information in the table made Molly think this?

.............................................................................................................

.............................................................................................................

1 mark

(ii)     How would Molly be able to tell if a more vigorous reaction took place with

hydrochloric acid than with vinegar?

.............................................................................................................

.............................................................................................................

1 mark

(d)     (i)      Complete the word equation for the reaction between magnesium and

hydrochloric acid.

         magnesium + hydrochloric → .................................. + ........................

                                                          acid

2 marks

(ii)     After some time this reaction stopped. Why did the reaction stop?

.............................................................................................................

.............................................................................................................

1 mark

maximum 9 marks

**Q23.**          Table 1 below shows the colour of universal indicator in acidic, neutral and alkaline

solutions.

|  |  |  |  |
| --- | --- | --- | --- |
|   | **acidic** | **neutral** | **alkaline** |
| **colour of indicator** | red | orange | yellow | green | blue | darkblue | purple |
|  |  |  |  |  |  |  |  |

                                               **table 1**

          Ramy tested different liquids with the indicator solution.

His results are shown in table 2 below.

|  |  |
| --- | --- |
| **liquid** | **colour of indicator solution** |
| Milk | green |
| lemonade | orange |
| water | green |
| fruit juice | red |
| washing-up liquid | blue |

                                               **table 2**

(a)     Use Ramy’s results to answer the following questions.

(i)      Give the name of **one** acidic liquid in **table 2**.

.............................................................................................................

1 mark

(ii)     Give the name of **one** neutral liquid in **table 2**.

.............................................................................................................

1 mark

(b)     Ramy dissolved some bicarbonate of soda in distilled water.

This produced an alkaline solution.

(i)      Ramy added the indicator to the alkaline solution.

         Suggest what colour the indicator became.

Use **table 1** to help you.

................................................................

1 mark

(ii)     Ramy added lemon juice to the solution of bicarbonate of soda.

                        

         How could he tell that a gas was produced?

.............................................................................................................

1 mark

(c)     Ramy mixed an acid with an alkali and tested the mixture with the indicator

solution.

The indicator solution turned green.

          What is the name of the reaction between an acid and an alkali?

Tick the correct box.

                          condensation       

                          crystallisation       

                          evaporation          

                          neutralisation       

1 mark

maximum 5 marks

**Q25.**          The word equation for the reaction between magnesium carbonate and hydrochloric

acid is shown below.

          magnesium   +   hydrochloric   →magnesium    +     carbon   +    water

          carbonate                  acid                   chloride               dioxide

(a)     Sadiq added hydrochloric acid to magnesium carbonate in a flask.



(i)      Suggest the pH of hydrochloric acid.

..................

(ii)     The carbon dioxide produced was bubbled through lime water.

         How would the lime water change?

................................................................................................................

2 marks

 (c)     Sadiq made a model volcano.

He put magnesium carbonate into the model.

He added vinegar and a drop of washing-up liquid.



          The mixture fizzed, and froth poured out of the model volcano.

(i)      The vinegar reacted with the magnesium carbonate.

         Suggest the pH of vinegar.

.............

(ii)     The froth running down the side of the model represents part of a real

volcano.

Give the name of this part.

..................................................................

2 marks

**Q26.**          Paul had four substances:



          He dissolved 1 g of each substance in 20 cm3 of distilled water.

He used universal indicator to find the pH of each solution.

(a)     (i)      Sugar solution does **not** change the colour of green universal indicator.

         What does this tell you about sugar solution?

Tick the correct box.

          It is an acid.                    It is an alkali.   

          It is neutral.                    It is sweet.       

1 mark

(ii)     Suggest the pH of citric acid.

............

1 mark

(iii)     Indigestion tablets neutralise acid in the stomach.

         What does this tell you about indigestion tablets?

...............................................................................................................

1 mark

(b)     Complete the flow chart below with the names of the substances in the boxes.





3 marks

**Q27.**          (a)     The chemical formula for hydrochloric acid is HCl.

The chemical formula for sodium hydroxide is NaOH.

          When they react together, two products are formed.

The chemical formula for one product is NaCl.

(i)      Complete the word equation below with the **names** of both products.

1 mark

(ii)     **On the dotted line**, give the chemical formula of the other product.

             sodium     +   hydrochloric     \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   +   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

           hydroxide               acid

              NaOH                  HCl                                 NaCl                          ...............

2 marks

(b)     In experiment 1, Molly put two beakers on a balance.

One contained 20 cm3 of hydrochloric acid.

The other contained 20 cm3 of sodium hydroxide solution.

The total mass was 163.5 g.



          She poured the acid onto the sodium hydroxide. They reacted.

          

          Why did the reading on the balance **not** change?

........................................................................................................................

........................................................................................................................

1 mark

(c)     In experiment 2, Molly put two beakers on a balance.

One contained 20 cm3 of hydrochloric acid.

The other contained 5 g of sodium carbonate.



          She poured the acid onto the sodium carbonate. They reacted. Two of the products are the same as in experiment 1.

(i)      Complete the word equation with the names of the **three** products.

    sodium  +   hydrochloric  → .......................... + .......................... + ..........................

  carbonate            acid

1 mark

(ii)     The total mass at the start was 149.0 g.

When the reaction stopped, the reading on the balance was 147.0 g.

         Why was there a loss of mass in this reaction?

...............................................................................................................

1 mark

**Q28.**          (a)     The table below shows the pH of four acidic liquids.

|  |  |
| --- | --- |
| **acidic liquid** | **pH** |
| grapefruit juice | 3.1 |
| ethanoic acid | 3.0 |
| lemonade | 4.4 |
| dilute hydrochloric acid | 1.0 |

          Which of these liquids is the **least** acidic?

1 mark

(b)     Emilio cooked an egg until it was hard-boiled.

He put the egg in a beaker of dilute hydrochloric acid as shown.

                     

(i)      The egg shell reacted completely with the acid.

After two days the pH of the liquid in the beaker was 2.5.

         How did the **acidity** of the liquid in the beaker change?

Use the table above to help you.

..................................................

1 mark

(ii)     Emilio put another hard-boiled egg in some ethanoic acid.

It took longer for the shell to react completely.

         Use the table opposite to suggest a reason for this.

...............................................................................................................

...............................................................................................................

1 mark

(c)     The chemical formulae for four acids are shown in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **sulphuric acid** | **hydrochloric acid** | **nitric acid** | **ethanoic acid** |
| H2SO4 | HCl | HNO3 | CH3COOH |

(i)      Give the **name** of the element that is present in all four acids.

..................................................

1 mark

(ii)     Give the **names** of the two **other** elements present in sulphuric acid.

1. ................................................

1 mark

2. ................................................

1 mark

(iii)     How many atoms are there in the formula HNO3 (nitric acid)?

...................

1 mark

**Q29.**          Michelle added some universal indicator solution to four liquids.

          Michelle uses the pH chart to fill in her table of results.

                                                                         **pH chart**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **pH** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **colour** | red | orange | green | blue | purple |

(a)     The table below shows some of Michelle’s results.

          Complete Michelle’s table of results below.

Use the pH chart to help you.

|  |  |  |
| --- | --- | --- |
| **liquid** | **colour of universal indicator solution** | **pH** |
| milk | green |   |
| rain water |   | 5 |
| hydrochloric acid | red |   |
| bleach |   | 11 |

2 marks

(b)     Explain why using acids can be dangerous.

........................................................................................................................

........................................................................................................................

1 mark

(c)     Michelle measured the pH of some milk stored at room temperature for five days.

          The graph of Michelle’s results is shown below.

One of the axes has been labelled.

                                 

1 mark

(i)      Write the axis label for the graph **at X.**

(ii)     Use the graph. How does the pH of the milk change over the five days?

...............................................................................................................

1 mark

maximum 5 marks

**M1.**          (a)

|  |  |  |  |
| --- | --- | --- | --- |
| **substance** | **acidic** | **neutral** | **alkaline** |
| **orange juice** | \*   |   |   |
| **egg white** |   |   | \*   |
| **oven cleaner** |   |   | \*   |
| **milk** | \*   |   |   |

*if more than one box is ticked in any row*

*award no mark for that row*

*do* ***not*** *accept a tick in ‘neutral’*

**4**

(b)     oven cleaner

**1**

(c)     pH7

**1**

**[6]**

**M2.**          (a)     It is an acid 

*if more than one box is ticked, award no mark*

**1 (L3)**

(b)     bubbling

*accept ‘fizzing’* ***or*** *‘froth’* ***or*** *‘effervescence’*

***or*** *‘gas given off’* ***or*** *‘carbon dioxide given off’*

*do* ***not*** *accept ‘a reaction’*

**1 (L3)**

(c)     (i)      red **or** bright red

**1 (L3)**

(ii)     indicators

**1 (L3)**

(d)     (i)      acid can be poisonous **or** burn **or** is dangerous **or** harmful

*accept ‘it makes you ill’* ***or*** *‘it is corrosive’*

***or*** *‘because it might be acid’*

*do* ***not*** *accept ‘it will kill you’*

**1 (L4)**

(ii)     **the answer should refer to the use of washing soda crystals**

**with both liquids**

any **one** from

•    pour some of the liquid from each bottle onto the washing soda

•    add washing soda to a sample from each bottle

*do* ***not*** *accept ‘ add washing soda to each bottle’*

**1 (L4)**

any **one** from

•    one bubbles and one does not

*accept ‘one of them bubbles’*

•    one gives off carbon dioxide and one does not

*accept ‘one of them gives off carbon dioxide’*

•    the acid bubbles **or** gives off carbon dioxide

*do* ***not*** *accept ‘it bubbles’* ***or*** *‘it gives off carbon dioxide’*

•    the water does **not** bubble **or** give off carbon dioxide

**1 (L4)**

**[7]**

**M3.**          (a)     (i)      acid **or** acidic

*accept ‘has acid in it’*

*do* ***not*** *accept ‘more acid than alkali’*

**1 (L3)**

(ii)     alkali **or** alkaline

*accept ‘it neutralises acid’*

*do* ***not*** *accept ‘turns the  acid into an alkali’*

**1 (L3)**

(iii)     purple

**1 (L3)**

(b)     neutralisation 

*if more than one box is ticked, award no mark*

**1 (L4)**

**[4]**

**M4.**          Acids damage teeth 

**1 (L4)**

Acids react with metals such as magnesium 

**1 (L4)**

Acids may harm your skin. 

**1 (L4)**

Acids react with limestone. 

**1 (L4)**

*i.e. ticks in the third, forth, sixth and seventh boxes*

*if more than four boxes are ticked, deduct one mark*

*for each incorrectly ticked box*

*minimum mark zero*

**[4]**

-

**M5.**          (a)     (i)      any **one** from

•    soap with moisturisers

*do* ***not*** *accept ‘soap’* ***or*** *‘pH 7.3’*

•    normal facial wash

**1 (L5)**

(ii)     normal soap

*do* ***not*** *accept ‘soap’* ***or*** *‘pH 10.0’*

**1 (L5)**

(b)     It is slightly acidic. 

*if more than one box is ticked award no mark*

**1 (L5)**

(c)     normal soap

*do* ***not*** *accept ‘soap’* ***or*** *pH 10.0’*

**1 (L5)**

**[4]**

**M6.**          (a)     (i)      hydrogen chloride

**1 (L3)**

(ii)     oxygen

**1 (L3)**

(b)     less gas will dissolve

*accept ‘it gets less’ or ‘lowers it’*

*do* ***not*** *accept ‘it dissolves less quickly’*

**1 (L4)**

(c)     (i)      any **one** from

•    carbon dioxide

*accept ‘CO2’*

•    hydrogen chloride

*accept ‘HCl’*

**1 (L4)**

(ii)     ammonia

*accept ‘NH3’*

**1 (L4)**

(iii)     oxygen

*accept ‘O2’*

*do* ***not*** *accept ‘O’’*

**1 (L4)**

**[6]**

**M7.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **liquid** | **what happened to blue litmus paper?** | **what happened to red litmus paper?** | **is the liquid acidic, alkaline or neutral?** |   |   |
| lemon juice | went red | stayed red | acidic |   |   |
| water | stayed blue | stayed red | **neutral** |   | 1 |
| sodiumhydroxidesolution | stayed blue | went blue | **alkaline** |   | 1 |
| alchohl | **stayed blue** | **stayed red** | neutral | **both** answers arerequired for the mark | 1 |
| ammoniasolution | **stayed blue** | went blue | **alkaline** | **both** answers are required for the mark | 1 |
| sour milk | went red | **stayed red** | **acidic** | **both** answers are required for the mark | 1 |

**(L4)**

*accept ‘blue’* ***or*** *‘did not change’ for stayed blue*

*accept ‘red’* ***or*** *‘did not change’ for stayed red*

*accept ‘alkali’ for alkaline*

*accept ‘acid’ for acidic*

*do* ***not*** *accept ‘went blue’ for stayed blue*

*do* ***not*** *accept ‘went red’ for stayed red*

**[5]**

**M8.**          (a)     C

**1 (L5)**

(b)     (i)      A **or** D

**1 (L5)**

(ii)     B **or** E

**1 (L5)**

(c)     neutralisation

**1 (L5)**

**[4]**

**M9.**          (a)     purple

**1**

          any **one** from

•    it changes colour in both acids and alkalis

*do* ***not*** *accept ‘it changes colour in acids’*

***or*** *‘it changes colour in alkalis’*

•    it goes pink in acid or pH1 and blue in alkaline or pH10

**1**

(b)     chromatography

**1**

(c)     dissolved

*answers must be in the correct order*

*do* ***not*** *accept ‘made a solution’*

**1**

          solvent

**1**

          red

*accept ‘second’*

**1**

**[6]**

**M10.**          (a)

          

*award one mark for each correct line if more than one*

*line has been drawn from a hazard description box,*

*award no mark for any of the lines from that box.*

**2**

(b)     (i)      red **or** orange

*accept ‘yellow’*

**1**

(ii)     Q

*accept a drawing of the correct hazard label*

*accept ‘X’*

*accept ‘T’*

**1**

**[4]**

**M11.**          (a)     any **one** from

•    amylase is denatured **or** destroyed

•    enzymes work best at the right pH

*accept ‘enzymes only work at the right pH’*

*do* ***not*** *accept ‘enzymes do* ***not*** *work at this pH’*

*do* ***not*** *accept ‘amylase does* ***not*** *work at this pH’*

*do* ***not*** *accept ‘amylase is killed at that pH’*

**1**

(b)     (i)      an alkali

*accept ‘strongly* ***or*** *weakly alkaline’*

**1**

(ii)     neutralisation

*do* ***not*** *accept ‘digestion’*

**1**

(c)     (i)      any **one** from

•    blood sugar level does not rise as high after eating pasta

*accept ‘blood sugar is lower’*

*do* ***not*** *accept ‘there is* ***not****as much starch in pasta’*

•    amount of insulin produced is related to the blood sugar level

**1**

(ii)     0.9 mg/cm3

*accept answers from 0.8 mg/cm3 to 1.0 mg/cm3*

*the unit is required for the mark*

**1**

**[5]**

**M12.**          (a)     in tube B: no oxygen

**1 (L5)**

          in tube C: no water **or** water vapour

*accept ‘no air’*

*accept ‘no moisture’*

*accept ‘it was dry’ or ‘it was not wet’*

**1 (L5)**

(b)     (i)      acidic

**1 (L5)**

(ii)     hydrogen

**1 (L6)**

(c)     (i)      it increased **or** it was more

*accept ‘it was heavier’*

**1 (L6)**

(ii)     any **one** from

•    oxygen **or** water was added

•    the oxygen has mass

•    rust contains iron and oxygen **or** water

*accept ‘rust is iron oxide’*

•    the iron reacted with oxygen **or** water

**1 (L6)**

(d)     **Answers must refer to either test-tube D or to sea water.**

          any **one** from

•    the nail was more rusty in D than in A

*accept ‘D was the only one which was rusty’*

*accept ‘D was very rusty’*

•    it was more rusty in sea water

•    sea water contains salt

**1 (L6)**

**[7]**

**M13.**          (a)

|  |  |  |
| --- | --- | --- |
| **Liquid added to the cabbage water** | **Colour of the cabbage water** | **Is the liquid acidic, alkaline or neutral?** |
| water | purple | neutral |
| lemon juice | red | acidic |
| washing up liquid | blue | alkaline |

**3 (L4)**

(b)     indicators

*if more than one box is ticked, award no mark*

**1 (L3)**

**[4]**

**M14.**          (a)     measuring cylinder

**1 (L3)**

(b)     (i)      4

**1 (L3)**

(ii)     35

**1 (L3)**

(c)     (i)      push the plunger in

*accept ‘squeeze the syringe’*

*do* ***not*** *accept a reference to pouring*

**1 (L3)**

until it reads 1.0 cm3

*accept ‘to 1’*

*award two marks for ‘remove 1 cm3*

*and push the rest into a beaker’*

**1 (L4)**

(ii)     A gas is produced. 

**1 (L3)**

The acid reacts with the chalk. 

*if more than two boxes are ticked,*

*deduct one mark for each incorrect tick*

**1 (L3)**

**[7]**

**M15.**          (a)

|  |  |  |
| --- | --- | --- |
|  | ***acidic or alkaline*** | ***colour of universal indicator paper*** |
| *bee sting**(pH2)* | acidic | red |
| *wasp sting**(pH10)* | alkaline | blueaccept ‘purple’ |

*award one mark for each correct row*

**2 (L5)**

(b)     (i)      any **one** from

•    bicarbonate toothpaste

*accept ‘bicarbonate’* ***or*** *‘toothpaste’*

***or*** *‘hydrogencarbonate’*

•    washing soda

**1 (L5)**

(ii)     any **one** from

•    vinegar

•    lemon juice

**1 (L5)**

**[4]**

**M16.**          (a)     cast iron

*do* ***not*** *accept ‘4.5’*

**1 (L3)**

(b)     (i)      0.8

**1 (L4)**

(ii)     high carbon steel

**1 (L4)**

(c)     (i)      any **one** from

•    for buildings

*accept any other reasonable answer, for*

•    for bridges

*example ‘street lights’* ***or*** *‘fence posts’*

**1 (L4)**

(ii)     any **one** from

•    oxygen

*accept ‘air’*

•    water

*accept ‘moisture’*

**1 (L4)**

**[5]**

**M17.**          (a)     any **one** from

•    it would be fizzing

•    there would be effervescence

•    bubbles would be given off

*accept ‘gas* ***or*** *carbon dioxide would be given off’*

*accept ‘there was a rise in temperature’*

*accept ‘there was a loss of mass’*

**1 (L5)**

(b)     any **one** from

•    carbon dioxide was lost

*accept ‘carbon dioxide was produced’*

*accept ‘gas was given off’*

•    the carbon dioxide had mass

*accept ‘the gas also weighed something’*

**1 (L6)**

(c)     green

**1 (L5)**

(d)     limestone 

**1 (L6)**

marble 

*if more than two boxes are ticked,*

*deduct one mark for each incorrect tick*

*minimum mark zero*

**1 (L6)**

(e)     hydrogen

**1 (L6)**

**[6]**

**M18.**          (a)     (i)      7

*do* ***not*** *accept ‘neutral’*

**1 (L3)**

(ii)     it was neutral 

*if more than one box is ticked, award no mark*

*consequential marking applies*

*accept ‘it was acidic’ if the answer to part (i) was less than 7*

*accept ‘it was alkaline’ if the answer to part (i) was greater*

*than 7 and up to 14*

**1 (L4)**

(b)     any **one** from

•    it decreased **or** went down

*accept ‘it dropped to 5’*

•    it became acidic **or** more acidic

**1 (L3)**

(c)     an alkali 

*if more than one box is ticked, award no mark*

**1 (L4)**

**[4]**

**M19.**          (a)     •    volume or alkali in cm3 on the *x* axis and pH of mixture on the *y* axis

*pupils can gain credit for correct responses to other*

*parts if the axes are wrongly labelled*

**1 (L7)**

•    appropriate scales for volume of alkali and pH of mixture

*this mark cannot be awarded for a non- linear scale*

**1 (L7)**

•    11 points correctly plotted

**1 (L7)**

     smooth curve of best fit

*do* ***not*** *accept a line drawn from point to point*

**1 (L7)**

(b)     9.0

*accept ‘9’*

**1 (L6)**

**[5]**

**M20.**          (a)     (i)      red **or** pink

*accept ‘orange’* ***or*** *‘yellow’*

**1 (L5)**

(ii)     any number greater than 0 and smaller than 7

*accept ‘0’*

**1 (L6)**

(b)     (i)      carbon dioxide is gas

*accept ‘carbon dioxide* ***or*** *a gas is produced’*

**1 (L5)**

(ii)     any **one** from

•    no more carbon dioxide **or** gas was produced

•    the reaction stopped

•    all the hydrochloric acid was used up

*accept ‘the acid had been neutralised’*

*do* ***not*** *accept ‘all the magnesium carbonate was used up’*

•    there was an excess of magnesium carbonate **or** carbonate

**1 (L6)**

(c)     a compound 

**1 (L6)**

         a salt 

*if more than two boxes are ticked, deduct one mark for*

*each incorrect tick*

*minimum mark zero*

**1 (L6)**

(d)     any **one** from

•    without it digestion would stop **or** slow down

*accept ‘to break down food’*

•    acid is needed for digestion

•    the enzymes only work in acid conditions **or** at a low pH

•    it is needed to kill bacteria **or** microbes

*do* ***not*** *accept ‘germs’*

**1 (L6)**

**[7]**

**M21.**          (a)     (i)      carbon dioxide

*accept ‘CO2’*

any **one** from

it took more **or** most alkali to neutralise it

**or** to change the colour of the indicator back to green

*accept ‘it took most drops’* ***or*** *‘it took 160’*

***both*** *the answer and the reason are required for the mark*

**1 (L5)**

(ii)     air

it did not change the colour of the indicator **or** the pH of the solution

*accept ‘no drops* ***or*** *alkali were needed’*

*accept ‘there was no change’*

***both*** *the answer and the reason are required for the mark*

**1 (L5)**

(iii)     any **one** from

•    neutralises it

•    it raises the pH

*accept ‘it makes it less acidic’*

*accept ‘it makes it pH 7’*

*accept ‘it forms a salt’*

*do* ***not*** *accept ‘makes it more alkaline’*

**1 (L6)**

(b)     zinc chloride +

**1 (L6)**

          hydrogen

*answers may be in either order*

**1 (L6)**

**[5]**

**M22.**          (a)

|  |  |  |  |
| --- | --- | --- | --- |
| **liquid** | **acidic** | **neutral** | **alkaline** |
| alcohol |   |  |   |
| dilute hydrochloric acid |  |   |   |
| distilled water |   |  |   |
| vinegar |  |   |   |
| sodium hydroxide solution |   |   |  |

*award one mark for a correct tick for*

***both*** *alcohol and distilled water*

*award one mark for a correct tick for*

***both*** *vinegar and sodium hydroxide solution*

*if more than one column is ticked for any liquid*

*award no mark for the corresponding pair of liquids*

**2 (L5)**

(b)     (i)      any **one** from

•    to clean the probe **or** it

•    to prevent contamination

•    to get an accurate reading

•    so the liquids do not get mixed up

•    it is neutral

*accept ‘to neutralise the probe’* ***or*** *‘so that it does not*

*affect the other liquids’* ***or****’to make it pH 7’*

*‘to make it a fair test’ is insufficient*

**1 (L5)**

(ii)     alcohol

*accept ‘the first* ***or*** *top one’*

**1 (L5)**

(c)     (i)      hydrochloric acid has a lower pH **or** is more acidic

*accept the converse*

*accept ‘vinegar is a weak acid’*

*‘vinegar is a weaker acid’ is insufficient*

**1 (L5)**

(ii)     any **one** from

•    more bubbles would be given off

*accept ‘more bubbles’* ***or*** *‘more fizzing’*

•    bubbles would be given off more rapidly

•    there would be a bigger rise in temperature

*accept ‘there would be a rise in temperature’*

***or*** *‘the test-tube would get hot’*

•    the magnesium would be used up more quickly

**1 (L5)**

(d)     (i)      •    magnesium chloride +

**1 (L6)**

•    hydrogen

*answers may be in either order*

**1 (L6)**

(ii)     any **one** from

•    the acid was used up

*accept ‘there were no reactants left’*

•    the magnesium was used up

*accept ‘one of the reactants has been used up’*

*accept ‘the reaction was complete’*

*do* ***not*** *accept ‘the magnesium had dissolved’*

**1 (L6)**

**[9]**

**M23.**          (a)     (i)      any **one** from

•    lemonade

•    fruit juice

*accept ‘fruit* ***or*** *juice’*

**1 (L3)**

(ii)     any **one** from

•    milk

•    water

**1 (L3)**

(b)     (i)      any **one** from

•    blue

•    dark blue

•    purple

**1 (L3)**

(ii)     any **one** from

•    it bubbled

*accept ‘it fizzed’*

•    bubbles were formed

*accept ‘bubbles’*

*accept ‘effervescence’*

**1 (L3)**

(c)     neutralisation 

*if more than**one**box is ticked, award no mark*

**1 (L4)**

**[5]**

**M24.**          (a)     (i)      filtration 

*if more than one box is ticked, award no mark*

**1 (L3)**

(ii)     chromatography 

*if more than one box is ticked, award no mark*

**1 (L3)**

(b)     (i)      it is alkaline

*accept ‘alkali’*

**1 (L3)**

(ii)     red

**1 (L3)**

(c)     indicator 

*if more than one box is ticked, award no mark*

**1 (L4)**

**[5]**

**M25.**          (a)     (i)      •    a number less than 7

**1 (L5)**

(ii)     •    it would turn milky **or** cloudy

*accept ‘white* ***or*** *chalky’*

**1 (L6)**

(b)     •    magnesium sulphate

**1 (L6)**

(c)     (i)      •    a number less than 7

**1 (L5)**

(ii)     •    lava

*do* ***not*** *accept ‘magma’*

**1 (L5)**

**[5]**

**M26.**          (a)     (i)      •    It is neutral 

*if more than one box is ticked, award no mark*

**1 (L5)**

(ii)     •    any number less than 7

**1 (L6)**

(iii)     any **one** from

•    they are alkaline **or** an alkali

*accept ‘a soluble base’*

*accept ‘it has a pH above 7’*

*specific pH values such as ‘its pH is 8.5’ are insufficient*

•    they react with the acid

**1 (L5)**

(b)     •    

*accept ‘copper sulfate’*

*accept ‘the sulphate’ for ‘copper sulphate’*

•    

*accept ‘acid’ for ‘citric acid’*

•              •    

*accept ‘tablet’ for ‘indigestion tablet’*

*if* ***all four*** *answers are correct, award three marks*

*if* ***two or three*** *answers are correct, award two marks*

*if* ***one*** *answer is correct, award one mark*

**3 (L5)**

**[6]**

-

**M27.**          (a)     (i)      •    sodium chloride + • water

*accept ‘hydrogen oxide’ for water*

*answers must be in the correct order*

**2 (L7)**

(ii)     •    H2O

**1 (L7)**

(b)     any **one** from

•    the same atoms are present in the reactants and the products

*accept ‘mass is conserved’*

*‘the mass did not change’ is insufficient*

*‘the particles are the same’ is insufficient*

*do* ***not*** *accept ‘the molecules are the same’*

•    no gas was given off

*accept ‘nothing was added* ***or*** *lost’*

**1 (L7)**

(c)     (i)      •    sodium chloride

     carbon dioxide

     water

*answers may be in any order*

***all three*** *answers are required for the mark*

**1 (L7)**

(ii)     any **one** from

•    carbon dioxide **or** gas escapes

*‘mass is lost’ is insufficient as it is given in the question*

•    carbon dioxide is a gas

•    one of the products is a gas **or** escapes

**1 (L7)**

**[6]**

**M28.**          (a)     lemonade

*accept ‘4.4’*

**1 (L5)**

(b)     (i)      any **one** from

•    it is less acidic

*accept ‘it is weaker’*

*do* ***not*** *accept ‘it has become more alkaline’*

*accept ‘it decreases’*

•    its pH has increased

*accept ‘it has gone from 1.0 to 2.5’*

*do* ***not*** *accept ‘it increased’*

*do* ***not*** *accept ‘the acidity changed by pH 1.5’*

**1 (L5)**

(ii)     any **one** from

•    ethanoic acid is less acidic than the hydrochloric acid

*accept the converse*

*‘ethanoic acid is pH 3’ is insufficient*

*accept ‘it is less acidic’*

*‘ethanoic acid is weak’ is insufficient*

•    ethanoic acid has a higher pH

*accept ‘partially neutralised’*

*‘it is weaker’ is insufficient*

•    it has a pH of 3 compared with 1

•    it is a weaker acid

**1 (L6)**

(c)     (i)      hydrogen

*‘H2’* ***or*** *‘H’ are insufficient*

**1 (L6)**

(ii)     •    sulphur

**1 (L6)**

•    oxygen

**1 (L6)**

*‘S’* ***or*** *‘O’* ***or*** *‘O2’ are insufficient*

*answers can be in either order*

(iii)     5

**1 (L6)**

**[7]**

**M29.**         (a)      •    7

*•*    orange

*•*    an answer in the range 1–3            *accept ‘1–3’*

•    purple

*for* ***all******four*** *rows correct, award two marks*

*for any* ***two*** *or* ***three*** *rows correct, award**one mark*

*answers must be in the correct column and row in the table*

**2 (L3)**

(b)     any **one** from

*•*    they are corrosive

*•*    they burn **or** irritate

*accept ‘they can damage your skin or eyes’*

*‘‘in case it touches your skin’ is insufficient*

*it is harmful* ***or*** *poisonous’ is insufficient*

*‘it can kill you’ is insufficient*

*‘wear gloves’ is insufficient*

*do* ***not*** *accept ‘it is flammable’*

**1 (L4)**

(c)     (i)      •    time, in days

*accept ‘time’*

*accept ‘days’*

*do* ***not*** *accept ‘hours’ or ‘minutes’*

**1 (L4)**

(ii)     it goes down or decreases

*accept ‘it becomes acidic’*

*‘it goes red’ is insufficient*

*accept ‘it goes from 6.5 to 2.5’*

*accept ‘the acid gets stronger’*

*‘it goes sour’ is insufficient*

*if the label for X is incorrect in part (ci),*

*do not penalise again in part (cii)*

**1 (L4)**

**[5]**