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June 2025

GCSE Chemistry 1CH0 1F

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June 2025

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Introduction

This is the first of two papers for Foundation Tier GCSE Chemistry. Six of the ten questions form one of the Combined Science papers. Two of the later questions in the paper also appear in Higher Tier Combined Science, and these and a further question appear in Higher Tier GCSE Chemistry.

Question 1(b)

Most candidates identified a Bunsen burner, but others seemingly misunderstood the question and stated answers such as test tube or boiling tube.

(b) State what apparatus should be used to heat the zinc carbonate in Figure 1. a burner

(1)

heater

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Examiner Comments

Answers involving apparatus should name specific apparatus found in a school laboratory, for example 'beaker' not container, or here, Bunsen burner.

Question 1(c)

Many candidates correctly said that the mixture would turn 'cloudy'; the question said that the gas was bubbled through, so 'bubbles' was not an acceptable answer.

(c) The word equation for the reaction that occurs when zinc carbonate is heated is

zinc carbonate → zinc oxide + carbon dioxide

The carbon dioxide bubbles through the limewater.

State what is seen when carbon dioxide bubbles through the limewater.

(1)

the lime water changing colour

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Examiner Comments

This is correct but not specific enough to score.

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Examiner Tip

Learn the standard way to describe tests for gases.

Question 1(d)i

Most candidates correctly subtracted the mass of the empty test tube from the total, although some added the two figures (or multiplied them).

(d) Another student investigates the change in mass that takes place when zinc carbonate is heated.

(i) Figure 2 shows the results the student records at the start of the investigation.

mass of empty test tube	14.62 g
mass of test tube + zinc carbonate	17.83 g

Figure 2

Using the results in Figure 2, calculate the mass of zinc carbonate in the test tube.

(1)

17.83
− 14.62
03.21

3.21

mass of zinc carbonate = 3.21 g

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Examiner Comments

This example is well set out showing the working with the final answer in the answer space.

Question 1(d)ii

The answer was to reheat the test tube and see whether any further change in mass occurred. Some candidates stated 'repeat the experiment' but did not make it clear whether this was with the already heated test tube or from the beginning. Many candidates were unsure as to how you would know that the carbonate had fully decomposed.

(ii) The student then

- heats the test tube containing the zinc carbonate for five minutes
- places the hot test tube on a bench mat to cool
- finds the mass of the test tube and contents.

Describe what the student should do next to make sure that all the zinc carbonate has reacted completely.

(2)

give the test tube a little shake and mix the zinc carbonate with a stirrer to make sure its all reacted and no left overs are present.

(Total for Question 1 = 6 marks)

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Examiner Comments

Experiments are often stirred to mix the reactants, but that is not correct in this example and would not let you see if the reaction has finished. In this reaction, the mass drops as carbon dioxide escapes into the air. The mass will stay constant when all of the carbon dioxide has been released.

Question 2(a)i

A confusion occurred here that this apparatus *was* a cell – some candidates drew a cell symbol in the gap.

2 Chemical cells and fuel cells produce a voltage.

(a) A student sets up a chemical cell by placing two different metal electrodes, magnesium and iron, into a salt solution.

Figure 3 shows an incomplete diagram of the chemical cell used by the student.

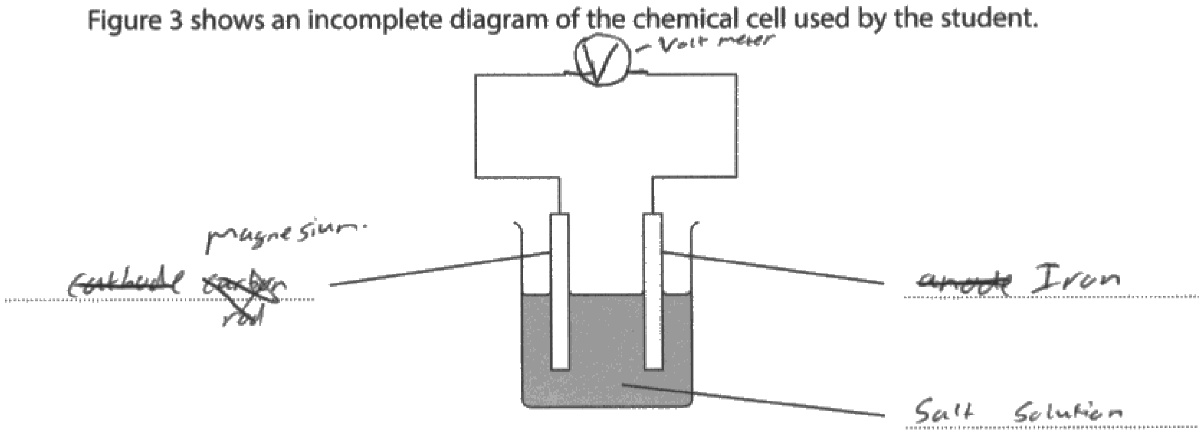

Figure 3

(i) Complete Figure 3 by adding a suitable piece of apparatus to show that a voltage is produced.

(1)

ResultsPlus
Examiner Comments

A voltmeter measures the voltage and the correct symbol is shown. It is worth labelling the symbol just in case the symbol is not quite clear.

2 Chemical cells and fuel cells produce a voltage.

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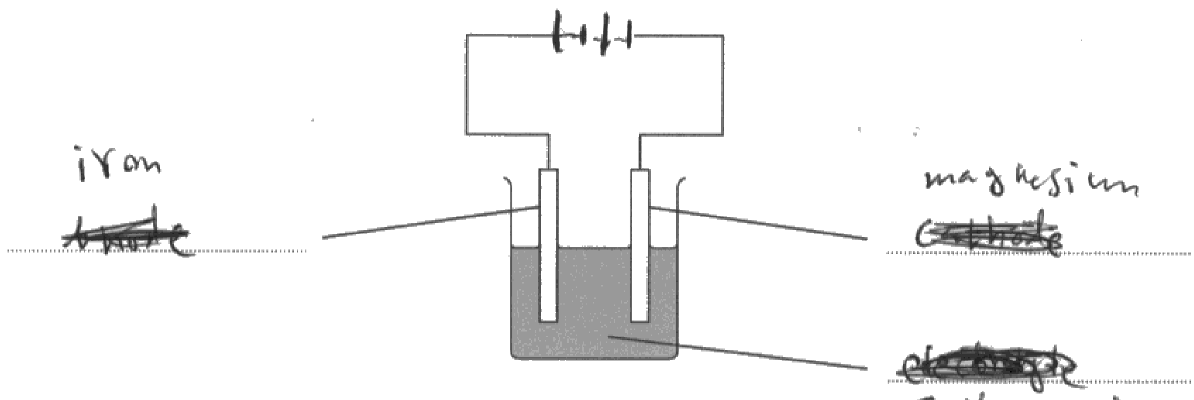

Figure 3

(i) Complete Figure 3 by adding a suitable piece of apparatus to show that a voltage is produced.

(1)

ResultsPlus
Examiner Comments

The whole apparatus is a cell, so a cell symbol is not correct.

Question 2(a)ii

Answer options were given in the box, so it is never correct to give other answers. Electrodes are called anodes and cathodes, but in this case, it is said that magnesium and iron are used, so these are the electrodes. The question also says that salt solution was used, although this is correctly described as the electrolyte which was also accepted.

(a) A student sets up a chemical cell by placing two different metal electrodes, magnesium and iron, into a salt solution.

Figure 3 shows an incomplete diagram of the chemical cell used by the student.

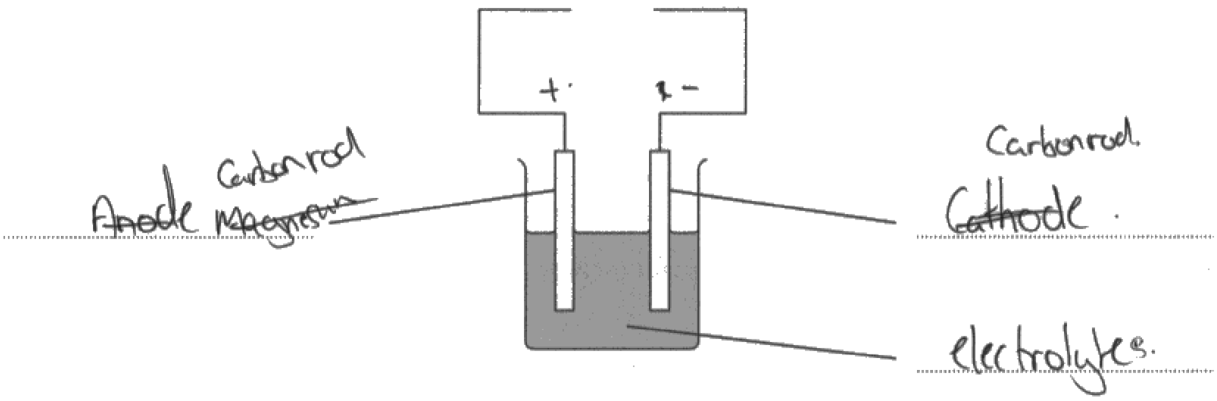

Figure 3

(i) Complete Figure 3 by adding a suitable piece of apparatus to show that a voltage is produced.

(1)

(ii) Use words from the box to complete labelling of Figure 3.

electrolyte	magnesium	salt solution
carbon rod	distilled water	iron

(2)

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Examiner Comments

The information as to the material making up the electrodes was given in the question.

Question 2(a)iii

Some misconceptions were apparent in this question, most commonly that the voltage increased as time passed. Not many candidates picked up on the wording "a long period of time" and hence that the voltage would go to zero.

(iii) Describe what happens to the cell's voltage over a long period of time.

(2)

The cells voltage decreases over a long period of time due to the electrodes decreasing.

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Examiner Comments

The voltage decreasing is correct – but after a long period of time it would go to zero.

(iii) Describe what happens to the cell's voltage over a long period of time.

(2)

the cells voltage would increase over a long period of time as the cell would be powered by a voltage that would keep the voltage the same.

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Examiner Comments

The maximum voltage of a cell is at the beginning.

Question 2(b)

Some candidates tried symbol equations (which are accepted if totally correct) but it is easier to stick to a word equation. Hydrogen oxide and hydroxide were sometimes seen as the product.

(b) One type of fuel cell is the hydrogen-oxygen fuel cell.

Hydrogen-oxygen fuel cells produce water only.

Write the word equation for the reaction.

(2)

H_2 + O_2 → H_2O

(Total for Question 2 = 7 marks)

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Examiner Comments

The symbols are correct but the equation has to be balanced if symbols are used.

Question 3(b)ii

Many candidates knew that the function of the piece of apparatus was to record temperature; however, some did not state that it was a thermometer. Some candidates said that a thermometer measures heat.

(ii) Explain the purpose of the piece of apparatus labelled **Q** in Figure 5.

(2)

Messure temperature to prevent boiling of unwanted ~~parts~~ solvents and only get ethanol

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Examiner Comments

This was an excellent answer that said why the thermometer was there (although it should have named the thermometer), and why you needed to measure the temperature in the first place.

Question 3(c)ii

Even though the formula was provided in the question, candidates did not always identify the correct values to substitute in. Some candidates were careless in their measurement of the distance moved by S.

Others, despite the diagram being labelled with the solvent front, subtracted numbers from the solvent front distance. Some candidates inverted their values in the formula. Even when all was correct, some candidates were unable to round correctly and produce 2 decimal places. Generally, candidates overcomplicated something that should have been simple.

(ii) The R_f value of a spot on the chromatogram can be calculated using the equation

$$R_f = \frac{\text{distance moved by the food dye}}{\text{distance moved by solvent front}}$$

Using the information in Figure 6, calculate the R_f value of the food dye labelled **S**.

Give your answer to 2 decimal places.

(3)

6.5 ÷ 4 =

R_f value of food dye **S** = 1.62

(Total for Question 3 = 9 marks)

ResultsPlus
Examiner Comments

This fraction is inverted. R_f values can never be greater than 1.

(ii) The R_f value of a spot on the chromatogram can be calculated using the equation

$$R_f = \frac{\text{distance moved by the food dye}}{\text{distance moved by solvent front}}$$

Using the information in Figure 6, calculate the R_f value of the food dye labelled **S**.

Give your answer to 2 decimal places.

(3)

$$\frac{4}{6.5}$$

R_f value of food dye **S** = 0.63

(Total for Question 3 = 9 marks)

ResultsPlus
Examiner Comments

This fraction is correct, but when calculated gives 0.61538..., which rounded is 0.62.

Question 4(c)i

As expected, many candidates correctly calculated the mass. The most common error was a misinterpretation of the brackets. For some candidates, everything including Zn was multiplied by 2, for others, Zn + N + 5O were used.

(c) When zinc reacts with very dilute nitric acid, zinc nitrate is formed.

(i) The formula of zinc nitrate is $Zn(NO_3)_2$

Calculate the relative formula mass of zinc nitrate, $Zn(NO_3)_2$

(relative atomic masses: Zn = 65, N = 14, O = 16)

(2)

Zn = 65 N = 14 × 2 = 28

O = 16 × 3 = 48 × 2 = 96

65 + 28 + 96 = 189

relative formula mass = 189g

ResultsPlus
Examiner Comments

This is a good answer clearly showing the working.

(c) When zinc reacts with very dilute nitric acid, zinc nitrate is formed.

(i) The formula of zinc nitrate is $Zn(NO_3)_2$

Calculate the relative formula mass of zinc nitrate, $Zn(NO_3)_2$

(relative atomic masses: Zn = 65, N = 14, O = 16)

(2)

~~65(14 x 16)~~

~~Zn(NO3)2~~ Zn(NO3)2

~~Zn 65 (14 X 16 X 3) x 2~~ 65(14x16x3)x2

relative formula mass = 65(14x16x3)x2

ResultsPlus Examiner Comments

This answer has the correct figures in an expression, but no value has been calculated.

Question 4(c)ii

Most candidates identified that the question required evidence that the reaction had **ended**. So, errors included bubbling or the balance value decreases.

(ii) A student investigates the reaction between a metal and a dilute acid using the apparatus shown in Figure 8.

Cotton wool is placed in the top of the apparatus as shown, to stop any acid from spraying out.

The total mass of the apparatus is shown at the start of the reaction and after the reaction has ended.

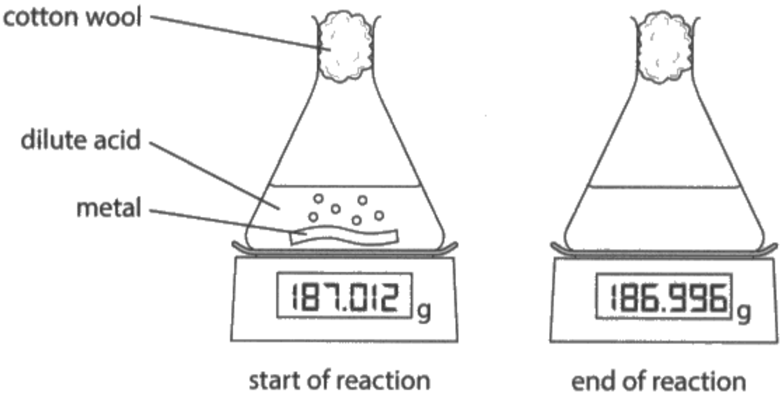

Figure 8

State **two** ways the student would know that the reaction has ended.

(2)

1 Metal will no longer produce bubbles, fully dissociated.

2 Change in grams would stop decreasing.

(Total for Question 4 = 9 marks)

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Examiner Comments

Both factors are correctly identified here.

Question 5(c)

A key error here was not linking the fact that they were doing a titration to the use of the indicator. Many answers talked about pH whereas that wasn't what the indicator is for in a titration. Other candidates seemed to think that Universal Indicator would be used. 'To show that a reaction has occurred' was a common incorrect response that was not specific enough.

(c) In this titration, the student uses methyl orange as the indicator.

Explain why an indicator is used in a titration.

(2)

To see concentration of acid. And easily changes colour with concentration eg: Orange - pink

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Examiner Comments

The answer says what an indicator does (colour change got 1 mark), but not why it is used in a titration.

(c) In this titration, the student uses methyl orange as the indicator.

Explain why an indicator is used in a titration.

(2)

an indicator is used to see the point when a reaction is complete as it indicates the change in PH

ResultsPlus
Examiner Comments

This answer has identified what the indicator is for – to show that the neutralisation is complete – but it does not say how it does that.

Question 5(d)

22.9 was worth 1 mark. Burette readings are always given to 2 decimal places, the final one being 0 or 5. Some candidates read the scale upside down giving 23.1(0).

(d) The student carries out a rough titration first.

Figure 9 shows the burette readings at the start and at the end of the titration.

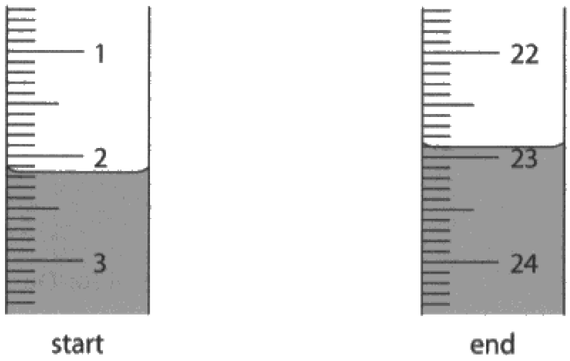

Figure 9

At the start of the titration, the burette reading is 2.15 cm^3.

Give the reading on the burette at the end of the titration.

(2)

23.1 cm^3

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Examiner Comments

The scale has been read upside down and only 1 decimal place is used.

Question 5(e)

It was surprising that the two concordant values were not often chosen. Even with incorrect choices, the incorrect use of a calculator hampered responses (by not always rounding correctly).

(e) The student carries out accurate titrations to obtain concordant results.

(i) Figure 10 shows the volume of solution delivered by the burette in the three accurate titrations.

Circle the volumes the student should use to calculate the mean volume.

	titration 1	titration 2	titration 3
volume in cm^3	20.00	20.10	20.25

Figure 10

(1)

(ii) Using the volumes that you have circled, calculate the mean volume of solution delivered by the burette.

(1)

20 + 20.10 + 20.25 = 60.35

60.35 ÷ 3 = 20.116

mean volume of solution = 20.116 cm^3

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Examiner Comments

It is incorrect to use all three figures as titration 3 is too far away to be included. Even so, the answer is well laid out, but the mean is 20.116666..., which rounded is 20.117, not 20.116.

Question 6(a)ii

This was reasonably well-answered, but some candidates produced metals not in the reactivity list. Incorrect answers were often copper or iron.

Question 6(b)

Many correct answers were seen, but candidates are advised to double check their calculations.

(b) 25 000 kg of an ore of iron was found to contain 10 050 kg of iron.

Calculate the percentage of iron in this ore of iron.

$$\text{percentage of metal} = \frac{\text{mass of metal}}{\text{mass of metal ore}} \times 100$$

(2)

10,050 kg ÷ 25,000 kg = 0.402805

0.402805 x 100 = 40.2805

percentage of iron in ore = 40.2805 %

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The correct numbers are given, but the answer has not been calculated correctly.

Question 6(c)i

Those candidates who didn't get the mark here omitted a reactant or product from the equation or attempted a symbol equation that was not fully correct.

(c) When copper oxide is heated with carbon, the products are copper and carbon dioxide.

(i) Write the word equation for this reaction.

(1)

Copper oxide + Carbon -> copper => Carbon dioxide

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Examiner Comments

This equation has the correct substances but it has two arrows.

Question 6(c)iii

There are different possible approaches here, but most correct responses scaled up from 159 to 238.5 : 238.5/159 x 127.

Question 6(c)iv

Many candidates indicated why carbon was used, rather than why **excess** carbon was used. Some failed to link the carbon to extracting the copper from the copper oxide. Identifying that the question is about extracting metals was the first step to a correct response.

(iv) State why this reaction with copper oxide uses excess carbon.

(1)

because oxygen reacts with carbon to create ~~car~~ carbon dioxide

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Examiner Comments

This is a correct reaction – but why is an excess used?

Question 6(d)

The need for conversion from cm^3 to dm^3 was not spotted by some candidates, and, of those who did spot this a good many did not know how to convert correctly. Most candidates achieved 1 mark for the mass/volume, 23.8/250. Some candidates did score the extra mark for converting to 2 significant figures.

(d) A solution of zinc sulfate was made by dissolving 23.8 g of the compound in water and was made up to a total volume of 250 cm^3 with water.

Calculate the concentration of this solution in $g\,dm^{-3}$.

$$\text{concentration } (g\,dm^{-3}) = \frac{\text{mass of solid (g)}}{\text{volume of solution } (dm^3)}$$

Give your answer to 2 significant figures.

(3)

23.8g ÷ 250 cm^3 = 0.09

concentration = 0.09 $g\,dm^{-3}$

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The volume has not been converted and the answer has not been correctly rounded to 2 significant figures.

Question 7(a)iii

This part was well-answered, paint or oil being common correct answers. Those candidates who did not gain the mark used loose fitting covers of various sorts, or said to keep the rods away from water.

(iii) State **one** way to prevent the corrosion of iron rods that will be used outside.

(1)

Add a protective layer to cover it.

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A more specific protection is required.

Question 7(a)iv

Some candidates did not adopt a logical approach – either by calculating the change in mass and then /5, or dividing by five both masses and subtracting. Some candidates got the first mark using the second route (calculating 0.906 and 0.75) but then added these 2 numbers up and divided by 2.

(iv) In an experiment, 5 iron rods were left outside in the rain for a few weeks.

The mass of the iron rods was found before they were left outside and again after a few weeks.

Figure 12 shows the recorded masses.

3.75 ÷ 5
= 0.75

mass of 5 iron rods before being left outside	3.75 g
mass of 5 iron rods after being outside for a few weeks	4.53 g

+3.78
+4.53

Figure 12

÷ 5 = 0.47

Use this information to calculate the mean increase in mass of **one** iron rod.

(2)

0.75 − 0.47 = 0.28

mean increase in mass of one iron rod = 0.28 g

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Examiner Comments

This method is correct, but the division by 5 of the final mass is not correct.

Question 7(b)ii

Some answers, a good minority, showed a good understanding of why an alloy was stronger. Candidates used 'neat rows' instead of layers; few described a lattice which is a better description. Many answers, however, stated that the gold was stronger than its alloy. Some candidates looked at the diagram and had the idea that gold alloy was a liquid because of the random arrangement of particles – hence weaker. Others mentioned irrelevant aspects such as conductivity, which was not asked for in the question. The best answers linked strength to atom sizes and to layers.

*(ii) Using Figure 13, compare pure gold and the gold alloy by

- describing how their atoms are arranged
- explaining the differences between the strength of the pure gold and the gold alloy.

(6)

Gold is structured in a ~~strog~~ strong lattice meaning that it is in a fixed position, regular arrangement, all atoms are same sizes and it doesn't move. Gold has a big strength and is really strong because all ~~atoms the atoms fixed position~~ the atoms positions are fixed and is structured togther so that they don't move. However, gold alloy is structured in weak lattice meaning that it is not in a fixed position, doesn't have a regular arrangement, all the atoms are different sizes and the atoms

slide past each other and bounce off each other. Gold alloy isn't strong ~~because~~ and hard because of how the atoms slide past each other between the layers and isn't in a fixed arrangement.

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Examiner Comments

This answer is limited to Level 1 because it says that the alloy is weaker.

*(ii) Using Figure 13, compare pure gold and the gold alloy by

- describing how their atoms are arranged
- explaining the differences between the strength of the pure gold and the gold alloy.

(6)

In pure gold, all of the atoms are the same shape and in a regular arrange-ment, making the atoms able to slide past one another. This makes pure gold weak and ~~easily~~ can be breken easily. The gold alloy has different size atoms which ~~stea~~ distrubs the arrangement and also ~~makes th~~ stops the atoms sliding past each other. This makes the gold alloy more durable.

(Total for Question 7 = 13 marks)

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Examiner Comments

This is a Level 2 answer which correctly links atom sizes to strength but does not give a full explanation in terms of layers sliding.

*(ii) Using Figure 13, compare pure gold and the gold alloy by

- describing how their atoms are arranged
- explaining the differences between the strength of the pure gold and the gold alloy.

(6)

Gold is arranged in a regular lattic structure and the particles are tightly bonded. Gold has a high melting point as it requires a lot of energy to break the metallic bonds. Gold is pure meaning it contains only one type of atom. This means that the layers can slide over each other easier.

The gold alloy is a mixture of more than one type of atom. Due to the atoms being different sizes the layers cannot easily slide over each other. This means that the gold alloy is much stronger. This also means that the melting point is higher as the bonds in between the atoms are much stronger as they are bonded through sharing electrons.

This means the ~~elect~~ intermolecular bonds are extremely strong.

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Examiner Comments

This is a Level 3 answer linking strength to atom size and sliding layers.

Question 8(a)ii

Many candidates knew that atomic number led to protons; rather fewer knew that it also gave the number of electrons. Some candidates mixed up electrons and neutrons.

(ii) All atoms of neon have an atomic number of 10.

Describe what information about the number of subatomic particles can be obtained from the atomic number of neon.

(2)

The atomic number tells us how many protons are in the atom, aswell as there is an equal number of electrons to protons, meaning there is 10 protons and 10 electrons

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A clearly expressed, correct answer.

Question 8(a)iii

A reasonable number of answers were able to identify the fact that the atoms have the same number of protons and electrons, but fewer went further explaining that the charges then cancel out. Incorrect answers included that this was because neon is a noble gas as it has a full outer shell or had a neutral pH.

(iii) Explain why atoms of neon are electrically neutral.

(2)

10 elections and 10 protons
Same number so positive and negative
charge cancel eachother out making it
neutral.

ResultsPlus
Examiner Comments

A well-expressed answer.

(iii) Explain why atoms of neon are electrically neutral.

(2)

~~Th~~ They are a noble gas, so are ~~unreactive. Th~~ inert. They have no overall charge as they have a full outer shell so unreactive.

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Examiner Comments

All atoms are neutral – the full outer shell is not relevant.

Question 8(b)

In this question, the explanation of groups was better than that for periods. Some answers failed to consider electrons, despite what was stated in the question. Equally, despite mentioning about electronic configuration, not many candidates took the hint about including these and relatively few examples were given. Most commonly the marks were scored for the part about the group number being the number of electrons in the outer shell. Some candidates then just repeated the same point about the outer shell, but for several different elements, so wrote a lot but not stating a general trend.

*(b) The structure of the periodic table and the position of the elements in the periodic table are linked to the electronic configuration of the elements.

Figure 15 shows the structure of the periodic table and the first 12 elements with their atomic numbers.

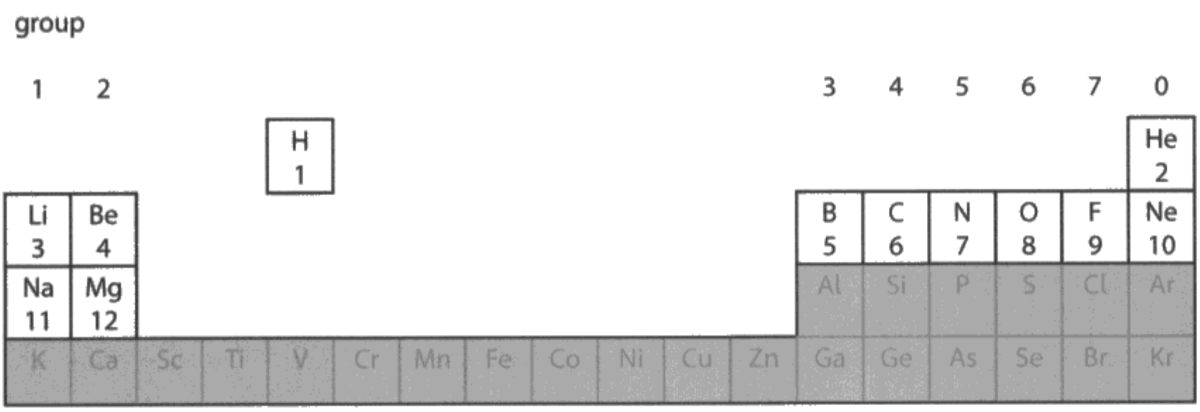

Figure 15

Use the first 12 elements shown in Figure 15 to explain

- how the structure of the periodic table is linked to the electronic configuration of the atoms of the elements
- how the arrangement of the elements is linked to their electronic configuration.

(6)

-group 1 elements are metals
- group 7 is noble gas

- its arranged in order the ~~[illegible]~~ atomic. number increases everytime
- For example Lithium is 3 and Berylium is 4.
- its arranged from the less boiling point to the high boiling point

- Its arranged from ~~high~~ less flammable to high flammable.

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Examiner Comments

This answer did not direct itself to the question so did not score.

*(b) The structure of the periodic table and the position of the elements in the periodic table are linked to the electronic configuration of the elements.

Figure 15 shows the structure of the periodic table and the first 12 elements with their atomic numbers.

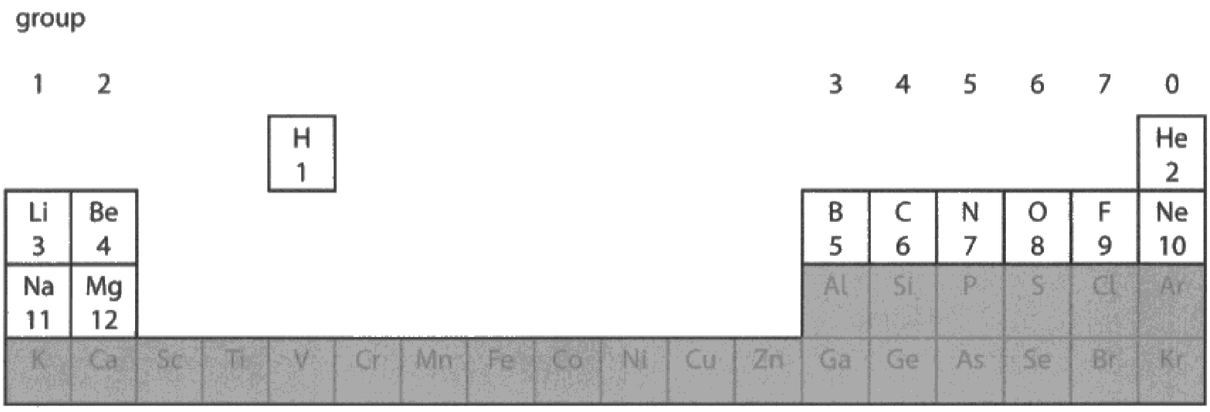

Figure 15

Use the first 12 elements shown in Figure 15 to explain

- how the structure of the periodic table is linked to the electronic configuration of the atoms of the elements
- how the arrangement of the elements is linked to their electronic configuration.

(6)

As the electronic configuration tells us what group the elements is. for example Lithium is 2.1 which tells us it's in group 1. Also the periodic table helps us with the electronic configuration. for example Since Carbon (c) ~~+~~ is in group 4 we know the last number for the electronic configuration is 4.

The electronic configuration also can tell us what period the ~~ele~~ element is in. For example Sodium (Na) since the electronic ~~configur~~ configuration is 2.8.1 we know it is in Period 3 because of how many numbers there are.

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Examiner Comments

A Level 1 answer. It gives some correct examples but does not state overall patterns.

*(b) The structure of the periodic table and the position of the elements in the periodic table are linked to the electronic configuration of the elements.

Figure 15 shows the structure of the periodic table and the first 12 elements with their atomic numbers.

group

1	2											3	4	5	6	7	0
				H 1													He 2
Li 3	Be 4											B 5	C 6	N 7	O 8	F 9	Ne 10
Na 11	Mg 12											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr

Figure 15

Use the first 12 elements shown in Figure 15 to explain

- how the structure of the periodic table is linked to the electronic configuration of the atoms of the elements
- how the arrangement of the elements is linked to their electronic configuration.

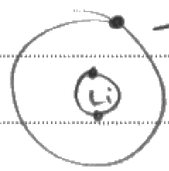
(6)

Arrangment:

The groups show how many electrons are in the last shell of each element

e.g. group 1

Li 3

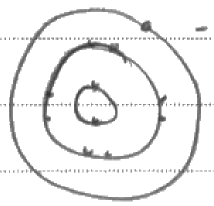


– 1 electron on outer shell

The periods show how many shells each element has in total

e.g. period 3

Na^{23}_{11}



- 3 shells

~~The atom~~

The elements are in order of atomic number (increases going left in order).

eg. Li Be B C
3 4 5 6

Hydrogen is not linked with the table but is in period 1 with Helium

electronic configuration increases as you go along and down the elements.

ResultsPlus
Examiner Comments

A Level 3 answer, correctly linking group and period to electronic configuration with an example.

Question 9(a)i

The formula was reasonably well done, but perhaps surprisingly, s or l were given for KCl, described as a solution in the question.

Question 9(a)iii

Whilst many candidates realised that filtration was required, some didn't realise that it was an **explain** question worth 3 marks, which needed detail to explain what it was they were going to do. Some candidates wanted to heat the mixture up. Sometimes candidates gave two options, such as filter or evaporate/distil, and so cost themselves the mark due to a list, only one part of which was correct.

(iii) State and explain how the white precipitate can be separated from the reaction mixture.

(3)

Filtration : put the reaction mixture into a filter paper. put the filter paper into a filter funnel. place the filter funnel into a beaker. The reaction mixture drips from the ~~into the~~ tiny hole in the filter paper ~~beaker~~ into the beaker. The white precipitate is then left in the filter paper. It is usually called the residue becomes it is the remains of the reaction mixture that couldn't pass through the filter paper.

ResultsPlus
Examiner Comments

This is not perfect – the 'reaction mixture' does not drip through, only the potassium nitrate solution – but the answer is in the correct format for an explanation.

(iii) State and explain how the white precipitate can be separated from the reaction mixture.

(3)

the white precipitate can be removed ~~through~~ from the solution by evaporating the solution. The solution and white percipitate should be added to a test tube. the test tube should be heated until the solution has all been evaporated.

ResultsPlus
Examiner Comments

A common error – heating the mixture would leave two solids, the silver chloride and the potassium nitrate.

Question 9(b)

Many candidates understood that conduction was about the movement of charged particles, but some got the ions and electrons the wrong way round. Most candidates were able to state that solid metals had delocalised electrons. Fewer candidates explained about ions in silver nitrate. Some candidates thought that silver nitrate could conduct because it contained a metal and metals were good conductors.

(b) Silver nitrate solution conducts electricity.
Solid silver also conducts electricity.

Describe how silver nitrate solution conducts electricity and how solid silver conducts electricity.

(3)

they contains delocalised electron allows them to move freely and conduct electricity silver nitrate solution is liquid. it's hard to conduct electricity but solid silver is solid it can move electrons more freely

ResultsPlus
Examiner Comments

A partially correct answer, but no mention of ions in silver nitrate.

Question 9(c)ii

This was generally well-answered, ‘goggles’ and ‘gloves’ were the common correct answers. Some candidates did not score with PPE, lab coat etc, as they were not specific enough.

Question 10(a)ii

Some answers realised that litmus only gave two colours, but many did not seem to understand what litmus paper is, writing comments like ‘it’s unreactive’, ‘it’s not found on the periodic table’.

(ii) State why litmus cannot be used to measure pH.

(1)

~~you~~ you need to measure PH with a PH Probe ~~[illegible]~~

ResultsPlus
Examiner Comments

This is correct but does not say why litmus is unsuitable.

(ii) State why litmus cannot be used to measure pH.

(1)

only shows if something is acid or alkali, not specific pH.

ResultsPlus
Examiner Comments

This answer shows an understanding of litmus.

Question 10(b)

Some answers were duplicates eg ‘to help plants grow’ and ‘to increase yield’. Lots of candidates misunderstood and thought that fertilisers were pesticides – ‘to keep away/kill pests/insects’.

Question 10(c)i

A well-answered question, correctly evaluated.

(c) An experiment was carried out to produce phosphoric acid.

(i) The actual yield for the experiment was 18.62 g.

The theoretical yield for the experiment is 24.50 g.

$$\text{percentage yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$$

Calculate the percentage yield of this experiment.

(2)

$$\frac{18.62}{24.5}$$

percentage yield = $\cancel{0}$.76

ResultsPlus
Examiner Comments

This candidate has not x 100.

Question 10(c)ii

Atom economy was not really well understood. The values were given, so just careful addition (not always done carefully) was required. Some candidates did calculate the masses needed, but did not know what to do with them.

(ii) The equation for a reaction to make phosphoric acid, H_3PO_4, is

$$Ca_5(PO_4)_3OH + 5H_2SO_4 \rightarrow 3H_3PO_4 + 5CaSO_4 + H_2O$$

Calculate the atom economy for the production of phosphoric acid in this reaction.

$$\text{atom economy (\%)} = \frac{\text{total formula mass of desired product}}{\text{total formula mass of all reactants or products}} \times 100$$

(relative formula masses: $Ca_5(PO_4)_3OH = 502$, $H_2SO_4 = 98$, $H_3PO_4 = 98$, $CaSO_4 = 136$, $H_2O = 18$)

(3)

$3H_3PO_4 \rightarrow 98 \times 3 = 294$

$Ca_5(PO_4)_3OH + 5H_2SO_4 \rightarrow 5 \times 98 = 490 + 502 = 992$

$\frac{294}{992} \times 100 = 29.64$

atom economy = 29.64 %

ResultsPlus
Examiner Comments

A carefully worked out, correct answer.

Question 10(c)iii

Most candidates got that a use needed to be found for further products, but not all were able to express this clearly.

Paper Summary

Based on their performance on this paper, candidates should:

- Learn the full description of tests for gases and ions.
- Learn how to round numbers to an appropriate number of significant figures, and how to convert units eg cm^3 to dm^3.
- Learn the practical steps in a titration and how to choose and find the mean of concordant results.
- Compare the two methods of extracting metals – heating with carbon and electrolysis.
- Understand how the model of an alloy explains its strength.
- Understand how metals and ionic solutions conduct electricity.

Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link: https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

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