Pearson Edexcel

Examiners' Report
June 2018

GCSE Combined Science 1SC0 2CF

ResultsPlus

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

ResultsPlus

Giving you insight to inform next steps

ResultsPlus is Pearson's free online service giving instant and detailed analysis of your students' exam results.

- See students' scores for every exam question.
- Understand how your students' performance compares with class and national averages.
- Identify potential topics, skills and types of question where students may need to develop their learning further.

For more information on ResultsPlus, or to log in, visit www.edexcel.com/resultsplus.
Your exams officer will be able to set up your ResultsPlus account in minutes via Edexcel Online.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk.

June 2018
Publications Code 1SC0_2CF_1806_ER

Introduction

This paper was the first paper of the new 9-1 combined science specification, graded 9-1. It consisted of 6 questions. 60 marks of which were in the Foundation Tier Chemistry paper. The paper also has questions in common with Higher Tier Combined Science and Higher Tier Chemistry.

Question 1 (a)

The first question on this combined science paper was answered well with the majority being able to write the steps for the method of the experiment in the correct order to gain both marks.

1 Students are investigating exothermic and endothermic reactions.
They are finding the temperature change in 50 cm^3 water when a solid dissolves in it.
The apparatus is shown in Figure 1.

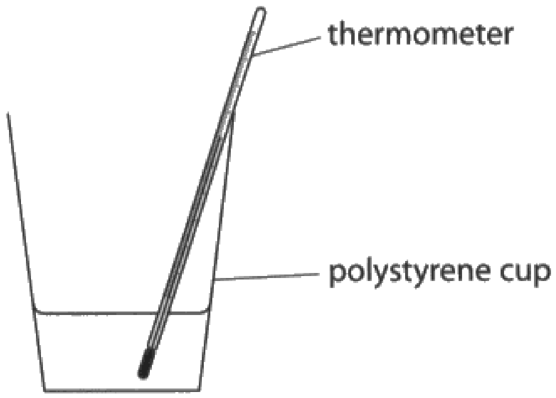


Figure 1

(a) The steps needed to carry out this experiment are **P**, **Q**, **R**, **S** and **T**.
They are shown below.

They are not in the correct order.

P pour the 50 cm^3 water into the polystyrene cup
Q add the solid to the water and stir
R measure 50 cm^3 water using a beaker
S measure the initial temperature of the water
T measure the final temperature of the solution when all the solid has dissolved

Write the steps in the correct order, from left to right.

(2)

R	P	S	Q	T

ResultsPlus
Examiner Comments

All steps in the correct order gains the two marks.

Question 1 (c)

Although question 1c appeared more straightforward, candidates found using the correct terminology to describe how the water could be measured more accurately difficult. Common answers that did not score were measuring jug, measuring cup or just repeated beaker from step R in the stem.

Some stated that repeating the experiment would be more accurate. This did not score.

(c) State how step **R** could be changed to measure the volume of water more accurately.
(1)

use a measuring jug.

ResultsPlus
Examiner Comments

A common answer that scored no marks.

(c) State how step **R** could be changed to measure the volume of water more accurately.
(1)

could of used a pepet than a beaker.

ResultsPlus
Examiner Comments

Those that stated pipette or burette did score, phonetic spellings were allowed.

Question 1 (d) (i)

Many candidates were able to score at least one mark for stating that the water or inner bag reacts with the solid.

Of those candidates that took this further to state that this resulted in a reaction, a larger proportion thought that the reaction was exothermic rather than endothermic.

A common misconception was that the water in the bag was cold and then dispersed through the pack which made it all cold or that ice was produced inside the pack.

In some cases, candidates stated that the water mixed with the solid, this was not sufficient for the mark as they did not state that a reaction took place between the two.

(d) Figure 2 shows a cold pack.

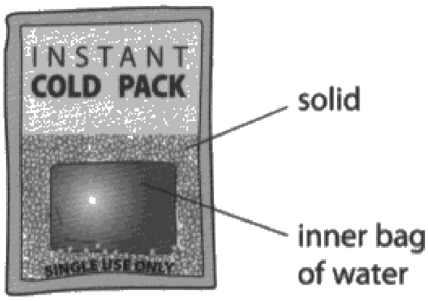


Figure 2

When the pack is squeezed hard the inner bag bursts.
Then the pack goes cold.

(i) Explain why the pack goes cold.

(2)

because when the a Bag pops their is a reaction and then that mahes it go cold

ResultsPlus
Examiner Comments

Just stating that there is a reaction was insuffcent to gain the mark.

(d) Figure 2 shows a cold pack.

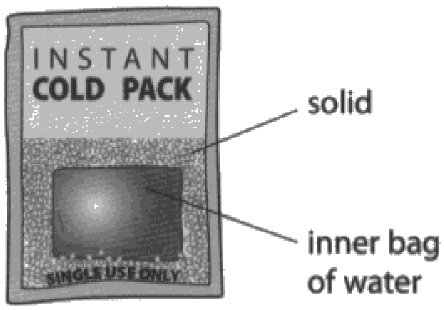


Figure 2

When the pack is squeezed hard the inner bag bursts.
Then the pack goes cold.

(i) Explain why the pack goes cold.

(2)

Because the water reacts with the solid, causes the molecules to vibrate together to freeze.

ResultsPlus
Examiner Comments

This example gained 1 mark for stating that the water reacts with the solid. The comment regarding the molecules vibrating and freezing was ignored.

(d) Figure 2 shows a cold pack.

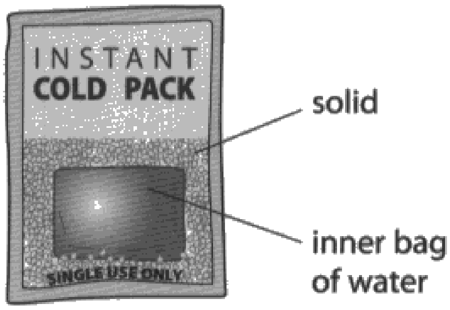


Figure 2

When the pack is squeezed hard the inner bag bursts.
Then the pack goes cold.

(i) Explain why the pack goes cold.

(2)

When the bag of water bursts the water reacts with the solid to produce an endothermic reaction.

ResultsPlus
Examiner Comments

A good example that gained both marks.

Question 1 (d) (ii)

A large proportion of candidates simply restated that question, stating that the pack could only be used once, which did not score.

Few candidates showed an understanding that the reaction was irreversible. Many just stated that the water would go warm.

Of those that scored it was often for stating that once the bag had been burst it could not be burst again.

(ii) Give the reason why the pack can be used only once.

(1)

Because the contents of the inner Back Hae Already Be Burst and cant Be Burst Again creating no Reaction.

ResultsPlus
Examiner Comments

Stating that once the bag had been burst, it couldn't be burst again gained the mark.

(ii) Give the reason why the pack can be used only once.

(1)

Because the water in the pack will go warm after a while of use.

ResultsPlus
Examiner Comments

A common incorrect response was that the water would go warm, this did not score.

Question 2 (a)

Stating gas syringe as the piece of apparatus shown in the diagram proved quite difficult for candidates with many thinking that it was a test tube.

2 Hydrogen peroxide decomposes to form water and oxygen.

The rate of this reaction can be found by measuring the volume of oxygen formed after different time intervals.

Hydrogen peroxide solution is placed in a conical flask.
The apparatus is set up as shown in Figure 3.

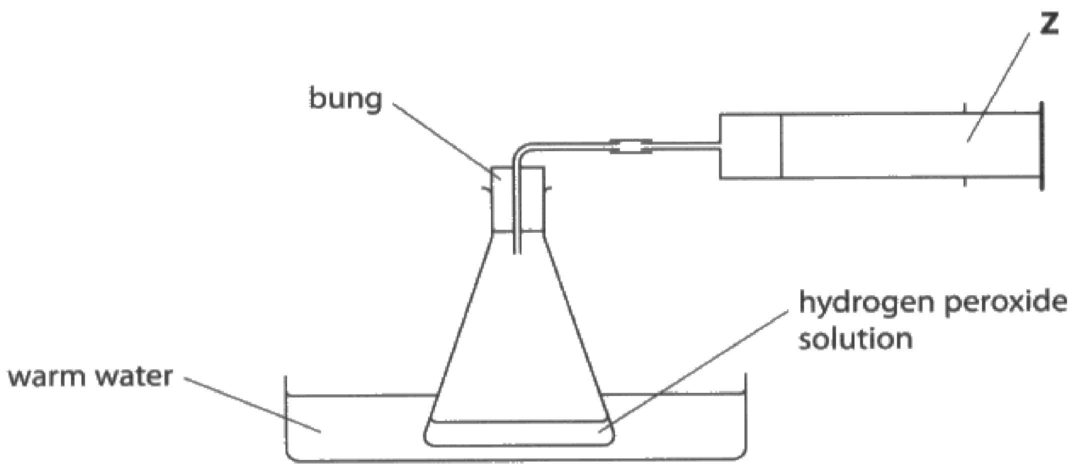


Figure 3

(a) State the name of the piece of apparatus labelled **Z** in Figure 3.

(1)

gas syringe

ResultsPlus
Examiner Comments

The correct answer that scored the mark.

ResultsPlus
Examiner Tip

Candidates are expected to be able to recognise key scientific pieces of equipment.

Question 2 (b)

Those candidates that read the question carefully and realised that the gas produced was oxygen often scored the mark and simply stating that it relights gained the mark.

However, a large proportion thought that the gas produced was hydrogen and therefore wrote that a 'squeaky pop' would be seen, this was rejected. Some stated that the splint would go out.

Others thought that bubbles would be seen.

In this case, the candidate states that the gas would relight, which is not correct and the mark was not scored.

(b) At the end of the reaction the bung is removed from the conical flask.
A glowing splint is put into the gas in the flask.

State what you would **see**.

(1)

The gas relights - oxygen

ResultsPlus
Examiner Comments

Stating that the gas relights is not correct and so therefore no marks were awarded.

(b) At the end of the reaction the bung is removed from the conical flask.
A glowing splint is put into the gas in the flask.

State what you would **see**.

(1)

The Splint will re-ignite

ResultsPlus
Examiner Comments

A correct answer that scored the mark.

Question 2 (c) (iii)

Stating a method of increasing the surface area of the lumps of solid catalyst proved quite hard for candidates, with many stating the solid lumps should be flattened or squashed which was ignored.

A very common answer was to add more catalyst which was not accepted.

(iii) A given mass of catalyst is more effective if it has a large surface area.

State how you could increase the surface area of some lumps of solid catalyst.

(1)

add more in the solution.

ResultsPlus
Examiner Comments

Add more was a common incorrect response.

(iii) A given mass of catalyst is more effective if it has a large surface area.

State how you could increase the surface area of some lumps of solid catalyst.

(1)

Cut it up into smaller ~~pieces~~ bits.

ResultsPlus
Examiner Comments

Cut up the solids or make them smaller gained the mark.

Question 2 (d)

The majority of candidates were able to score at least 1 mark for circling the correct rate of decomposition under the differing experimental conditions for at least one situation.

The better candidates knew all three and scored the two marks.

(d) The experiment is repeated three times
once using a more dilute solution of hydrogen peroxide
once using a lower temperature
once using a larger flask

In each case, all other conditions are kept the same.

Circle the word that shows the change in the rate of decomposition in each case.

(2)

	change in rate		
hydrogen peroxide solution is more dilute	faster	slower	unchanged
the temperature used is lower	faster	slower	unchanged
the reaction is carried out in a larger flask	faster	slower	unchanged

ResultsPlus
Examiner Comments

Al three are correct here and so both marks were scored.

Question 2 (e)

It was pleasing to see that many were able to score at least 1 mark for balancing the equation.

Candidates found it much more difficult to add the state symbols to the equation with many losing this mark. A common error was to write the state symbol as the complete word.

(e) Complete the balanced equation for the reaction and fill in the two missing state symbols.
(2)

....2.... $H_2O_2(aq) \rightarrow 2H_2O($....L....$) + O_2($....g....$)$

(Total for Question 2 = 9 marks)

ResultsPlus
Examiner Comments

A correct answer that scored both marks.

(e) Complete the balanced equation for the reaction and fill in the two missing state symbols.
(2)

....2.... $H_2O_2(aq) \rightarrow 2H_2O($....liquid....$) + O_2($....g....$)$

(Total for Question 2 = 9 marks)

ResultsPlus
Examiner Comments

1 mark was scored here for the balancing.

Capitals were allowed when writing state symbols, but words were not.

ResultsPlus
Examiner Tip

When writing state symbols, remember to write the lowercase letter rather than the word.

(e) Complete the balanced equation for the reaction and fill in the two missing state symbols.

(2)

Hydrogen

C $H_2O_2(aq) \rightarrow 2H_2O($ ~~H~~ O $) + O_2($ carbon $)$

ResultsPlus

Examiner Comments

Some obviously had not encountered state symbols before and added the names or symbols of other elements into the brackets.

Question 3 (c) (i)

The majority of candidates were able to select the correct words from the box to complete the sentences and gain both marks.

(c) (i) Use a word from the box to complete each of the sentences about the fractional distillation of crude oil.

condensed	heated	melted	solidified	stirred

Each word may be used once, more than once, or not at all.

(2)

The separation of crude oil into fractions occurs in a fractional distillation column.

Before crude oil is passed into the column it is heated .

During the distillation, vapour rises up the column until it is cold enough for the vapour to form a liquid. The vapour has been condensed .

ResultsPlus
Examiner Comments

A correct answer that scored both marks.

Question 3 (c) (ii)

Many knew that the fraction from the bottom of the column has more carbon atoms per molecule than the fraction from the top of the column to score the mark.

(ii) Complete this sentence by underlining the correct answer in the box.

(1)

Compared with the fraction from the top of the column,

	has more carbon atoms per molecule.
the fraction from the bottom of the column	has a lower viscosity.
	is easier to ignite.

ResultsPlus
Examiner Comments

The correct answer that scored the mark.

Question 3 (d)

Around half of all candidates were able to analyse the data in the table and recognise that fuel oil was the fraction for which the relative amount obtained exceeds the relative demand.

(d) When crude oil is separated into fractions, the amount of each fraction obtained rarely matches the demand for that fraction.

Figure 4 shows the relative amounts of four of the fractions obtained from a crude oil and the relative demand for each of these fractions.

fraction	relative amount obtained from the crude oil	relative demand
gases	5	5
petrol	10	25
kerosene	20	25
fuel oil	45	5

Figure 4

State the fraction for which the relative amount obtained exceeds the relative demand.

(1)

fuel oil

ResultsPlus
Examiner Comments

The correct answer that scored the mark.

Question 3 (e)

In general, this question was answered well with candidates using variety of methods to calculate the number of barrels of fuel oil present in the 850 000 barrels of crude oil.

A good proportion of candidates were able to calculate the 382 500. Of these, fewer were able to write this correctly to 2 significant figures. Some did not attempt to round the number; a common mistake was to round to 38 rather than 380 000. Therefore scoring 2 marks.

(e) In January 2015 the United Kingdom produced 850 000 barrels of crude oil per day. 45% of this crude oil was fuel oil.

Calculate the number of barrels of fuel oil present in the 850 000 barrels of crude oil.

Give your answer to two significant figures.

(3)

850,000 ÷ 10 = 85000 x 4 = 340,000 = 40%

85000 ÷ 2 = 42.500 = 5%   42,500 + 340,000

= 382,500 barrels

(Total for Question 3 = 9 marks)

ResultsPlus
Examiner Comments

The candidate has correctly calculated the number of barrels of fuel oil to gain 2 marks.

They have not attempted to give their answer to two significant figures and so do not gain the third mark.

(e) In January 2015 the United Kingdom produced 850 000 barrels of crude oil per day. 45% of this crude oil was fuel oil.

Calculate the number of barrels of fuel oil present in the 850 000 barrels of crude oil.

Give your answer to two significant figures.

(3)

10% 85 000 4x = 340 000

5% 42 500 + 340 000 = 382 500

380 000 barrels

ResultsPlus
Examiner Comments

A good answer that scored all three marks.

(e) In January 2015 the United Kingdom produced 850 000 barrels of crude oil per day. 45% of this crude oil was fuel oil.

Calculate the number of barrels of fuel oil present in the 850 000 barrels of crude oil.

Give your answer to two significant figures.

(3)

10% = 85000 x4 = 340000

5% = 42500 + 42500

382500

38 barrels

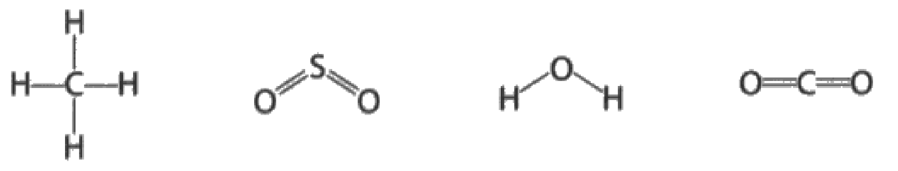
ResultsPlus
Examiner Comments

A common error was calculate the correct number of barrels but then to write this as 38 rather than 380 000.

Question 4 (a)

This question proved quite hard with many candidates not being able to give the correct formula for sulfur dioxide. In some cases, candidates did not read the question carefully and gave name of substance B rather than the formula.

4 Figure 5 shows one molecule of each of four different substances, **A**, **B**, **C** and **D**.



substance A   substance B   substance C   substance D

Figure 5

(a) State the formula of a molecule of substance **B**.

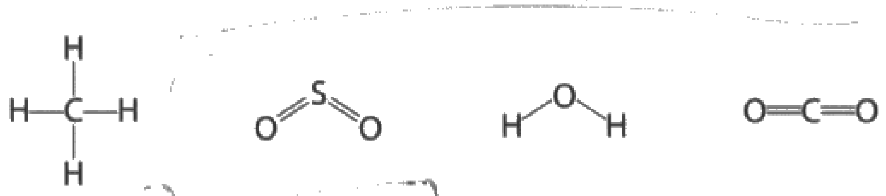
(1)

Sulfuric oxide

ResultsPlus
Examiner Comments

Some candidates did not read the question carefully and gave the name rather than the formula of the molecule so did not gain the mark.

4 Figure 5 shows one molecule of each of four different substances, **A**, **B**, **C** and **D**.



substance A   substance B   substance C   substance D

Figure 5

(a) State the formula of a molecule of substance **B**.

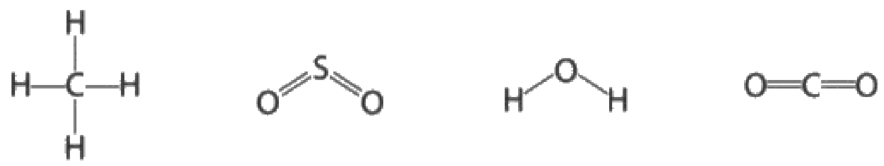
(1)

SO_2

ResultsPlus
Examiner Comments

The correct answer that gained the mark.

4 Figure 5 shows one molecule of each of four different substances, **A**, **B**, **C** and **D**.



substance A | substance B | substance C | substance D

Figure 5

(a) State the formula of a molecule of substance **B**.

(1)

$O_2 + S$

ResultsPlus
Examiner Comments

A common incorrect answer was to give the elements present in the B rather than the formula of B.

Question 4 (b) (i)

Candidates found this question very difficult with few being able to write the correct word equation.

Some candidates did not read the question carefully and tried to give symbol equations. If symbol equations were given they were expected to be fully correct, which was rarely achieved.

(b) (i) Substance **C** can be formed by burning an element in oxygen.

Write the word equation for this reaction.

(1)

Hydrogen + Oxygen ⟶ Water

ResultsPlus
Examiner Comments

The correct word equation that gained the mark.

(b) (i) Substance **C** can be formed by burning an element in oxygen.

Write the word equation for this reaction.

(1)

$O_2 + H^2 \rightarrow H^2O.$

ResultsPlus
Examiner Comments

Candidates that tried to give the balanced symbol equation rather than the word equation rarely scored.

ResultsPlus
Examiner Tip

If asked for a word equation, do not attempt to write the balanced symbol equation. It is much harder and will have to be fully correct to gain the marks.

(b) (i) Substance **C** can be formed by burning an element in oxygen.

Write the word equation for this reaction.

(1)

~~H_2O => H~~ hydrogen Oxide => Hydrogen + Oxygen

ResultsPlus
Examiner Comments

Hydrogen oxide was not accepted as an alternative for water and in some cases candidates also had the word equation the wrong way around with the reactants and products mixed. This scored no marks.

Question 4 (b) (ii)

This question also proved hard, often due to candidates not reading the question carefully.

Many included C in their answer, when they had been told to only consider A, B and D. Many only gave one letter.

(ii) Consider substances **A**, **B**, and **D**.

Give the letters of the two substances that can be formed by burning an element in oxygen.

(1)

B and D.

ResultsPlus
Examiner Comments

The correct answer that scored the mark.

(ii) Consider substances **A**, **B**, and **D**.

Give the letters of the two substances that can be formed by burning an element in oxygen.

(1)

D , C

ResultsPlus
Examiner Comments

Many did not read the question carefully and included C in their answer, when they had been told to only consider A, B and D.

(ii) Consider substances **A**, **B**, and **D**.

Give the letters of the two substances that can be formed by burning an element in oxygen.

(1)

B

ResultsPlus

Examiner Comments

Again, candidates that had not read the question carefully only gave one letter even though they were clearly asked for two. Both letters were required for the mark.

Question 4 (c)

A good proportion of candidates were able to score at least 1 mark on this question, often for showing an understanding the plants or a named plant, such as trees, were responsible for causing the change in the amount of oxygen in the atmosphere since the Earth's early atmosphere.

Fewer were able to take this further and explain that it was the photosynthesis of these plants that caused the change. In some cases, candidates thought that respiration was the process, this was rejected.

A large proportion of candidates did not read the question carefully and stated facts they knew about the atmosphere such as global warming, pollution, volcanoes, burning fossil fuels, greenhouse gases that did not relate to the amount of oxygen increasing.

(c) The amount of oxygen in the atmosphere has increased since the Earth's early atmosphere was formed.

Explain what has caused this change.

(2)

plants and Trees

ResultsPlus
Examiner Comments

This answer gained 1 mark for stating that plants were responsible. Trees would have also gained the mark. There is no reference to photosynthesis for the second mark.

(c) The amount of oxygen in the atmosphere has increased since the Earth's early atmosphere was formed.

Explain what has caused this change.

(2)

Photosynthesis from primitive plants and algae has Caused the amount of Carbon dioxide in the atmosphere to decrease and the amount of oxygen to increase greatly. because carbon dioxide is a reactant and oxygen is a product of photosynthesis.

ResultsPlus
Examiner Comments

A good answer that scored both marks.

(c) The amount of oxygen in the atmosphere has increased since the Earth's early atmosphere was formed.

Explain what has caused this change.

(2)

Respiration grom plants which take in Carbon dioxide and release Oxygen.

ResultsPlus
Examiner Comments

The candidate gains 1 mark for understanding that plants are responsible for the change in the amount of oxygen. However, they do not gain the second mark as they believe that the process is respiration rather than photosynthesis.

Question 4 (d)

Candidates found it hard to identify the two processes that caused the change in the amount of carbon dioxide in the atmosphere.

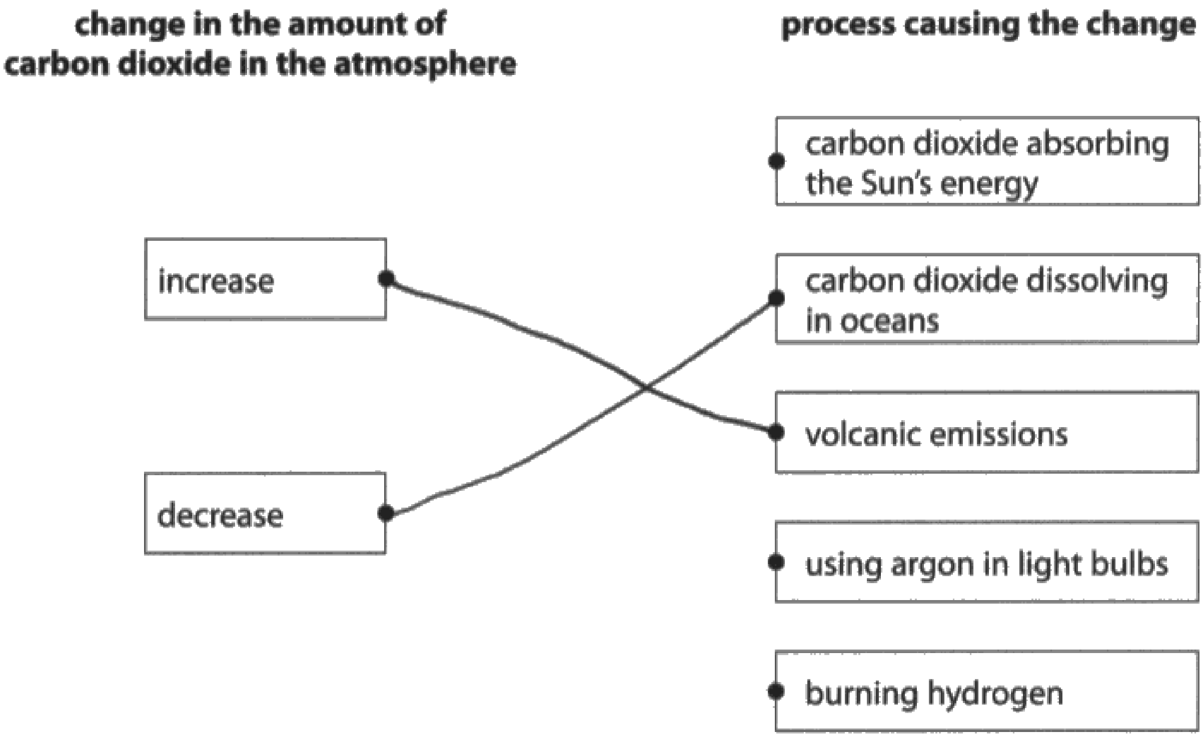
In some cases, candidates drew more than one line from each change and therefore scored no marks.

(d) Carbon dioxide is present in the Earth's atmosphere.

Some processes increase the amount of carbon dioxide in the atmosphere, other processes decrease it.

Draw one straight line from each change in the amount of carbon dioxide in the atmosphere to the process causing the change.

(2)



ResultsPlus
Examiner Comments

A good answer that scored the mark.

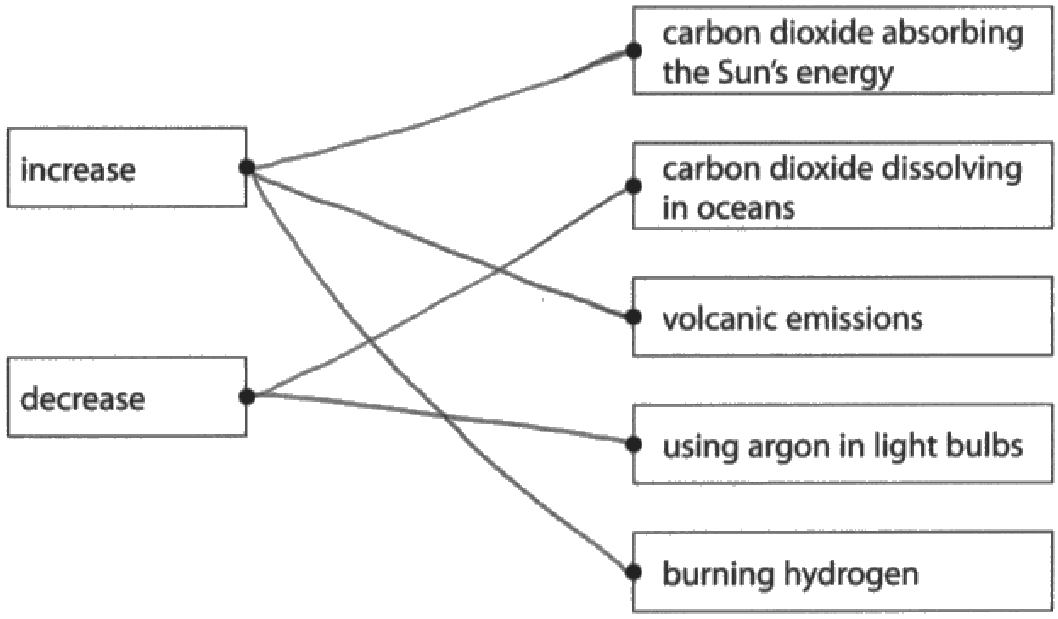
(d) Carbon dioxide is present in the Earth's atmosphere.

Some processes increase the amount of carbon dioxide in the atmosphere, other processes decrease it.

Draw one straight line from each change in the amount of carbon dioxide in the atmosphere to the process causing the change.

(2)

change in the amount of carbon dioxide in the atmosphere | **process causing the change**



ResultsPlus
Examiner Comments

The candidate has drawn two lines from each box, this is equivalent to giving two conficting answers and therefore no mark can be awarded.

ResultsPlus
Examiner Tip

Ensure that when you are asked to draw one line from one box remember to draw only 1 line.

Question 4 (e) (iii)

This question was answered well with the majority of candidates gaining both marks for being able to read the values from the graph and using them to calculate the change in the amount of carbon dioxide from 1990 to the beginning of 2000.

In some cases, candidates were able to read the values from the graph correctly but then divided rather than subtracted the numbers and therefore scored just the first marking point.

(iii) Calculate the change in the amount of carbon dioxide in the Earth's atmosphere from the beginning of 1990 to the beginning of 2000.

(2)

\- 350

365

15

change in amount = 15 ppm

(Total for Question 4 = 11 marks)

ResultsPlus
Examiner Comments

In this example, the candidate has read the values from the graph correctly to gain the first mark and subtracted the values correctly to gain the second.

(iii) Calculate the change in the amount of carbon dioxide in the Earth's atmosphere from the beginning of 1990 to the beginning of 2000.

(2)

$350 \div 365 = \frac{70}{73}$

change in amount = $\frac{70}{73}$ ppm

(Total for Question 4 = 11 marks)

350

365

$350 \div 365 = \frac{70}{73}$

$350 \times 365 = 127750$

ResultsPlus
Examiner Comments

In this case the values have been read from the graph correctly. However, the values have been divided rather than subtracted so the second mark is not awarded and the response gained just 1 mark.

Question 4 (e) (i) - (ii)

Giving a description of how the amount of carbon dioxide in the Earth's atmosphere varied in a year proved difficult for some candidates. Usually this was because they did not read the scale carefully and thought that the amount increased in one year and decreased the next. Often the overall trend was given in part 4(e)(i) rather than in part 4(e)(ii).

A common error seen was to describe why carbon dioxide levels changed over the years rather than simply describing the trend. No credit was awarded for this.

The overall trend in part 4(e)(ii) was often described well to gain the mark.

(e) Figure 6 shows a graph of the amount of carbon dioxide in the Earth's atmosphere from 1985 to 2005.

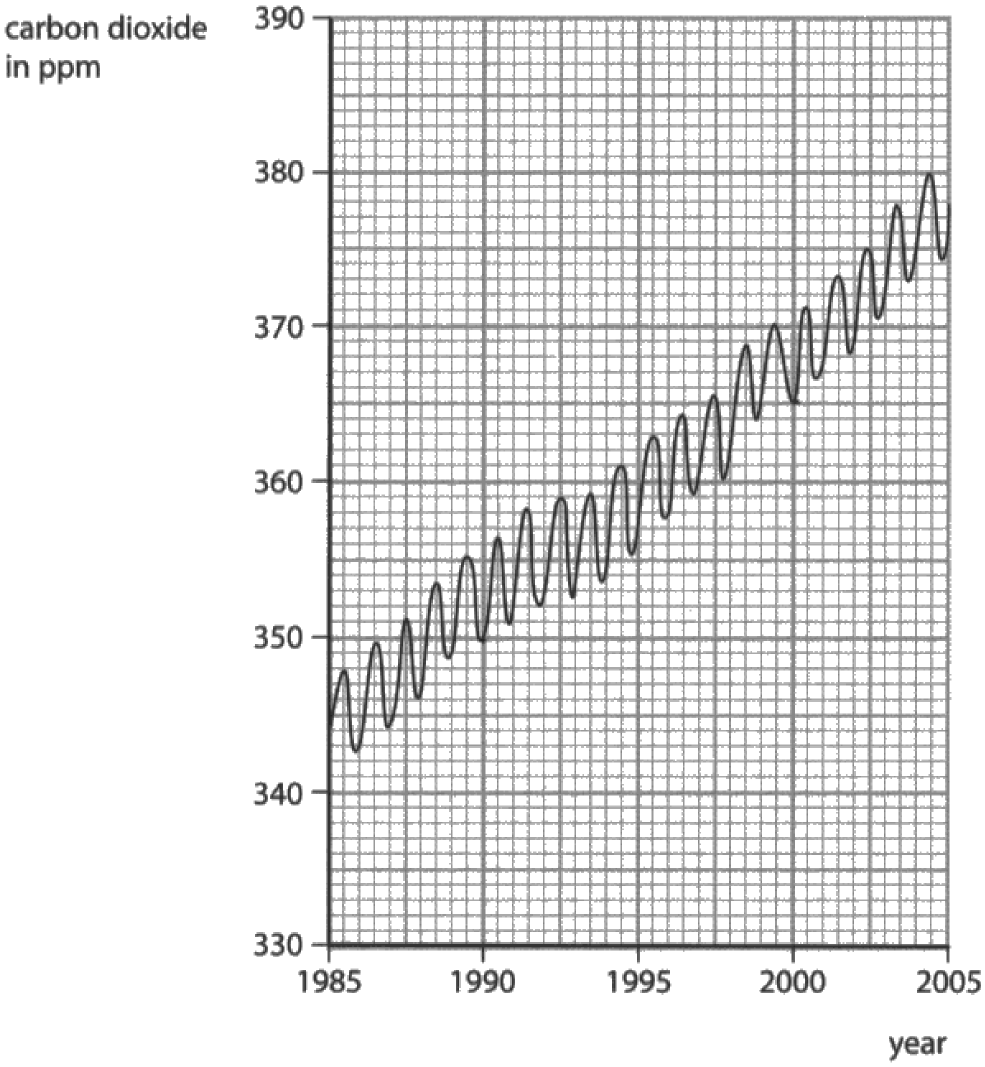


Figure 6

(i) Describe how the amount of carbon dioxide in the Earth's atmosphere varies within each year.

(1)

More cars and factories are in use

(ii) Describe the overall trend in the amount of carbon dioxide in the Earth's atmosphere from 1985 to 2005.

(1)

Cars become popular and nearly everyone had one.

ResultsPlus
Examiner Comments

Some candidates tried to explain why the amount of carbon dioxide increased rather than describing how the amount varied. This gained no marks.

ResultsPlus
Examiner Tip

Ensure that you read the question carefully and know the difference between describing or explaining how and describing or explaining why.

Question 5 (a) (i)

Candidates found it quite hard to state the mass number of this chlorine atom.

A common error was to give the atomic number instead or to use the periodic table at the back rather than the information given in the stem of the question and giving an answer of 35.5.

5 (a) A chlorine atom contains 17 electrons, 18 neutrons and 17 protons.

(i) State the mass number of this chlorine atom.

(1)

17

ResultsPlus
Examiner Comments

A common error was to give the atomic number rather than the mass number.

5 (a) A chlorine atom contains 17 electrons, 18 neutrons and 17 protons.

(i) State the mass number of this chlorine atom.

(1)

35.5

ResultsPlus
Examiner Comments

Some candidates did not use the information given in the stem of the question to answer the question and used the periodic table instead.

5 (a) A chlorine atom contains 17 electrons, 18 neutrons and 17 protons.

(i) State the mass number of this chlorine atom.

(1)

35

ResultsPlus
Examiner Comments

The correct answer that scored the mark.

Question 5 (a) (ii)

More candidates were able to correctly give the electronic configuration of the atom than were able to state the mass number .

In some cases, the question was not read correctly, and the number of electrons given rather than the electronic configuration.

Some candidates drew diagrams, which were accepted.

(ii) Give the electronic configuration of this chlorine atom.

(1)

2.8.7.

ResultsPlus
Examiner Comments

The correct answer that scored the mark.

(ii) Give the electronic configuration of this chlorine atom.

(1)

17 electrons

ResultsPlus
Examiner Comments

Some candidates gave the number of electrons rather than the electronic configuration of the atom.

Question 5 (b)

The result of the test for chlorine was not well recalled. Many could state that the paper went red or white, but few could fully describe what would be seen to gain both marks.

(b) Describe what you would **see** if damp, blue litmus paper is placed into chlorine gas.

(2)

it would change color because it would react with the chlorine gas

ResultsPlus
Examiner Comments

Some lost marks as they were not specific with their answers. Simply stating that the colour would change without describing what it would change to.

ResultsPlus
Examiner Tip

If there is a colour change, remember to state what the change is. Just stating that there is a colour change will not be sufficient.

(b) Describe what you would **see** if damp, blue litmus paper is placed into chlorine gas.
(2)

you would see the color to start to fade

ResultsPlus
Examiner Comments

Simply saying that the colour would fade was not allowed. However, if it was stated that the colour would disappear or that it went colourless this was accepted.

(b) Describe what you would **see** if damp, blue litmus paper is placed into chlorine gas.
(2)

the Paper goes red then white

ResultsPlus
Examiner Comments

A concise answer that scored both marks.

Question 5 (c) (i)

A very small proportion of candidates were able to fully describe what is meant by a covalent bond to gain both marks.

Some knew that a covalent bond involves the sharing of electrons, but few knew that it was a shared pair of electrons.

A common error was to confuse covalent bonds with the loss or gain of electrons and the formation of ions which resulted in an overall score of 0 for the question.

(c) Chlorine exists as diatomic molecules.

In a molecule, two chlorine atoms are joined by a covalent bond.

(i) Describe what is meant by a **covalent bond**.

(2)

They share electrons, meaning they can both have a full ~~ott~~ ~~oter~~ outer shell.

ResultsPlus
Examiner Comments

Some knew that a covalent bond involves the sharing of electrons, but few knew that it was a shared pair of electrons.

(c) Chlorine exists as diatomic molecules.

In a molecule, two chlorine atoms are joined by a covalent bond.

(i) Describe what is meant by a **covalent bond**.

(2)

When to atoms shair a pair of electrons, so that they both have a full, stable outer shell.

ResultsPlus
Examiner Comments

A good answer that scored both marks.

(c) Chlorine exists as diatomic molecules.

In a molecule, two chlorine atoms are joined by a covalent bond.

(i) Describe what is meant by a **covalent bond**.

(2)

if an atom gains or loses an electron.

ResultsPlus
Examiner Comments

A common error was to confuse covalent bonds with the loss or gain of electrons and the formation of ions which resulted in an overall score of 0 for the question.

Question 5 (c) (ii)

Explaining why chlorine is a gas rather than a liquid at room temperature was very hard for candidates and few could give an answer that related to the intermolecular forces involved.

Those that did score on this question often did so for showing an understanding that chlorine has a low boiling point. Although some did confuse the melting point with the boiling point and so did not score.

(ii) Explain why chlorine is a gas, rather than a liquid, at room temperature.

(2)

Chlorine isn't stable to be a liquid at room temperature due to it having weak intermolecular forces. It will only be stable as a gas.

ResultsPlus
Examiner Comments

A good answer that scored both marks.

(ii) Explain why chlorine is a gas, rather than a liquid, at room temperature.

(2)

~~because the bonds between~~

because chlorine has weak covalent bonds between its molecules.

ResultsPlus
Examiner Comments

Some candidates knew that it had to do with forces between molecules but referred to these as bonds or covalent bonds and so did not gain credit.

ResultsPlus
Examiner Tip

When describing forces in between molecules, candidates should take care that they are using the correct scientific language at all time.

Question 5 (d)

Candidates found stating why the litmus turns red quite hard.

(d) When the gas hydrogen chloride, HCl, is dissolved in water, a solution forms. Blue litmus paper dipped in this solution turns red.

State why the litmus paper turns red.

(1)

Because it's reacting with the hydrogen.

ResultsPlus
Examiner Comments

Some candidates stated that it turned red due to the presence of hydrogen rather than hydrogen ions which and so did not gain the mark.

(d) When the gas hydrogen chloride, HCl, is dissolved in water, a solution forms. Blue litmus paper dipped in this solution turns red.

State why the litmus paper turns red.

(1)

The litmus paper turns red to show acidic solutions as hydrogen chloride has a ph of less than 7

ResultsPlus
Examiner Comments

Many candidates gained a mark as they knew that the solution was acidic and would therfore turn the paper red.

(d) When the gas hydrogen chloride, HCl, is dissolved in water, a solution forms. Blue litmus paper dipped in this solution turns red.

State why the litmus paper turns red.

(1)

It's because chlorine is an acid.

ResultsPlus
Examiner Comments

Some candidates did not read the question carefully or were not careful with their language and stated that chlorine is acidic which is incorrect and therefore not accepted.

Question 5 (e) (i)

The majority of candidates could estimate the boiling point of iodine to gain a mark.

Question 5 (e) (ii)

Fewer candidates were able to name a halogen that would react with the iron more vigorously with bromine.

A common error was candidates did not read the question carefully and gave the name of a reactive element such as sodium or potassium rather than a more reactive halogen.

(ii) Bromine reacts with heated iron.

Give the name of one halogen that would react with iron more vigorously than bromine.

(1)

fluorine

(Total for Question 5 = 11 marks)

ResultsPlus
Examiner Comments

A correct answer that gained the mark.

(ii) Bromine reacts with heated iron.

Give the name of one halogen that would react with iron more vigorously than bromine.

(1)

Sodium

(Total for Question 5 = 11 marks)

ResultsPlus
Examiner Comments

Some candidates gave the name of a reactive element, but as the element was not a halogen did not gain the mark.

Question 6 (a)

Candidates found calculating the empirical formula of the sodium oxide very difficult.

Many left this question blank. Of those that attempted the question, few scored full marks.

Those that did score full marks, set their working out clearly and concisely.

In some cases, candidates inverted the fraction and so lost the first mark. In these cases, the next two marks could be awarded for an error carried forward and scored for the correct ratio from the incorrect fraction and the correct formula for this ratio. This highlights the importance of showing working. Those candidates that just stated NaO_2 scored zero marks, those that showed their working and came to an answer of NaO_2 could score 2 marks.

Some candidates had clearly not attempted empirical formula calculations before and simply multiplied all the numbers together.

6 Lithium, sodium and potassium are reactive metals in group 1 of the periodic table.

(a) Sodium metal tarnishes in air to form a layer of sodium oxide on its surface.
0.92 g of sodium combined with 0.32 g of oxygen in this oxide.

Calculate the empirical formula of this sodium oxide.
(relative atomic masses: O = 16, Na = 23)

You must show your working.

$\frac{g}{ar}$

(3)

Na	O
$\frac{0.92}{23}$	$\frac{0.32}{16}$
$\frac{0.04}{0.02}$	$\frac{0.02}{0.02}$
2	1

empirical formula of sodium oxide = Na_2O

ResultsPlus
Examiner Comments

A well laid out answer that scored all three marking points.

6 Lithium, sodium and potassium are reactive metals in group 1 of the periodic table.

(a) Sodium metal tarnishes in air to form a layer of sodium oxide on its surface. 0.92 g of sodium combined with 0.32 g of oxygen in this oxide.

Calculate the empirical formula of this sodium oxide.
(relative atomic masses: O = 16, Na = 23)

You must show your working.

(3)

O $\frac{16}{0.32}$ = 50 | Na $\frac{23}{0.92}$ = 25

$\frac{50}{25}$ = ~~4~~ 2 | $\frac{25}{25}$ = 1

empirical formula of sodium oxide = 2 : 1

ResultsPlus
Examiner Comments

This candidate gained 1 mark for calculating the correct ratio from the inverted fraction. Had the candidate given the formula from this ratio, 2 marks could have been awarded.

6 Lithium, sodium and potassium are reactive metals in group 1 of the periodic table.

(a) Sodium metal tarnishes in air to form a layer of sodium oxide on its surface. 0.92 g of sodium combined with 0.32 g of oxygen in this oxide.

Calculate the empirical formula of this sodium oxide.
(relative atomic masses: O = 16, Na = 23)

You must show your working.

(3)

S	O
0.92	0.32
23	16
0.04	0.02
2	1

empirical formula of sodium oxide = 2 : 1

ResultsPlus
Examiner Comments

Some candidates managed get the correct ratio but did not then covert this ratio to the formula to gain the last mark.

Question 6 (b)

It was pleasing to see that many candidates attempted to balance the equation, some with more success than others.

Often more candidates correctly placed a 2 in front of the sodium than in front of the sodium hydroxide.

As in question 2(e), candidates found it hard to recall state symbols. Those that did know how to use state symbols lost marks as they thought that water should have the state symbol (aq) rather the (l).

Again, it was clear that some candidates had not used state symbols before and tried to add further elements, compounds or numbers in the brackets.

(b) Sodium reacts with water to form sodium hydroxide in solution and hydrogen.

Complete the balancing of the equation for this reaction and add the state symbols for each substance.

(3)

2 Na(S) + $2H_2O$(L) → 2 NaOH(aq) + H_2(g)

1Na
~~2H~~ 4H
2 O

1 Na 1 O 3H

2Na 2O 4H

ResultsPlus

Examiner Comments

A correct answer that scored the full three marks.

(b) Sodium reacts with water to form sodium hydroxide in solution and hydrogen.

Complete the balancing of the equation for this reaction and add the state symbols for each substance.

(3)

2 Na(CO_2) + $2H_2O$(Ma) → CO_2 NaOH($2CO_2$) + H_2(Ma)

ResultsPlus
Examiner Comments

Again, it was clear that some candidates had not used state symbols before and tried to add further elements, compounds or numbers in the brackets.

Question 6 (c) (ii)

It was pleasing to see that many candidates had obviously seen this practical demonstrated.

There were very few blank responses, and many were able to describe how the teacher could demonstrate the experiment.

In addition to describing the experiment, better candidates also described how the results of the experiment give the order of reactivity of the metals.

Common safety precautions credited were the used of safety goggles, gloves, use of a safety shield and ensuring that the students were stood well back. Some candidates gave generic lab rules such as wearing your hair up, tucking chairs under tables etc, these were not credited.

Other valid points were the need to cut the metal into small pieces, the fact that a large bowl would be needed, that tweezers should be used to transfer the metals.

*(ii) A teacher demonstrated this experiment.

The results are shown in Figure 8.

	lithium	sodium	potassium
position of metal in water	floats	floats	floats
movement of metal	slow	fast	very fast
effervescence / bubbling	slow	fast	very fast

Figure 8

Describe, in detail, how the teacher would demonstrate this experiment safely, showing how the results give the order of reactivity of the metals.

(6)

The teacher would get a large glass scientific bowl and fill it half way up with water. Then the teacher would put a glass cover infront of the bowl to prevent any harm. The teacher and students would wear goggles. The teacher wearing medical gloves would use ~~a~~ tweezers to pick up only one piece of the metal and gentally place it in the bowl. Starting off firstly with lithium, placing a single piece in and waiting standing a meter away. The reaction of lithium is very little however to stay safe everyone must stand back. Then the teacher will wait until the reaction has fully reacted and wait until lithium has disolved. The teacher will then try the experiment with sodium doing exactly the same ~~and~~ as sodium will give a slightly more active reaction. Finally, the teacher will wait for sodium to be disolved and place a single piece of potassium into the bowl very carefully and quickly standing back. Watching the experiment, potassium will react the most and ~~gt~~ making it the most reactive in this reactivity series. After the experiment is over and potassium has disolved and stopped, the teacher will carefully drain the water into the sink to prevent any harm.

ResultsPlus
Examiner Comments

The candidate has many method points- large glass scientific bowl, safety shield, goggles, gloves, standing away, using the tweezers. They then give some analysis giving the order of reactivity, they have begun to link these to the observations but just the order of reactivity would have been sufficient to bring the mark to 6 marks. A mark of 6 in level 3 was awarded.

*(ii) A teacher demonstrated this experiment.

The results are shown in Figure 8.

	lithium	sodium	potassium
position of metal in water	floats	floats	floats
movement of metal	slow	fast	very fast
effervescence / bubbling	slow	fast	very fast

Figure 8

Describe, in detail, how the teacher would demonstrate this experiment safely, showing how the results give the order of reactivity of the metals.

(6)

Use a plastic container to put the water in, and have a glass sheild for saftety. Use small amounts of each metal and see ~~the~~ how they react in water. Use lithium first theran sodium, then potassium to show how the metals get more reactive. in the water.

Have a table (figure 8) to show how the metals ~~a~~ react in the water.

ResultsPlus
Examiner Comments

The candidate has given two points of the method aspect - use a shield and use small amounts of each metal. They have said use lithium then sodium then potassium to 'show how the metals get more reactive' from which we can infer that the order is lithium to potassium. A mark of 4 in level 2 was awarded.

*(ii) A teacher demonstrated this experiment.

The results are shown in Figure 8.

	lithium	sodium	potassium
position of metal in water	floats	floats	floats
movement of metal	slow	fast	very fast
effervescence / bubbling	slow	fast	very fast

Figure 8

Describe, in detail, how the teacher would demonstrate this experiment safely, showing how the results give the order of reactivity of the metals.

(6)

Lithium, Potassium and sodium are all ingroup 1. Group 1 metals are ~~very reacti~~ reactive. As you go down the elements in group 1 they ~~beei~~ become Even more reactive.
lithium is the least reactive and potassium is the most reactive.
The movement in lithium is slow because it's less reactive than sodium and potassium. Potassium moves very fast because it's more reactive.

Also In Group 1 as you go down the elemens the melting point and boiling points increase.

ResultsPlus
Examiner Comments

The candidate has given the order of reactivity of the metals. This order of reactivity gained a mark of 2 in level 1.

*(ii) A teacher demonstrated this experiment.

The results are shown in Figure 8.

	lithium	sodium	potassium
position of metal in water	floats	floats	floats
movement of metal	slow	fast	very fast
effervescence / bubbling	slow	fast	very fast

Figure 8

Describe, in detail, how the teacher would demonstrate this experiment safely, showing how the results give the order of reactivity of the metals.

(6)

The movement of metal in ~~Pa~~ potassium is very fast and in ~~sodi~~ sodium it's fast and in lithium it's slow. The position of metal in water, ~~is~~ lithium it's floats and in sodium it floats and in potassium it floats. The effervescence / bubbling is in lithium slow and in sodium fast and in potassium is very fast.

ResultsPlus
Examiner Comments

When it came to the analysis, some candidates simply copied out the table, this gained no marks.

Paper Summary

Candidates that did well were able to apply their scientific knowledge, understand practicals, use scientific terminology correctly balance equations.

Those that did less well often did so as they did not read the question carefully, which let them down. Whilst some candidates could explain some areas of the chemistry at hand, their response was not always directed to the question being asked or simply repeated the stem of the question.

Based on their performance on this paper, candidates are offered the following advice

- learn definitions as outlined in the specification
- ensure that you have seen and understand and explain the core practicals detailed in the specification, including the specific pieces of equipment that are used in the practical
- ensure that you know what is required by different command words such as describe and explain and the difference between how and why
- learn how to write formula using correct scientific conventions
- learn how to use state symbols and balance equations
- learn how to round numbers correctly and be able to write them to the correct number of significant figures
- where colour changes are the result of a test, learn the colour change rather than simply recalling that there is a change
- practice 6-mark questions, focus on succinct layout and logical presentation of relevant information.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL.