

COMBINED SCIENCE

Paper 5129/11
Multiple Choice

Question Number	Key	Question Number	Key	Question Number	Key	Question Number	Key
1	B	11	C	21	B	31	C
2	A	12	C	22	A	32	B
3	C	13	A	23	D	33	D
4	B	14	A	24	D	34	C
5	D	15	C	25	D	35	D
6	A	16	C	26	B	36	C
7	B	17	C	27	A	37	D
8	D	18	D	28	B	38	A
9	B	19	B	29	A	39	C
10	B	20	B	30	D	40	B

General comments

Most candidates found the questions on this paper accessible but **Questions 8, 15, 19 and 33** proved to be more demanding.

Comments on specific questions

Question 1

The majority of candidates knew the three components which are only present in plant cells.

Question 2

Many candidates knew the process of diffusion for the movement of oxygen molecules into a cell.

Question 3

This question required candidates to analyse data about enzymes and many candidates correctly selected option **C**.

Question 4

Many candidates were able to identify the cuticle and a mesophyll cell in a leaf.

Question 5

This question was well answered and many candidates knew that absorption is the passage of soluble products of digestion through the small intestine wall into the blood capillaries.

Question 6

Candidates were required to interpret the graph of water loss and water uptake and recognise that wilting occurs when water uptake is less than water loss.

Question 7

Many candidates were uncertain about the differences between a vein and an artery with many thinking that arteries have large lumens.

Question 8

This question proved challenging for many of the candidates sitting this paper. Few candidates knew that plasma transports carbon dioxide whilst oxygen is transported by red blood cells.

Question 9

This question required candidates to understand that the kidneys remove urea from the blood and add carbon dioxide because they are respiring. While many candidates knew this, there were many candidates who got this the wrong way around.

Question 10

The majority of candidates knew that hormones are produced by endocrine glands and are destroyed by the liver.

Question 11

Many candidates knew that heroin is addictive but thought that alcohol was not addictive.

Question 12

Many candidates knew that respiration and excretion lead to energy losses between trophic levels.

Question 13

The majority of candidates understood that syphilis is caused by a bacteria and is therefore treated with antibiotics.

Question 14

Most candidates knew that chromatography is used to separate coloured dyes.

Question 15

This question proved demanding for some candidates. A significant number incorrectly thought that the change from liquid water to water vapour involves a loss of energy.

Question 16

The composition of isotopes of the same element was well understood by many candidates.

Question 17

A large proportion of candidates understood what happens to the atoms during the formation of magnesium chloride.

Question 18

There was some uncertainty with this question but many candidates were able to link the covalent bonds in the structure of carbonyl dichloride to pairs of electrons in the dot-and-cross diagrams.

Question 19

This question proved difficult for a large proportion of the candidates and there was evidence that candidates guessed rather than worked through the information.

Question 20

The vast majority of candidates were able to identify the change in indicator colour but a large proportion of these candidates thought that the pH of the solution increased during the titration and selected option **A**.

Question 21

A majority of the candidates recognised that an element in Group II of the Periodic Table is a metal. However, a significant proportion of these candidates thought that metals form negative ions and selected option **D**.

Question 22

The electrical conductivity of metals was not well understood by many candidates. There was a misconception that molten metals act as insulators.

Question 23

The composition of brass as copper and zinc was well known by many of the candidates.

Question 24

The composition of clean, dry air was not well known by the candidates. Oxygen, option **D**, is the second most abundant gas in clean, dry air.

Question 25

Most candidates correctly identified the next alkane in the homologous series.

Question 26

There was evidence of guesswork amongst the candidates. Many candidates did not recognise that two of the hydrocarbons in the mixture had the same boiling point and therefore thought that five fractions would be collected.

Question 27

Many candidates realised that ethene, option **A**, would be produced.

Question 29

There was some uncertainty among candidates as each option attracted a significant fraction of responses. The incorrect options **B** and **C** were selected by a significant number of candidates.

Question 30

Again, there was some uncertainty, with a significant number of candidates selecting options **A** and **B** rather than option **D**.

Question 31

Most candidates realised that the shape would change although some thought the density would change and selected option **A**.

Question 32

Many candidates incorrectly selected option **D** rather than the correct option, **B**.

Question 33

The two fixed points needed to mark the temperature scale on a thermometer were not well known.

Question 34

Some candidates were uncertain about identifying the amplitude and wavelength of a wave. The most popular distractors were option **A** (incorrect wavelength) and option **D** (incorrect amplitude).

Question 35

Most candidates had a good understanding of the electromagnetic spectrum.

Questions 36

Most candidates correctly identified volt as the unit of potential difference. Some candidates incorrectly selected joule and ohm.

Question 37

Most candidates identified option **D** as the correct use of a fuse.

Question 38

This question was well answered although some candidates selected option **C**, rather than the correct option, **A**.

Question 39

Nuclide notation was well known although some candidates incorrectly selected option **B**.

Question 40

The properties of alpha and beta emissions were not well known with many candidates selecting either option **A** or option **D**.

COMBINED SCIENCE

Paper 5129/12
Multiple Choice

Question Number	Key	Question Number	Key	Question Number	Key	Question Number	Key
1	B	11	D	21	B	31	C
2	A	12	C	22	A	32	B
3	C	13	C	23	A	33	C
4	B	14	D	24	D	34	C
5	C	15	C	25	D	35	A
6	A	16	A	26	C	36	C
7	C	17	C	27	A	37	C
8	D	18	D	28	D	38	A
9	B	19	B	29	D	39	B
10	D	20	B	30	D	40	A

General comments

Most candidates found the questions on this paper accessible but **Questions 6, 8, 10, 13, 15, 29, 32, 34** and **38** proved to be more demanding.

Comments on specific questions

Question 1

The majority of candidates correctly identified the structures which are not found in animal cells.

Question 2

Many candidates knew that oxygen moves from a high concentration to a low concentration by diffusion. However, a number thought oxygen moves by osmosis. Osmosis describes the movement of water molecules only.

Question 3

Many candidates knew that enzymes increase the rate of reactions. A number thought that enzymes were made of carbohydrate rather than protein.

Question 4

Many candidates were able to identify the cuticle and a mesophyll cell in a leaf.

Question 5

Many candidates knew that absorption of the soluble products of digestion occurs in the small intestine, although many thought that it occurs in the large intestine.

Question 6

This question proved very demanding with many linking the phloem to the process of transpiration rather than translocation.

Question 7

Most candidates knew the functions of white blood cells and selected option **C**.

Question 8

This question proved demanding for many of the candidates sitting this paper. Few candidates knew that plasma transports carbon dioxide whilst oxygen is transported by red blood cells.

Question 9

This question required candidates to understand that the kidneys remove urea from the blood and add carbon dioxide because they are respiring. While many candidates knew this, there were many candidates who got this the wrong way around.

Question 10

Many knew that the lens needed to be pulled thin, however, few knew that the ciliary muscles needed to be relaxed and that the suspensory ligaments would therefore be stretched.

Question 11

This was a well answered question and many candidates knew the effects of excessive alcohol consumption.

Question 12

The majority of candidates knew that decomposers break down waste matter.

Question 13

This question proved very demanding for the majority of candidates. Most did not know that mechanical birth control can also reduce the risk of spreading gonorrhoea.

Question 14

There was some confusion and many did not correctly identify filtration, option **D**, as the correct method.

Question 15

This question proved demanding for some candidates. A significant number incorrectly thought that the change from liquid water to water vapour involves a loss of energy.

Question 16

The relative charge on an electron was well known but the relative mass was less well known.

Question 17

A large proportion of the candidates understood what happens to the atoms during the formation of magnesium chloride.

Question 18

There was some uncertainty with this question but many candidates were able to link the covalent bonds in the structure of carbonyl dichloride to pairs of electrons in the dot-and-cross diagrams.

Question 19

Many candidates correctly identified the formula as being option **B**.

Question 20

Only a small proportion of candidates recognised that the reaction is complete when no more carbon dioxide is given off. There was a misconception that solid copper(II) sulfate is produced in the reaction.

Question 21

Many candidates understood the relationship between the number of electrons in an atom and the number of electron shells and the number of electrons in the outer shell of atoms of elements in the same group of the Periodic Table.

Question 22

The arrangement of atoms in brass was not understood by many candidates. Option **A** represented the correct arrangement but options **C** and **D** were popular choices.

Question 23

The lack of reactivity of aluminium due to the presence of an oxide layer was well known by many candidates.

Question 24

The properties of the gases present in polluted air was not well understood by many candidates. A significant number thought that carbon monoxide is formed by the complete combustion of methane and that nitrogen causes acid rain and therefore chose options **A** and **C**.

Question 25

Most candidates correctly identified the next alkane in the homologous series.

Question 26

The nature of the molecules in different fractions and their uses are not well known by many candidates. Statements 2 and 4 were correct so option **C** was the correct choice.

Question 27

Many candidates recognised that a compound that decolourises aqueous bromine contains a carbon-to-carbon double bond. A significant number thought that size of the molecule increased and chose option **B**.

Question 28

Many candidates correctly interpreted the speed-time graph. Option **B** was the most popular distractor.

Question 29

There was some uncertainty among candidates as each option attracted a large number of responses. Option **A** and, in particular, option **C** were selected by a significant number of candidates.

Question 30

This question was well answered with option **C** the most popular of the distractors.

Question 31

Most candidates realised that the shape would change although some thought the density would change and selected option **A**.

Question 32

Many candidates knew that telephone wires hang loosely to allow for contraction in cold conditions. Option **C** was a more popular choice than the correct answer, option **B**.

Question 33

Some candidates were uncertain about identifying the amplitude and wavelength of a wave. The most popular distractors were option **A** (incorrect wavelength) and option **D** (incorrect amplitude).

Question 34

Some candidates were uncertain about converging lenses. The correct answer, option **C**, was chosen less frequently than option **B**. Option **A**, was also a popular choice.

Question 35

Most candidates had a good understanding of electrostatic charges. Some candidates incorrectly selected options **C** and **D**.

Question 36

Most candidates correctly selected option **C**.

Question 37

This question was well answered although some candidates selected option **D**.

Question 38

This question was well answered although some candidates selected option **C**, rather than the correct option, **A**.

Question 39

Most candidates understood the meaning of nucleon number and selected option **B**. The most popular distractor was option **D**.

Question 40

Many candidates correctly worked through the information to select option **A**. Options **B** and **D** were also popular choices.

COMBINED SCIENCE

Paper 5129/21
Theory

Key messages

Candidates should take care to read each question carefully. To be awarded full marks, candidates should ensure that they complete all the instructions contained within the question.

Candidates should try to match the answers they give to the number of marks available for each part of a question. A two-mark question will require two separate points to be made.

Candidates should write down the equation that is being used in all calculations, using the correct symbols for the quantities involved.

General comments

The answers to questions based on the physics subject content proved demanding for some candidates. Calculations were particularly demanding for some candidates. Responses to recall questions based on the biology subject content were generally very good but those questions that required application of knowledge were less well understood. The Chemistry questions involving recall were less well answered.

Comments on specific questions

Question 1

This question was well understood by the vast majority of candidates.

Question 2

- (a) (i) A large proportion of candidates stated that the separation process was fractional distillation. There was no fractionating column shown in the diagram and therefore the process was distillation.
- (ii) Many of the candidates were able to name **A** as a thermometer. The fact that **B** was a condenser was less well known.
- (iii) A significant number of candidates did not use the information about the boiling points of the two liquids and thought that water was the first liquid to be distilled.
- (b) Candidates were expected to state an industrial use of water, such solvent or coolant. Vague answers, such as cleaning, were not given credit.
- (c) A large proportion of candidates were able to describe the bunching of the particles in ice but only some described the vibration of the particles. There was a misconception that the particles in ice do not move.

Question 3

- (a) (i) A majority of candidates were able to determine the change in speed of the car from the graph.
- (ii) A majority of candidates were able to determine the time taken for the car to travel from **A** to **B** from the graph.

- (iii) This question was well answered by the vast majority of candidates.
- (b) The equation $F = ma$ was well known by many of the candidates.
- (c) Some candidates were able to name friction, air resistance or drag as another force acting on the car. Many of the candidates answered the question in terms of the wheels without stating the name of the force.

Question 4

- (a) This question was well answered by the majority of candidates although some drew the arrows in the wrong direction.
- (b) Many candidates understood how plants and animals depend on photosynthesis.

Question 5

- (a) (i) The majority of candidates deduced that either carbon or carbon monoxide are oxidised during the reactions in the blast furnace.
- (ii) The meaning of the term exothermic was not understood by many candidates.
- (iii) This question proved to be demanding for many candidates. The responses indicated that many candidates were unsure of the correct formulae for the substances involved in the reaction.
- (b) Some candidates were able to state that hematite is an ore of iron that contains iron oxide.
- (c) The idea that making iron into an alloy to change its properties was not well understood by many candidates.

Question 6

- (a) Many candidates knew the equation for calculating the moment about a pivot but fewer candidates converted the mass to a force.
- (b) The equation density = mass ÷ volume was well known by candidates. However, a significant number had difficulty rearranging the equation in order to calculate the volume.
- (c) Many candidates answered this question in terms of masses rather than in terms of moments. Candidates were expected to state that the clockwise moment is equal to the anti-clockwise moment.

Question 7

- (a) A majority of candidates knew that the walls of a vein are thinner than the walls of an artery.
- (b) The fact that veins carry blood towards the heart was well known by many candidates.
- (c) There was a misconception amongst candidates that blood in most veins contains more oxygen than arteries.
- (d) A large proportion of candidates knew that blood in an artery is at a higher pressure than blood in a vein.

Question 8

- (a) Some candidates recognised that ethene is used to make poly(ethene) which is used to make plastic bags.
- (b) Most candidates knew that stainless steel is used to make cutlery.
- (c) The use of helium to fill balloons was well known by the majority of candidates.

- (d) A large proportion of candidates knew that zinc is used to make brass.
- (e) Most candidates knew that nitrogen makes up 78% of the atmosphere.

Question 9

- (a) (i) The majority of candidates were able to take a correct reading from the bar chart.
- (ii) A large proportion of the candidates stated the student with the highest heart rate rather than the student that had the largest **increase** in heart rate.
- (b) Only the strongest responses stated that the results would be more reliable if the investigation was repeated and the average calculated, or by increasing the number of candidates in each group.
- (c) Many responses were too vague and did not explain that during exercise more oxygen is required by the muscles. Candidates were expected to suggest that the heart rate increases during exercise to increase the blood supply to the muscles or to increase the supply of oxygen or to allow an increase in respiration.

Question 10

- (a) A large proportion of candidates were able to plot the point correctly and draw the straight line from the origin to the point.
- (b) Few candidates extrapolated the graph to 12 N in order to determine the extension of the spring. Some candidates used proportional reasoning to determine the extension.
- (c) This question proved demanding for a large number of candidates. Candidates were expected to state that they assumed the load and extension were directly proportional.

Question 11

- (a) Most candidates were able to deduce the formula of ethanol.
- (b) The use of ethanol as a solvent was not well known. Answers about ethanol being used to make alcoholic drinks were not awarded credit.
- (c) (i) Many candidates recognised that ethanol is made from glucose by fermentation. Fewer candidates identified reaction **B** as an addition reaction.
- (ii) Stronger responses stated that the test for an acid is blue litmus paper or universal indicator. Candidates that simply stated litmus paper were only awarded credit for the correct result of the test.

Question 12

- (a) (i) The fact that the energy store in a radioactive source is nuclear was not understood by a large proportion of the candidates.
- (ii) Most candidates identified that the air particles gain kinetic energy.
- (iii) There was a misconception amongst candidates that the energy store in a battery is electrical rather than chemical.
- (b) (i) Only a small proportion of candidates recognised that time should be converted to seconds before using the equation $Q = It$. Some candidates had difficulty rearranging the equation to make current the subject of the equation.
- (ii) This question proved to be very demanding for the vast majority of the candidates. Many of the candidates started the calculation with the electrical power rather than calculate the power from the information given in the question and their answer to **(b)(i)**.

Question 13

- (a) The differences between sexual and asexual reproduction were not well understood. Some candidates repeated the information given in the question or simply stated that the offspring produced by asexual reproduction are identical with the parents rather than the offspring are genetically identical.
- (b) The names of the structures and their functions were well known by many candidates.
- (c) The methods of contraception used by a man were well known by a large proportion of the candidates.

Question 14

- (a) (i) The relationship between group number and the electronic structure of an atom was well known by a large proportion of candidates. The relationship between period number and the electronic structure was less well known.
- (ii) A large proportion of candidates deduced that the ion formed by the element would be positively charged but fewer stated that the charge on the ion would be +2.
- (b) Some candidates were able to define the meaning of the term isotope as atoms of the same element with the same number of protons but a different number of neutrons.

Question 15

- (a) A majority of the candidates recognised that sphere **B** would have four positive charges.
- (b) Many candidates identified that object **C** was positively charged but were unable to explain why the spheres move apart. Candidates were expected to explain that sphere **A** was attracted and sphere **B** was repelled due to the fact that unlike charges attract and like charges repel. There was confusion amongst some candidates who referred to magnetic poles rather than charges.

Question 16

- (a) Many candidates were able to complete three correct statements about the alimentary canal.
- (b) The fact that hydrochloric acid in the stomach breaks down the amylase was not well understood. There was a misconception that the hydrochloric acid increases the effectiveness of the enzyme.

Question 17

- (a) (i) The use of limewater to test for carbon dioxide was well known by many candidates.
- (ii) Some responses were too vague to gain credit. Candidates were expected to state that oxygen is used and water is produced during both respiration and complete combustion of methane rather than stating that oxygen and water are involved in the two processes.
- (b) Only the strongest responses correctly described the toxic nature of carbon monoxide. There was a misconception amongst many candidates that carbon monoxide is responsible for global warming.

Question 18

- (a) (i) Few candidates were able to identify instrument **Z** as a voltmeter.
- (ii) The idea that an e.m.f. is induced by moving the wire up and down was not understood by a large proportion of the candidates.
- (iii) The orientation of the magnets required for an e.m.f. to be induced was well known by the candidates.
- (b) Factors that determine the size of the induced e.m.f. were not well known.

COMBINED SCIENCE

Paper 5129/22
Theory

Key messages

Candidates should take care to read each question carefully. To be awarded full marks, candidates should ensure that they complete all the instructions contained within the question.

Candidates should try to match the answers they give to the number of marks available for each part of a question. A two-mark question will require two separate points to be made.

Candidates should write down the equation that is being used in all calculations, using the correct symbols for the quantities involved.

General comments

Questions based on the biology subject content, particularly those which involved recall, were well answered. Those question that required application of knowledge were less well answered. Chemistry questions involving recall or descriptions of experiments were not well known. Some candidates found it difficult to manipulate equations based on the physics subject content. Radioactivity was not well understood and some had difficulty reading values from a graph.

Comments on specific questions

Question 1

- (a) (i) A large proportion of candidates plotted the point correctly on the speed-time graph.
- (ii) Most candidates drew a correct line on the graph.
- (iii) A significant proportion of candidates had difficulty calculating the change in speed and the time taken from the speed-time graph.
- (b) The equation $\text{force} = \text{mass} \times \text{acceleration}$ was not well known. In order to gain full credit for the calculation candidates were required to round their answer correctly.

Question 2

- (a) Many candidates were able to identify the numbers of producers, herbivores and carnivores, however, a significant proportion of these candidates did not understand that both herbivores and carnivores are consumers.
- (b) Many candidates stated the number of organisms rather than number of food chains.
- (c) Most candidates correctly added the snake to the food web, although some candidates had the arrow on the food web pointed in the wrong direction.

Question 3

- (a) (i) Ideas about reactivity series were well understood by the candidates.
- (ii) The lack of reactivity of metal **C** in all of the reactions was not identified by many of the candidates.

- (b) Some candidates were able to identify hydrogen as the gas produced when a metal reacts with dilute hydrochloric acid.
- (c) Few candidates were able to explain the apparent lack of reactivity of aluminium. Candidates should know that aluminium only reacts slowly with dilute hydrochloric acid because it is covered by an unreactive layer of aluminium oxide.
- (d) The general physical properties of metals were well known. There was a misconception amongst some candidates that all metals are attracted to a magnet.
- (e) The idea that alloys are harder and stronger than the constituent metals was not well known by a large proportion of the candidates.

Question 4

- (a) Many candidates recognised the need to multiply force by distance but then went on to solve the equation $F_1 \times d_1 = F_2 \times d_2$ rather than calculate the moment of the block about the pivot.
- (b) A large number of candidates knew the equation $d = m \div V$ but rather than using the gravitational field strength to calculate the mass many used the gravitational field strength instead of the mass in the equation.
- (c) The idea that the beam was not balanced because the mass of the beam would add to the moment on the LHS was not understood by a majority of the candidates.

Question 5

- (a) Some candidates were able to match the structures to the descriptions. The blood vessel carrying blood to the lungs was the least well known of the structures.
- (b)(i) The substances present in blood plasma were not well known. Many candidates stated the names of the cells present in the blood rather than the substances.
 - (ii) The types of cell found in blood were well known by the vast majority of candidates.

Question 6

- (a)(i) Many candidates identified hydrogen as the gas that reacts with nitrogen in the Haber process.
 - (ii) The conditions used in the Haber process were not well known.
- (b) The use of nitric acid to make ammonium nitrate from ammonia was not well known.
- (c) The fact that ammonium nitrate is used to make fertilisers was only known by a small proportion of the candidates.

Question 7

- (a) A large proportion of candidates simply described the results rather than the procedure for obtaining the results. Candidates were expected to state that the student added different masses to the spring and then measured the length of the spring.
- (b) Many candidates did not use the information in the question. Candidates were expected to use the graph by drawing a line through the points and extrapolating the line to a load of 0 N and reading the value from y-axis. The scale of the y-axis proved to be difficult for some candidates.
- (c) The vast majority of the candidates who determined the length of the spring from the graph stated this value as the extension ignoring the initial length of the spring determined in (b).

Question 8

- (a)(i) A number of candidates did not attempt this question. Candidates are expected to be able to draw the dot-and-cross diagrams for the covalent molecules listed in the syllabus.

- (ii) Some candidates were able to identify the homologous series to which methane and ethane belong.
- (iii) The characteristics of a homologous series were not well known.
- (b) The use of bromine to distinguish between saturated and unsaturated hydrocarbons was well known by some candidates.

Question 9

- (a) The products of photosynthesis were well known by a majority of the candidates.
- (b) The diffusion of carbon dioxide through the stomata was well known by many of the candidates.
- (c) The absorption of water through the root hair cells was well known by the vast majority of the candidates. The fact that water is transferred to the leaves by xylem tissue was less well known.
- (d) The conversion of light energy to chemical energy by chlorophyll was well known.

Question 10

- (a) (i) Some candidates recognised that chemical energy in the animal was transferred to thermal energy during respiration.
- (ii) The transfer of electrical energy from the battery in the night vision camera to the screen was not well understood by a large proportion of the candidates.
- (iii) There was a misconception amongst many candidates that electrical energy is transferred from the display screen rather than light.
- (b) (i) A large proportion of candidates tried to use the equation $V = IR$ rather than the equation $P = VI$ to calculate the current in the circuit.
- (ii) This question proved to be very demanding for the vast majority of the candidates. Many candidates started the calculation with the electrical charge rather than calculate the charge from the information given in the question and their answer to **(b)(i)**.

Question 11

- (a) (i) Most candidates were able to deduce from the bar chart that running slowly is the activity which produces an average heart rate in group **X** of 114 beats/min.
- (ii) Many candidates were able to use the bar chart to deduce the average heart rate for group **Z** when the activity is 'running fast'. Some candidates had difficulty using the scale on the y-axis.
- (iii) A significant proportion of candidates answered this question in terms of a comparison between the two groups rather than comparing heart rate with different activities.
- (b) (i) The word equation for aerobic respiration was well known.
- (ii) The difference between aerobic and anaerobic respiration was well known although there was a misconception that energy is used during respiration.

Question 12

- (a) (i) The use of a balance to measure the mass of the nail was not well known.
- (ii) A significant proportion of the candidates stated the mass of the iron nail after 300 days rather than the increase in the mass of the nail over 300 days.
- (iii) The fact that the nail is oxidised/rusts when it reacts with water and air was not known by a large proportion of the candidates.

- (b) A large number of candidates suggested that the iron nail should not be placed in the presence of water and air as their method for preventing the reaction. Candidates were expected to state that the reaction is prevented by painting the nail, galvanising the nail or oiling the nail.

Question 13

- (a) Many candidates recognised that the sphere had both positive and negative charges but many did not state that there were equal numbers of each charge.
- (b) (i) A large number of candidates recognised that the negative charges were attracted to the positively charged object without stating that the negative charges moved towards the object.
- (ii) Many candidates stated that the opposite charges were attracted to each other but did not answer the question 'what happens to the sphere'. Candidates were expected to state that the sphere moves towards the object.

Question 14

- (a) (i) Few candidates knew that the piece of apparatus used to measure the volume of aqueous sodium hydroxide in a titration experiment is a pipette. Candidates should be aware that a measuring cylinder is not sufficiently accurate to measure exactly 25.0 cm^3 of solution.
- (ii) The vast majority of candidates recognised that dilute hydrochloric acid was neutralised by aqueous sodium hydroxide and the pH value of the neutral mixture was 7. Most candidates did not know that the pH of aqueous sodium hydroxide is 14 and therefore the pH of the mixture decreases during the titration.
- (iii) The colour of universal indicator in a neutral solution was known by many of the candidates.
- (b) The ionic equation for the reaction was not known by the vast majority of candidates.
- (c) Few were able to describe that solid sodium chloride is obtained from the neutralised solution by evaporation. There was a misconception that the sodium chloride was a solid and could be obtained from the mixture by filtration.

Question 15

The functions of the named structures were well known.

Question 16

- (a) Only a small number of candidates were able to describe the feature that explains why an alpha particle is the most ionising type of radiation. Candidates were required to indicate that the alpha particle is large or positively charged and this increases the chance of colliding with other particles.
- (b) Many candidates were able to state that beta particles or gamma radiation are other types of radioactive emission.
- (c) The explanation that new elements can be formed when radiation is emitted from a radioactive source was not understood by the vast majority of the candidates. Candidates were expected to state that the emission of radiation from a radioactive element leads to changes in the number of protons in the nucleus of the element.
- (d) Strong responses explained that waste radioactive materials are encased in concrete and stored deep underground for many years because they are dangerous.

Question 17

- (a) (i) Most candidates knew that non-metallic elements form ionic bonds with metallic elements.
- (ii) There was a misconception amongst candidates that non-metallic elements react with oxygen to form hydrogen oxides.

- (iii) The fact that hydroxide ions are formed when an alkali is dissolved in water was well known.
- (iv) The idea that amphoteric oxides react with both acids and bases was not understood by a large proportion of the candidates.
- (b) Few candidates were able to name the atmospheric pollutant responsible for acid rain as sulfur dioxide or nitrogen dioxide.
- (c) There was a misconception that farmers add calcium carbonate to soil because it is a fertiliser. Candidates were expected to state that farmers add calcium carbonate to soil in order to reduce the acidity of the soil.