PEARSON EDEXCEL GCSE CHEMISTRY · 1CH0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 1: KEY CONCEPTS IN CHEMISTRY (PACK 5)

SCORE	PERCENTAGE
/147	%

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Q1.

The table shows the number of electrons, neutrons and protons in particles P, Q, R, S, T and V.

particle	number of		
	electrons	neutrons	protons
P	1	0	1
Q	3	4	3
R	8	8	8
S	13	14	13
T	18	16	16
V	18	20	20

(i) Which particle is a negatively charged ion?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** P

☒ **B** S

☒ **C** T

☒ **D** V

(ii) Which particles are atoms of metals?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** P and R

☒ **B** Q and R

☒ **C** Q and S

☒ **D** Q, S and V

Q2.

The table shows the number of electrons, neutrons and protons in particles P, Q, R, S, T and V.

particle	number of		
	electrons	neutrons	protons
P	1	0	1
Q	3	4	3
R	8	8	8
S	13	14	13
T	18	16	16
V	18	20	20

(i) Which particle is a negatively charged ion?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** P

☒ **B** S

☒ **C** T

☒ **D** V

(ii) Which particles are atoms of metals?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** P and R

☒ **B** Q and R

☒ **C** Q and S

☒ **D** Q, S and V

Q3.

Phosphorus oxide is a compound that contains covalent bonds.

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

(2)

.....

.....

.....

.....

(ii) The formula of a molecule of phosphorus oxide is P_4O_{10}

Give the empirical formula of this oxide.

(1)

.....

Q4.

Phosphorus oxide is a compound that contains covalent bonds.

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

(2)

.....

.....

.....

.....

(ii) The formula of a molecule of phosphorus oxide is P_4O_{10}

Give the empirical formula of this oxide.

(1)

.....

Q5.

(i) Titanium(IV) oxide is an ionic solid.
Many ionic solids are soluble in water.

Titanium(IV) oxide is not soluble in water.
Its other physical properties are typical of ionic solids.

Predict **one** other physical property of titanium(IV) oxide that would be typical of ionic solids.

(1)

.....

(ii) The formula of titanium(IV) oxide is TiO_2.

Deduce the charge of the titanium ion in titanium(IV) oxide.

(1)

.....

.....

(Total for question = 2 marks)

Q6.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Gallium, Ga, is in the same group of the modern periodic table as aluminium.

The formula of aluminium oxide is Al_2O_3.

(i) Predict the formula of gallium oxide.

(1)

.....

(ii) Gallium oxide has a very high melting point.

Gallium oxide does not conduct electricity when solid but does conduct electricity when molten.

What type of substance is gallium oxide?

(1)

☒ **A** giant covalent

☒ **B** ionic

☒ **C** metallic

☒

D simple molecular

(Total for question = 2 marks)

Q7.

Which row of the table correctly shows the boiling point and ability to conduct electricity of a simple molecular, covalent liquid?

Put a cross (☒) in the box next to your answer.

(1)

	boiling point	ability to conduct electricity
☒ **A**	low	good
☒ **B**	high	poor
☒ **C**	low	poor
☒ **D**	high	good

Q8.

Which row of the table correctly shows the boiling point and ability to conduct electricity of a simple molecular, covalent liquid?

Put a cross (☒) in the box next to your answer.

(1)

	boiling point	ability to conduct electricity
☒ **A**	low	good
☒ **B**	high	poor
☒ **C**	low	poor
☒ **D**	high	good

Q9.

State **two** characteristic properties of metals.

(2)

property 1

.....

property 2

.....

(Total for question = 2 marks)

Q10.

Silver is a metal that is often used in jewellery.

Give one property of silver that makes it a suitable material for use in jewellery.

(1)

.....

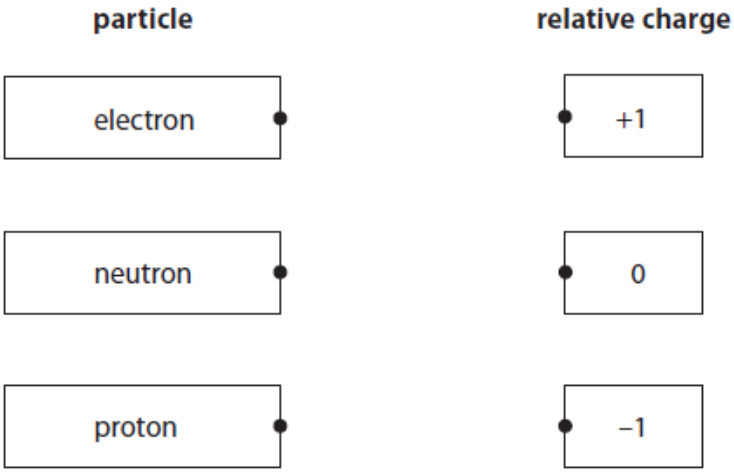
(Total for question = 1 mark)

Q11.

Atoms contain electrons, neutrons and protons.

(i) Draw one line to link each particle to its correct relative charge.

(2)



(ii) Which of the following is the relative mass of a proton?

(1)

☒ **A** 0

☒ **B** $\frac{1}{1837}$

☒ **C** 1

☒ **D** −1

(Total for question = 3 marks)

Q12.

A solution is made by dissolving calcium chloride in water.

11.1 g of calcium chloride are dissolved in water.

The volume of the solution is made up to 500 cm^3.

Calculate the concentration, in mol dm^{-3}, of calcium chloride, $CaCl_2$, in this solution.

(relative atomic masses: Cl = 35.5, Ca = 40.0)

(3)

.....

.....

.....

.....

.....

.....

.....

concentration = ...mol dm^{-3}

Q13.

A solution is made by dissolving calcium chloride in water.

11.1 g of calcium chloride are dissolved in water.

The volume of the solution is made up to 500 cm^3.

Calculate the concentration, in mol dm^{-3}, of calcium chloride, $CaCl_2$, in this solution.

(relative atomic masses: Cl = 35.5, Ca = 40.0)

(3)

.....

.....

.....

.....

.....

.....

.....

concentration = ...mol dm^{-3}

Q14.

When iron reacts with copper sulfate solution, solid copper is formed.

Two possible equations for this reaction are

A $CuSO_4 + Fe \rightarrow Cu + FeSO_4$
B $3CuSO_4 + 2Fe \rightarrow 3Cu + Fe_2(SO_4)_3$

It was found that 10.00 g of iron powder reacted with excess copper sulfate solution to produce 11.34 g of copper.

Carry out a calculation to decide which equation, **A** or **B**, represents the reaction taking place.

(relative atomic masses: Fe = 56.0, Cu = 63.5)

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q15.

Covalent substances can be simple molecular covalent or giant covalent.

(i) Ammonia is a simple molecular, covalent substance.

Which is the most likely set of properties for ammonia?

(1)

	melting point in °C	boiling point in °C	ability to conduct electricity in liquid state
☒ A	1713	2950	does not conduct
☒ B	−78	−33	does not conduct
☒ C	−39	357	conducts
☒ D	801	1413	conducts

(ii) Ammonia, NH_3, is made by reacting nitrogen with hydrogen.

Write the balanced equation for this reaction.

(2)

.....

(Total for question = 3 marks)

Q16.

Dilute hydrochloric acid reacts with silver nitrate solution to form silver chloride and nitric acid.

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

The reaction produces silver chloride as a precipitate.
In an equation this would be shown as

(1)

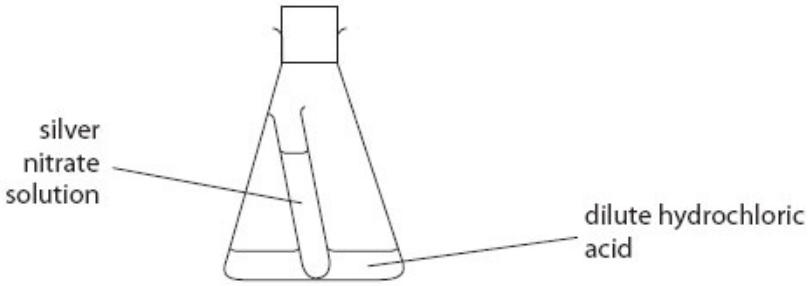
☒ **A** AgCl(aq)

☒ **B** AgCl(g)

☒ **C** AgCl(l)

☒ **D** AgCl(s)

(ii) This apparatus is used to investigate the mass of the reactants and the mass of products in this reaction.



The total mass of this apparatus was measured.
The flask was shaken to allow the silver nitrate solution and dilute hydrochloric acid to react.
After the reaction the total mass of the apparatus was measured again.

State how the total mass of the apparatus after the reaction will compare with the total mass of the apparatus before the reaction.

(1)

.....

(iii) Write the balanced equation for the reaction of silver nitrate solution, $AgNO_3$, with dilute hydrochloric acid to form silver chloride, AgCl, and nitric acid.

(2)

.....

Q17.

Dilute hydrochloric acid reacts with silver nitrate solution to form silver chloride and nitric acid.

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

The reaction produces silver chloride as a precipitate.
In an equation this would be shown as

(1)

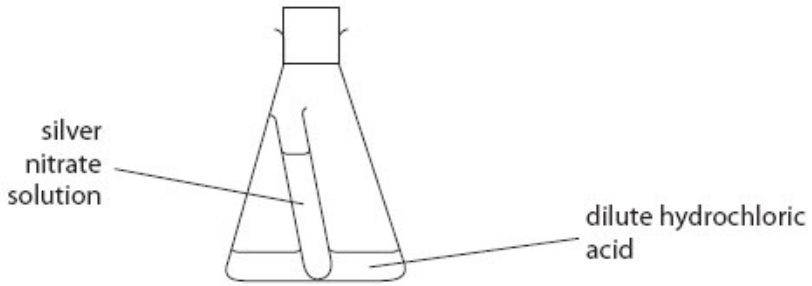
☒ **A** AgCl(aq)

☒ **B** AgCl(g)

☒ **C** AgCl(l)

☒ **D** AgCl(s)

(ii) This apparatus is used to investigate the mass of the reactants and the mass of products in this reaction.



The total mass of this apparatus was measured.
The flask was shaken to allow the silver nitrate solution and dilute hydrochloric acid to react.
After the reaction the total mass of the apparatus was measured again.

State how the total mass of the apparatus after the reaction will compare with the total mass of the apparatus before the reaction.

(1)

.....

(iii) Write the balanced equation for the reaction of silver nitrate solution, $AgNO_3$, with dilute hydrochloric acid to form silver chloride, AgCl, and nitric acid.

(2)

.....

Q18.

(i) Explain what is meant by the term relative atomic mass.

(2)

.....

.....

.....

.....

(ii) A sample of boron contains
19.7% of boron-10.
80.3% of boron-11.

Use this information to calculate the relative atomic mass of boron.

(3)

.....

.....

.....

.....

.....

.....

Q19.

(i) Explain what is meant by the term relative atomic mass.

(2)

.....

.....

.....

.....

(ii) A sample of boron contains
19.7% of boron-10.
80.3% of boron-11.

Use this information to calculate the relative atomic mass of boron.

(3)

.....

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.....

Q20.

Calculate the relative formula mass of butene, C_4H_8.

(relative atomic masses: H = 1, C = 12)

(2)

.....

relative formula mass .....

(Total for question = 2 marks)

Q21.

Salts and analysis

(a) Which of the following pairs of substances contains one substance that is soluble in water and one that is insoluble in water?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** aluminium nitrate and lead sulfate

☒ **B** ammonium chloride and copper sulfate

☒ **C** copper hydroxide and lead sulfate

☒ **D** sodium hydroxide and potassium nitrate

(b) Barium chloride is an ionic compound and has a high melting point.

Explain why barium chloride has a high melting point.

(2)

.....

.....

.....

.....

(c) Barium chloride solution is used to test for the presence of sulfate ions in a solution.

When sulfate ions are present, insoluble barium sulfate is formed.

(i) Describe the appearance of barium sulfate.

(1)

.....

(ii) Complete the balanced equation for the reaction between barium chloride and potassium sulfate.

(2)

$BaCl_2 + K_2SO_4 \rightarrow$ .....

(d) Compound **X** is a metal carbonate.

(i) A flame test was carried out on compound **X**.
A lilac flame was seen.

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

(1)

The formula of the metal ion in compound **X** is

☒ **A** Ca^{2+}

☒ **B** Cu^{2+}

☒ **C** K^{+}

☒ **D** Na^{+}

(ii) Lead carbonate is an insoluble salt.

Describe how a pure, dry sample of solid lead carbonate can be obtained from sodium carbonate solution and lead nitrate solution.

(3)

.....

.....

.....

.....

.....

.....

(Total for question = 10 marks)

Q22.

Salts and analysis

(a) Which of the following pairs of substances contains one substance that is soluble in water and one that is insoluble in water?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** aluminium nitrate and lead sulfate

☒ **B** ammonium chloride and copper sulfate

☒ **C** copper hydroxide and lead sulfate

☒ **D** sodium hydroxide and potassium nitrate

(b) Barium chloride is an ionic compound and has a high melting point.

Explain why barium chloride has a high melting point.

(2)

.....

.....

.....

.....

(c) Barium chloride solution is used to test for the presence of sulfate ions in a solution.

When sulfate ions are present, insoluble barium sulfate is formed.

(i) Describe the appearance of barium sulfate.

(1)

.....

(ii) Complete the balanced equation for the reaction between barium chloride and potassium

sulfate.

(2)

$BaCl_2 + K_2SO_4 \rightarrow$ .....

(d) Compound **X** is a metal carbonate.

(i) A flame test was carried out on compound **X**.
A lilac flame was seen.

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

(1)

The formula of the metal ion in compound **X** is

☒ **A** Ca^{2+}

☒ **B** Cu^{2+}

☒ **C** K^{+}

☒ **D** Na^{+}

(ii) Lead carbonate is an insoluble salt.

Describe how a pure, dry sample of solid lead carbonate can be obtained from sodium carbonate solution and lead nitrate solution.

(3)

.....

.....

.....

.....

.....

.....

(Total for question = 10 marks)

Q23.

Salts

(a) A mass of magnesium sulfate was taken.

mass of watch glass + magnesium sulfate = 18.50 g

mass of watch glass = 18.20 g

The solid was dissolved in water to make 500 cm^3 solution.

Calculate the concentration of the magnesium sulfate solution in g dm^{-3}.

(1000 cm^3 = 1 dm^3)

(2)

.....

.....

.....

concentration = ... g dm^{-3}

(b) A titration is used to determine the exact volumes of sulfuric acid and sodium hydroxide solution that neutralise each other.

25.00 cm^3 of sodium hydroxide solution is put into a conical flask and a few drops of indicator solution are added.

The sulfuric acid is added slowly from a burette until the indicator changes colour when all the sodium hydroxide is just neutralised.

(i) State what is used to measure out 25.00 cm^3 of sodium hydroxide solution.

(1)

.....

(ii) State the name of an indicator that could be used and the colour change seen in this titration.

(3)

indicator

.....

colour in sodium hydroxide solution

.....

colour at end of titration

.....

*(c) Copper sulfate is a soluble salt.

Copper sulfate can be prepared by reacting copper oxide with dilute sulfuric acid.
Copper oxide is an insoluble solid.

Describe how you would prepare some pure, dry crystals of copper sulfate by reacting excess copper oxide with dilute sulfuric acid.

(6)

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(Total for question = 12 marks)

Q24.

Salts

(a) A mass of magnesium sulfate was taken.

mass of watch glass + magnesium sulfate = 18.50 g

mass of watch glass = 18.20 g

The solid was dissolved in water to make 500 cm^3 solution.

Calculate the concentration of the magnesium sulfate solution in g dm^{-3}.

(1000 cm^3 = 1 dm^3)

(2)

.....

.....

.....

concentration = ... g dm^{-3}

(b) A titration is used to determine the exact volumes of sulfuric acid and sodium hydroxide solution that neutralise each other.

25.00 cm^3 of sodium hydroxide solution is put into a conical flask and a few drops of indicator solution are added.

The sulfuric acid is added slowly from a burette until the indicator changes colour when all the sodium hydroxide is just neutralised.

(i) State what is used to measure out 25.00 cm^3 of sodium hydroxide solution.

(1)

.....

(ii) State the name of an indicator that could be used and the colour change seen in this titration.

(3)

indicator

.....

colour in sodium hydroxide solution

.....

colour at end of titration

.....

*(c) Copper sulfate is a soluble salt.
Copper sulfate can be prepared by reacting copper oxide with dilute sulfuric acid.
Copper oxide is an insoluble solid.

Describe how you would prepare some pure, dry crystals of copper sulfate by reacting excess copper oxide with dilute sulfuric acid.

(6)

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.....

(Total for question = 12 marks)

Q25.

Salts

(a) Solutions of soluble salts can react together to form an insoluble salt.

What name is given to this type of reaction?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** combustion

☒ **B** neutralisation

☒ **C** precipitation

☒ **D** separation

(b) Information about the solubility of some salts is given below.

- all nitrates are soluble
- all common carbonates are insoluble except sodium carbonate, potassium carbonate and ammonium carbonate.

Copper carbonate can be made by reacting together solutions of sodium carbonate and copper nitrate.

Complete this equation by filling in the missing state symbols.

(2)

$$\text{sodium carbonate}(aq) + \text{copper nitrate}(aq) \rightarrow \text{copper carbonate}(\ldots\ldots) + \text{sodium nitrate}(\ldots\ldots)$$

(c) The symbol for a copper ion is Cu^{2+}.

The symbol for a carbonate ion is CO_3^{2-}.

Write the formula for copper carbonate.

(1)

.....

(d) In an experiment, solid lead iodide is produced in a mixture with a solution of a soluble salt.

Describe how a pure, dry sample of solid lead iodide can be obtained from this mixture.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

(e) Two tests were carried out to identify the ions in salt **X**.

(i) Test: flame test on solid salt **X**.

Result: lilac flame.

Identify the ion in salt **X** that gives the lilac flame.

(1)

ion in salt **X** .....

(ii) Test: addition of dilute nitric acid and silver nitrate solution to a solution of salt **X**.

Result: white solid formed.

Identify the ion in salt **X** that produces the white solid.

(1)

ion in salt **X** .....

(Total for question = 9 marks)

Q26.

Salts

(a) Solutions of soluble salts can react together to form an insoluble salt.

What name is given to this type of reaction?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** combustion

☒ **B** neutralisation

☒ **C** precipitation

☒ **D** separation

(b) Information about the solubility of some salts is given below.

- all nitrates are soluble
- all common carbonates are insoluble except sodium carbonate, potassium carbonate and ammonium carbonate.

Copper carbonate can be made by reacting together solutions of sodium carbonate and copper nitrate.

Complete this equation by filling in the missing state symbols.

(2)

$$\text{sodium carbonate}(aq) + \text{copper nitrate}(aq) \rightarrow \text{copper carbonate}(\ldots\ldots) + \text{sodium nitrate}(\ldots\ldots)$$

(c) The symbol for a copper ion is Cu^{2+}.

The symbol for a carbonate ion is CO_3^{2-}.

Write the formula for copper carbonate.

(1)

.....

(d) In an experiment, solid lead iodide is produced in a mixture with a solution of a soluble salt.

Describe how a pure, dry sample of solid lead iodide can be obtained from this mixture.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

(e) Two tests were carried out to identify the ions in salt **X**.

(i) Test: flame test on solid salt **X**.

Result: lilac flame.

Identify the ion in salt **X** that gives the lilac flame.

(1)

ion in salt **X** .....

(ii) Test: addition of dilute nitric acid and silver nitrate solution to a solution of salt **X**.

Result: white solid formed.

Identify the ion in salt **X** that produces the white solid.

(1)

ion in salt **X** .....

(Total for question = 9 marks)

Q27.

Sodium chloride is a metal chloride which is soluble in cold water.

(i) Give the name of a metal chloride which is insoluble in cold water.

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** copper chloride

☒ **B** lead chloride

☒ **C** magnesium chloride

☒ **D** potassium chloride

(ii) Sodium chloride has a melting point of 801 °C.

Explain why the melting point of sodium chloride is high.

(2)

.....

.....

.....

(iii) Describe how you would test for the presence of chloride ions in a solution of sodium chloride.

(3)

.....

.....

.....

.....

.....

.....

Q28.

Sodium chloride is a metal chloride which is soluble in cold water.

(i) Give the name of a metal chloride which is insoluble in cold water.

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** copper chloride

☒ **B** lead chloride

☒ **C** magnesium chloride

☒ **D** potassium chloride

(ii) Sodium chloride has a melting point of 801 °C.

Explain why the melting point of sodium chloride is high.

(2)

.....

.....

.....

(iii) Describe how you would test for the presence of chloride ions in a solution of sodium chloride.

(3)

.....

.....

.....

.....

.....

.....

Q29.

A sample of silicon contains isotopes.

(i) State, in terms of subatomic particles, how atoms of these isotopes are the same.

(1)

.....

.....

(ii) This sample of silicon contains three isotopes.

92% of the atoms are silicon-28
5% of the atoms are silicon-29
3% of the atoms are silicon-30

Calculate the relative atomic mass of silicon in this sample.

(2)

.....

.....

.....

.....

.....

.....

relative atomic mass = ...

(Total for question = 3 marks)

Q30.

A student investigated the reaction between potassium iodide and lead nitrate.

(i) Solutions of potassium iodide and lead nitrate were mixed together.

Lead iodide and potassium nitrate were formed.

Complete the word equation.

(2)

..... + ... → ..... + ...

(ii) The student recorded the total mass of the reactants and the total mass of the products.

The results are shown in Figure 4.

	reactants	products
total mass in g	21.7	21.7

Figure 4

State how the results in Figure 4 show that mass is conserved in this reaction.

(1)

.....

.....

(Total for question = 3 marks)

Q31.

State how you know that calcium is a metal from its position in the periodic table.

(1)

.....

.....

(Total for question = 1 mark)

Q32.

In the 19^{th} century, Mendeleev arranged the elements known at the time to form his periodic table.
Mendeleev's periodic table is different from the modern periodic table.

State **one** difference between Mendeleev's periodic table and the modern periodic table.

(1)

.....

.....

(Total for question = 1 mark)

Q33.

In Figure 8, the letters **A**, **E**, **G**, **J**, **X** and **Z** show the positions of six elements in the periodic table.

These letters are not the symbols of the atoms of these elements.

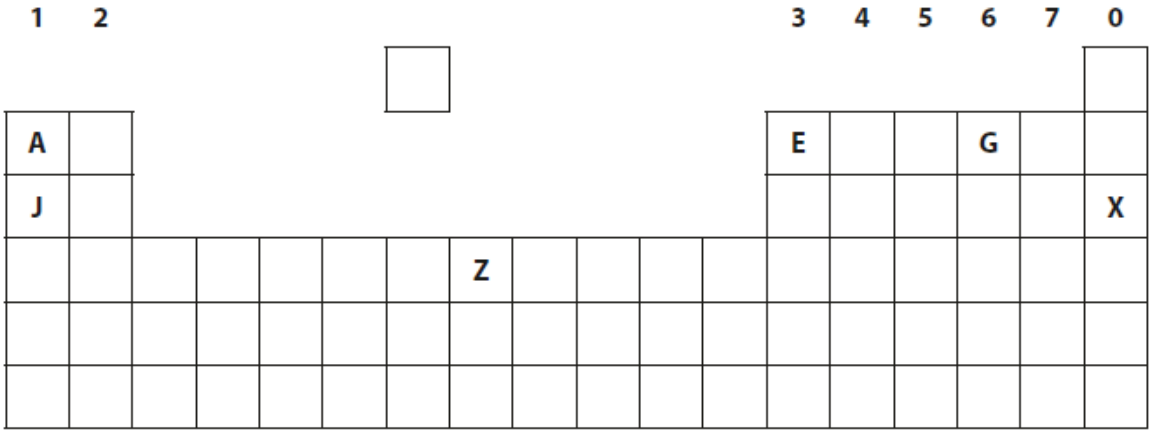


Figure 8

Element **X** has an atomic number of 18.

State the electronic configuration of an atom of element **X**.

(1)

.....

(Total for question = 1 mark)

Q34.

In Figure 1, the letters **A**, **E**, **G**, **J**, **X** and **Z** show the positions of six elements in the periodic table.

These letters are not the symbols of the atoms of these elements.

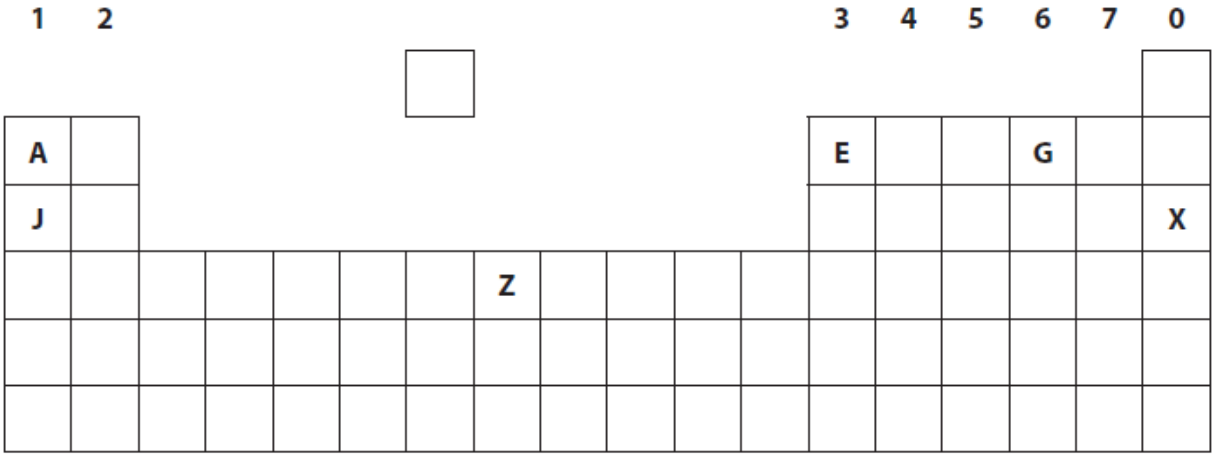


Figure 1

Element **X** has an atomic number of 18.

State the electronic configuration of an atom of element **X**.

(1)

.....

(Total for question = 1 mark)

Q35.

A carbon atom contains 6 electrons, 7 neutrons and 6 protons.

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

(1)

.....

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

(1)

.....

(Total for question = 2 marks)

Q36.

A carbon atom contains 6 electrons, 7 neutrons and 6 protons.

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

(1)

.....

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

(1)

.....

(Total for question = 2 marks)

Q37.

Answer the questions with a cross in the boxes you think are correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Fluorine, chlorine, bromine and iodine are elements in group 7 of the periodic table.

(i) State the name given to the group 7 elements.

(1)

.....

(ii) Name one other element that is in group 7.
Use the periodic table on the back of this exam paper to help you.

(1)

.....

(iii) Which element is liquid at room temperature and pressure?

(1)

☒ **A** fluorine

☒ **B** chlorine

☒ **C** bromine

☒ **D** iodine

(iv) Which element is dark-grey in colour at room temperature and pressure?

(1)

☒ **A** fluorine

☒ **B** chlorine

☒ **C** bromine

☒ **D** iodine

(Total for question = 4 marks)

Q38.

This question is about the metal gold.

(i) Gold can be hammered into shape.

State the name of this property.

(1)

.....

(ii) Gold alloys can be used to repair teeth.
One reason that gold alloys are used is that they can be hammered into shape.

Give **one other** reason why gold alloys are used to repair teeth.

(1)

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.....

.....

(Total for question = 2 marks)

Q39.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Sodium reacts with hydrochloric acid to form sodium chloride and hydrogen.

(i) Write the word equation for this reaction.

(2)

..... → .....

(ii) The hazard symbol shown in Figure 1 is used on containers of sodium.



Figure 1

What is the meaning of this hazard symbol?

(1)

☒ **A** corrosive

☒ **B** flammable

☒ **C** oxidising

☒ **D** toxic

(iii) Hydrogen has one electron in its electron shell.

Figure 2 shows the incomplete dot and cross diagram of a hydrogen molecule.

Complete Figure 2 to show the electrons in the covalent bond between the two atoms of hydrogen.

(1)

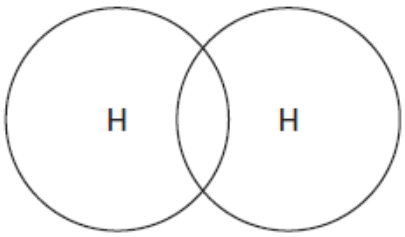


Figure 2

(Total for question = 4 marks)

Q40.

Chlorine, bromine and iodine are elements in group 7 of the periodic table.

Figure 8 shows apparatus used to find out if a solution conducts electricity.

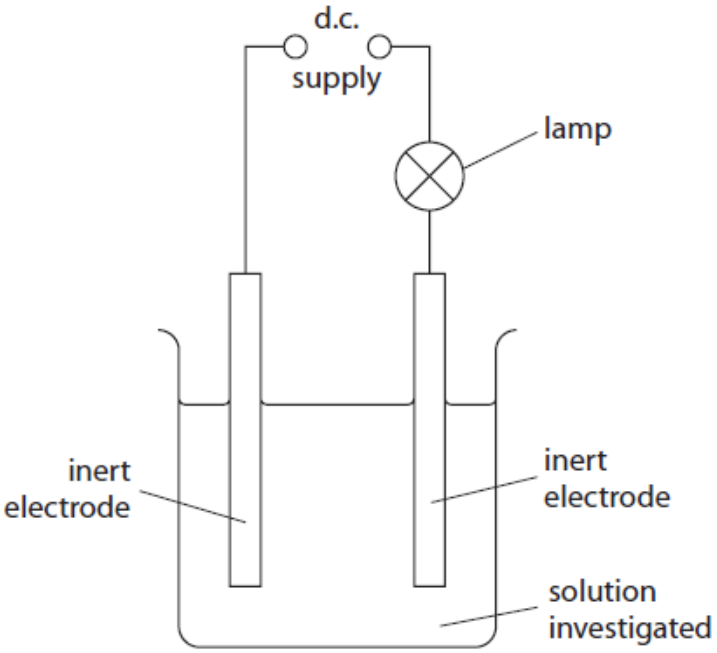


Figure 8

Glucose solution and sodium chloride solution are tested.
Glucose is a typical simple molecular covalent compound.
Sodium chloride is an ionic compound.

(i) State what would happen to the lamp when glucose solution is tested.

(1)

.....

.....

(ii) State what would happen to the lamp when sodium chloride solution is tested.

(1)

.....

.....

(Total for question = 2 marks)

Q41.

Transition metals have many uses.

Most iron produced is converted into alloys of iron.

(i) State why alloys have more uses than pure metals.

(1)

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(ii) An alloy of iron contains 0.40 % of molybdenum.

Calculate the mass of molybdenum contained in a 30 g sample of this alloy of iron.

(2)

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.....

.....

mass of molybdenum = ... g

(Total for question = 3 marks)

Q42.

This question is about the noble gases.

Mendeleev produced one of the earliest periodic tables.

State why he could **not** include any of the noble gases in his periodic table.

(1)

.....

(Total for question = 1 mark)

Q43.

Figure 1 shows the dot and cross diagram for a molecule of ammonia.

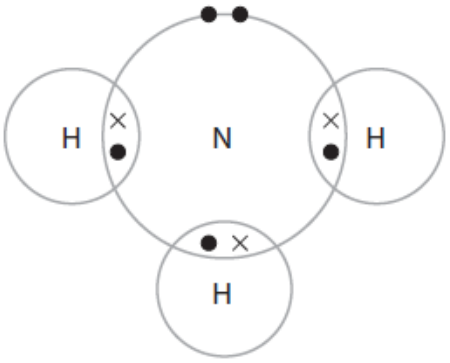


Figure 1

(i) What do the dots and crosses represent in the diagram?

(1)

☒ **A** electrons

☒ **B** neutrons

☒ **C** protons

☒ **D** nuclei

(ii) Give the formula for the molecule of ammonia.

(1)

.....

(Total for question = 2 marks)

Q44.

Alloy steels are made when iron is alloyed with other transition metals such as cobalt and chromium.

Metals have high melting points.

Explain, in terms of their structure and bonding, why metals have high melting points.

(2)

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.....

(Total for question = 2 marks)

Q45.

Figure 4 shows the atomic number and mass number of two isotopes of argon.

isotope	atomic number	mass number
argon-38	18	38
argon-40	18	40

Figure 4

Describe the structure of an atom of argon-38 and of an atom of argon-40.

(3)

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(Total for question = 3 marks)

Q46.

Covalent substances can be simple molecular covalent or giant covalent.

* Figure 8 shows the arrangement of carbon atoms in diamond, graphene and a fullerene (C_{60}).

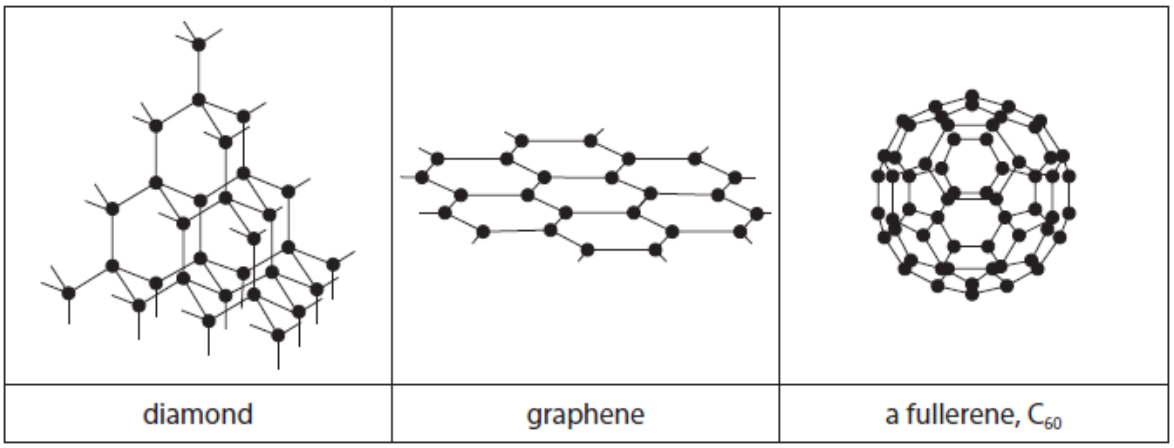


Figure 8

Consider these three substances.

Explain, in terms of their structures and bonding, their relative melting points, strengths and abilities to conduct electricity.

(Total for question = 6 marks)

Q47.

Figure 4 shows information about the charges and relative masses of the three subatomic particles.

	particle **A**	particle **B**	particle **C**
charge	positive	neutral	negative
relative mass	1	1	$\frac{1}{1840}$

Figure 4

Use the information to give the names of particles **A**, **B** and **C**.

(2)

particle **A**

.....

particle **B**

.....

particle **C**

.....

(Total for question = 2 marks)

Q48.

When heated, zinc carbonate decomposes to form zinc oxide and carbon dioxide gas.

$$ZnCO_3 \rightarrow ZnO + CO_2$$

A student investigated the decomposition of a sample of zinc carbonate.

The student used the following method.

step 1 the mass of an empty crucible was determined

step 2 a sample of zinc carbonate was placed into the crucible

step 3 the mass of the crucible and the zinc carbonate was determined

step 4 the crucible and zinc carbonate was heated for five minutes

step 5 the mass of the crucible and contents was determined.

Figure 1 shows the apparatus used.

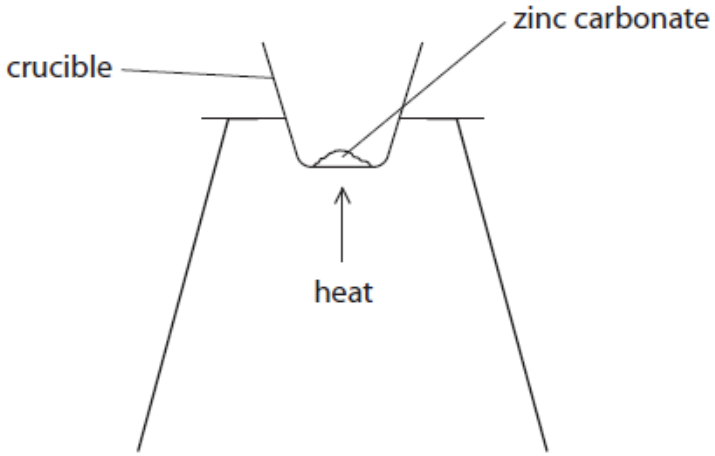


Figure 1

Suggest how the student could confirm that the decomposition was complete.

(3)

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.....

(Total for question = 3 marks)

Q49.

Salts of metals can be prepared by reacting the metal with an acid to produce the salt and hydrogen.

(i) Describe the test to show that the gas is hydrogen.

(2)

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(ii) Nickel is a metal.

Explain how the structure of a nickel atom, Ni, changes when it forms a nickel ion, Ni^{2+}.

(2)

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(Total for question = 4 marks)

Q50.

Salts of metals can be prepared by reacting the metal with an acid to produce the salt and hydrogen.

(i) Describe the test to show the gas is hydrogen.

(2)

.....

.....

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(ii) Nickel is a metal.

Explain how the structure of a nickel atom, Ni, changes when it forms a nickel ion, Ni^{2+}.

(2)

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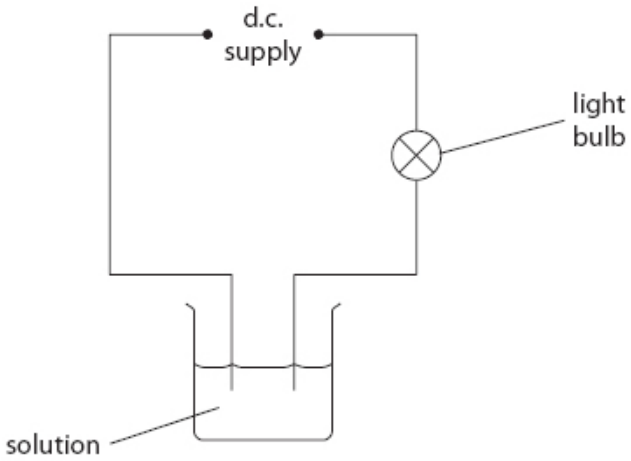
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(Total for question = 4 marks)

Q51.

An experiment is carried out on two solutions to see if they conduct electricity.

The apparatus used is shown.



The two solutions used are sodium chloride solution and sucrose solution.
Sodium chloride is an ionic compound.
Sucrose is a simple molecular, covalent compound.

Explain what happens when each solution is tested in the circuit shown.

(3)

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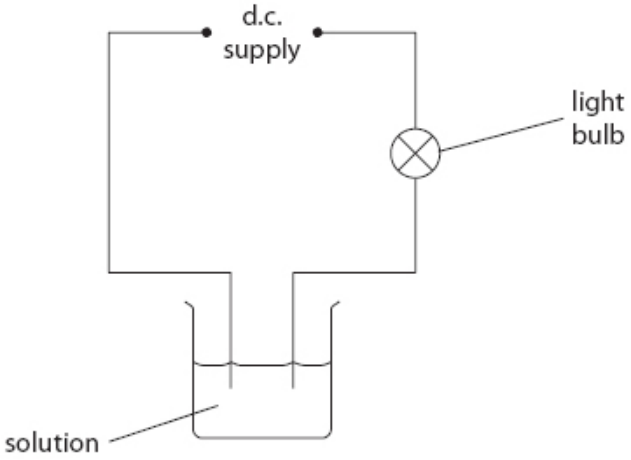
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Q52.

An experiment is carried out on two solutions to see if they conduct electricity.

The apparatus used is shown.



The two solutions used are sodium chloride solution and sucrose solution.
Sodium chloride is an ionic compound.
Sucrose is a simple molecular, covalent compound.

Explain what happens when each solution is tested in the circuit shown.

(3)

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Q53.

The elements beryllium, magnesium, calcium, strontium and barium are in group 2 of the periodic table.

Each calcium atom contains 20 electrons.

Which of the following is the electronic configuration of a calcium atom?

(1)

☒ **A** 2.8.10

☒ **B** 2.8.8.2

☒ **C** 2.2.8.8

☒ **D** 8.10.2

(Total for question = 1 mark)

Q54.

Barium sulfate contains

barium ions, Ba^{2+}
sulfate ions, SO_4^{2-}

(i) Give the formula of barium sulfate.

(1)

.....

(ii) Give the meaning of the term **ion.**

(1)

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.....

Q55.

Barium sulfate contains

barium ions, Ba^{2+}
sulfate ions, SO_4^{2-}

(i) Give the formula of barium sulfate.

(1)

.....

(ii) Give the meaning of the term **ion.**

(1)

.....

.....

Q56.

The equation for the reaction that occurs in the Haber process is

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

(i) Use the periodic table to give the number of the group and of the period of nitrogen.

(2)

group

.....

period

.....

(ii) State what is meant by the symbol $\rightleftharpoons$ in the equation.

(1)

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(Total for question = 3 marks)

Q57.

A compound of sulfur was analysed to determine its empirical formula.

(i) State the meaning of the term **empirical formula**.

(1)

.....

.....

(ii) A compound of sulfur and fluorine contains 4.8 g of sulfur and 17.1 g of fluorine.

Calculate the empirical formula of this compound.

You must show your working.
(Relative atomic masses: F = 19, S = 32)

(3)

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empirical formula = ...

(Total for question = 4 marks)

Q58.

A compound of sulfur was analysed to determine its empirical formula.

(i) State the meaning of the term **empirical formula**.

(1)

.....

.....

(ii) A compound of sulfur and fluorine contains 4.8 g of sulfur and 17.1 g of fluorine.

Calculate the empirical formula of this compound.

You must show your working.
(relative atomic masses: F = 19, S = 32)

(3)

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empirical formula = ...

(Total for question = 4 marks)

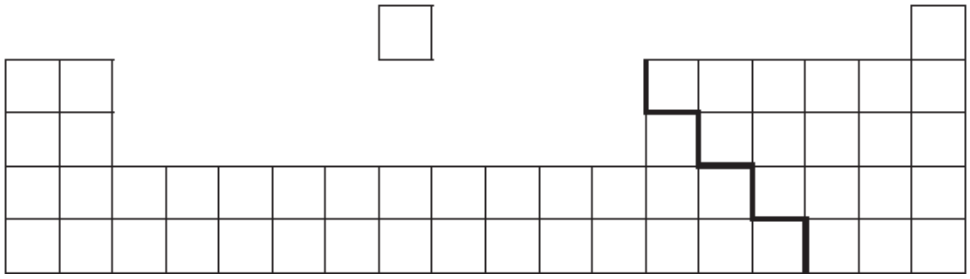
Q59.

* Here is some information about the periodic table.

In the periodic table elements are arranged in rows and columns.
The position of an element in the periodic table depends on its atomic structure.
Elements with similar chemical properties are found in the same parts of the periodic table.

Identify different parts of the periodic table and explain how the position of an element in the periodic table is linked to its chemical properties and atomic structure.

(You are provided with an outline of the periodic table below and you may use this to help your answer.)



(6)

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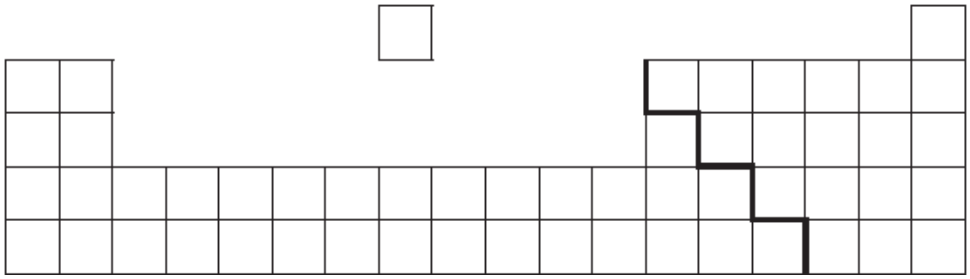
Q60.

* Here is some information about the periodic table.

In the periodic table elements are arranged in rows and columns.
The position of an element in the periodic table depends on its atomic structure.
Elements with similar chemical properties are found in the same parts of the periodic table.

Identify different parts of the periodic table and explain how the position of an element in the periodic table is linked to its chemical properties and atomic structure.

(You are provided with an outline of the periodic table below and you may use this to help your answer.)



(6)

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