RECOGNISING ACHIEVEMENT

GCSE

Additional Science B

Gateway Science Suite

General Certificate of Secondary Education **J641**

OCR Report to Centres

January 2012

2924609428 **J641/R/12J**

Oxford Cambridge and RSA Examinations

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

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CONTENTS

General Certificate of Secondary Education

Additional Science B (Gateway) (J641)

OCR REPORT TO CENTRES

Overview

The entry for B623/01, B623/02, B624/01 and B624/02 was similar to the corresponding series in January 2011; in fact the entries for B624 rose slightly.

The papers produced a full range of marks and mean marks were all in the range 29.3 to 30.7. Centres appear to have the correct entry policies with only a small number of candidates entered for the incorrect tier.

Candidates have improved their ability to tackle questions involving extended writing. Good use is made of the bullet points which are provided to structure an answer. Candidates perform well on questions requiring data analysis and interpretation and can successfully carry out calculations involving selection of the appropriate formula, substitution and use of a calculator to arrive at the final answer. A small number of candidates appear not to have access to a calculator.

The writing of chemical equations continues to improve with candidates taking more care over the use of subscripts and upper and lower case in atomic symbols.

Candidates' ability to draw lines on a graph was variable with too many either drawing multiple lines or failing to pass through all the points, both of which lost the mark.

The final entry for these papers (with the exception of re-sits only) will be in June 2012.

B623/01 Foundation Tier

General Comments

This was the tenth occasion that this examination was available to be sat by candidates. There were approximately 14200 candidates and marks ranged from 0 to 55 out of 60. Just over a quarter of the candidates achieved a grade C and there were some candidates who might have been better targeted at higher tier.

The mean mark for the paper was 30.3 and the paper discriminated satisfactorily over the target grade range of C to G. The paper allowed candidates to demonstrate positive achievement in all three areas of science, although many candidates found section A to be more difficult than the other two sections.

There was little evidence that candidates had insufficient time to complete the paper and the only questions which were omitted by a significant number of candidates (about 30%) were 3c and 7b. A small minority of candidates did not follow instructions regarding how to answer questions or how many answers to provide. Where the intentions of the candidate were clear, marks were awarded.

Candidates are encouraged to show how they work out the answer to numerical questions. In this way, credit can be given for showing how an answer is obtained, even if the answer is incorrect. This was more evident than in the past. In general, calculations were well answered by all candidates.

Some examiners reported that poor handwriting from some candidates made marking difficult and in extreme cases may have cost marks.

Comments on Individual Questions

Question 1

Almost every candidate knew why sperm need a tail. It was rare for all four sentences to be completed correctly. Most completed the first and many the second. There is some confusion between meiosis and mitosis and differentiation is not well understood. The majority of candidates correctly explained why adults need to make new cells.

Question 2

Some candidates mentioned shape as an adaptation, but failed to describe the biconcave disc shape. There were references to flexibility and small size. Few candidates mentioned the lack of nucleus. Most gained credit for describing what happens if white blood cells were not produced rapidly although a significant number provided a reverse argument. The fact that blood flow or blood pressure is reduced if the heart does not work properly is well known; some argued that the blood would continue to flow normally but would not reach all parts of the body. Cholesterol appears not to be well known and there were a number of alternatives suggested for the fatty substances in arteries. Only a quarter of candidates could describe cloning or genetic engineering. Answers were often reversed. Many suggested that cloning was copying something without making it clear that the copy is a genetically identical organism.

Question 3

The quality of lines drawn to complete the graph was disappointing. There were many examples of multiple lines being drawn; straight lines drawn between each point; U shaped graphs which projected back to the point (4,0) and straight “lines of best fit” originating at (4,0). Half the candidates made a suitable comment regarding the optimum pH for rennin. Few could describe what happens to amino acids. Many thought they aided digestion or were immediately excreted. Few could identify either one or both correct graphs showing the pH of pepsin. There were very mixed responses describing the gene for rennin. Nearly a third of candidates did not attempt the question. Some candidates scored a mark for an appropriate mention of DNA but there was general confusion about the difference between gene, DNA and chromosome as well as the difference between rennin and the gene for rennin.

Question 4

Almost every candidate correctly identified bromine from its chemical symbol, but more than half used the data provided to deduce that it is a liquid at room temperature. Answers to part (a)(iii) were often confused and difficult to follow. Some candidates appeared to find the negative temperatures difficult to interpret. Uses of chlorine were generally well known although some thought it acceptable to use directly on a wound.

Question 5

Half the candidates failed to score a mark. This was because they suggested heating the chemicals in a test tube or described a variation of the test for hydrogen producing different colours. Those who correctly described the test usually knew the coloured flames produced. Group 1 elements were commonly named as alkalis or reactive metals. Many failed to correctly count the number of atoms in the formula. Five and seven were common answers.

Question 6

The majority of candidates correctly identified the atomic number of sulfur and found an element in the same group. Most confused group and period suggesting that sulfur is in Period 6. There were few incorrect names of the elements in sulfuric acid.

Question 7

Most candidates knew the test for carbon dioxide. Those who did not usually stated that the limewater fizzed. Almost all knew that decomposition involved breaking down, but many thought that three or more substances were formed. A significant number of candidates omitted part (b). Of those who answered, very few identified an insoluble solid as a precipitate. Common answers included chemical, compound, insoluble or iron hydroxide.

Question 8

Half the candidates correctly identified gold as a transition element and half lithium as an element with one electron in its outer shell. All other answers were seen with no particular common misconception.

Question 9

The majority of candidates realised that the shape of the lorry led to an increase in maximum speed, but the force that was reduced was often referred to as gravitational instead of frictional. Most realised that a laden lorry would take longer to reach its maximum speed. The factors that affect thinking distance are generally well known. Tiredness was more commonly known than the speed of the lorry. Just under half the candidates could identify the correct graph

representing the lorries motion. The most common incorrect response was the graph with the same shape but incorrect axes.

Question 10

Both calculations were well done. Marks were often not awarded for the unit of work done. Candidates who incorrectly calculated the work done were not penalised if they then used their answer correctly to calculate power. Some candidates divided their answer by 2, presumably because the question asked for the power developed in the left arm. The majority of candidates scored one of the two marks for describing the energy changes, but increases and kinetic together with decreases and potential were often seen.

Question 11

Many candidates repeated the question stem by stating that the seat belt stops the wearer from moving forward and hitting the windscreen. Few referred to it absorbing energy. Whilst car safety features are well known, the distinction between those designed to reduce the chance of a crash and those designed to protect in a crash is less well known. Many candidates wrote about braking systems, paddle shift controls and electric windows.

Question 12

Almost every candidate knew that petrol and diesel are used as fuels in cars. Most identified batteries as an energy source but few knew that solar energy could be used. Many described how electricity is used in the car for such things as radio and lights.

B623/02 Higher Tier

General Comments

The paper produced a mean mark of 29.3 which was similar to the January 2011 performance. The paper gave candidates the opportunity to show what they know understand and can do. Marks ranged from 58 to zero and a standard deviation of 9.2 was achieved. A number of candidates scored less than 15 marks and would have been better served by entry to the foundation tier. Assistant examiners and team leaders thought that the level of difficulty of the paper was appropriate. Most candidates could access the paper with very few questions omitted. There was no evidence of lack of time. Questions involving 2 or more marks were suitably differentiated for A grade candidates. Performance on calculation questions was generally good even by weaker candidates.

The paper differentiated well with 36 marks required for grade A and 21 for grade C.

Comments on Individual Questions

Section A

Question 1

1 (a) (i) Just under half of candidates scored this mark. A sooth curve (not 'dot-to-dot') which touched every cross was required. Candidates frequently drew multiple lines or missed one or more crosses and failed to score.

1 (a) (ii) Virtually no candidates gave the desired answer that Bob was incorrect because the reaction might be faster before or after pH6 or that there were too few points. About two-thirds of candidates gained the fall-back mark that Bob was correct because pH6 is the lowest point.

1 (b) (i) This question was generally not well answered. Diffusion of amino acids into the blood stream in the small intestine was known only by more able candidates. Many candidates talked about protein building and failed to score.

1 (b) (ii) Just under half of all candidates answered this question correctly. The mark scheme allowed **B** and **D** or **B** or **D** to score. Every other possible combination was seen with quite a few getting it upside down and picking **A** and **C**.

1 (c) This question discriminated well at the higher grades. Many gained one mark for the idea of coding, but only better candidates scored the marks for the base sequence determining the amino acid sequence. Again triplet codes were only mentioned by more able candidates.

Question 2

2 (a) (i) This question was generally well answered with many candidates mentioning the high energy requirement or respiration. Vague answers such as 'to reach the egg' or 'so they can swim' did not score.

2 (a) (ii) The idea that the acrosome releases enzymes to digest or break down the egg membrane was not well understood. Candidates lost marks by referring to the egg cell wall or the idea of penetration.

2 (b) This question was correctly answered by just under half of all candidates. Many referred to chemicals or radiation. The most common incorrect answers referred to 'inbreeding' or a description of mutation itself.

2 (c) (i) Again just under half of all candidates scored this mark. Many just described haploid and did not then go on to state that the fertilised egg would then be diploid.

2 (c) (ii) This question was poorly answered. A common error was to have 2 long, 2 short chromosomes, one long-short pair and one short-long pair with black and white colours mixed up among that distribution of lengths.

2 (d) Surprisingly, less than half of candidates mentioned stem cells. A number of candidates said diploid or undifferentiated cells merely repeating the question.

Question 3

3 (a) (i) Very few candidates understood the relationship between small size and increased surface area to volume ratio. Common wrong answers referred to ease of movement or need for large numbers of blood cells. References to ease of diffusion often implied diffusion of the cells so scored zero.

3 (a) (ii) This question was better answered, presumably as there were a number of acceptable answers. No nucleus was a very common correct response as was haemoglobin. There were lots of references to biconcave or disc shape which scored the mark.

3 (b) Again this question was well answered with the majority of candidates understanding the idea of blockage of the arteries. Some wayward references to valves, capillaries etc lost marks.

3 (c) (i) Over half of all candidates scored this mark, usually for a reference to reduced waiting lists. Some references to mechanical alternatives didn't score.

3 (c) (ii) Although this question scored reasonably well for one that concerns a harder topic, the range of errors was wide. Many said egg cell **or** cell from a pig (sometimes naming the wrong type of pig cell). For the second marking point some candidates failed to appreciate that the process had just removed two nuclei from two different cells and were unclear about which nucleus to implant where. There were vague answers about putting the cells together, fusing the nuclei etc which failed to score.

Section B

Question 4

4 (a) (i) Over two-thirds of candidates knew that chlorine was a gas at room temperature. The most common incorrect answer was 'liquid'.

4 (a) (ii) Relatively few candidates scored both marks but a number scored one mark. The mark scheme had generous ranges for the answers.

4 (b) Significant numbers of more able candidates scored both marks. A number of weaker candidates didn't include F_2 preferring 2F and therefore failed to score. Most candidates who got the formulae right could usually balance the equation.

5 (a) It was possible to gain 3 marks here with a fairly simple sentence eg "dip the flame test wire in the compound and hold it in the flame". As a result a good number of candidates scored three marks. The most commonly dropped mark was the second marking point – candidates often thought that the element/metal was being tested, not a compound containing it. Many candidates were unable to describe the wire as being placed **in** the flame, instead saying "over the flame" or even "under the flame."

5 (b) (i) Most candidates scored one mark, usually for 'hydrogen'. More able candidates correctly named both products and placed them in a correct word equation scoring both marks. 'Sodium oxide' and 'alkaline solution' were predictably common incorrect answers.

5 (b) (ii) Just under two-thirds of candidates correctly identified oxidation. 'Reduction' and to a lesser extent 'precipitation' were frequent incorrect responses.

6 (a) About half of candidates correctly gave Period 3 in this question. Common incorrect answers were 6 (ie group rather than period) and 2 (presumably having missed the two elements in the first period.

6 (b) About two-thirds of candidates understood that atomic number was the number of protons in the nucleus. Some stated 'number of electrons' and scored the mark. Those who stated 'the number of protons and electrons' did not score.

6 (c) Over four-fifths of candidates could correctly draw the electronic structure of sulfur.

Question 7

7 (a) Only a quarter of candidates knew the word 'precipitate'. A lot of candidates named the iron(II) hydroxide or simply described it as insoluble.

7 (b) Under half of candidates scored this mark. The most common incorrect answers were 'orange' or 'brown' showing a confusion with iron(III) hydroxide.

7 (c) In this question quite a few got one mark by placing the formulae into an equation and making no attempt to balance it. A number of candidates were unable to do that correctly, introducing charges into the right hand formula or missing the brackets. $Fe^{2+} + 2OH^- \rightarrow 2Fe(OH)_2$ was a common one mark answer.

Question 8

8 (a) The vast majority of candidates correctly identified lithium.

8 (b) The vast majority of candidates correctly identified calcium.

Section C

Question 9

9 (a) (i) The mark scheme required the idea that the forces were balanced or equal but opposite. A number of candidates just said that the two forces acted in opposite directions, which was insufficient to score.

9 (a) (ii) A large number of candidates understood that reducing the drag increased the maximum speed. Only the very best candidates realised that the forces would be balanced at a higher speed for two marks.

9 (b) This question was correctly answered by the vast majority of candidates. Those who got one mark appeared to be split fairly evenly between getting the top one right and the bottom one right – no imbalance noted. Commonly the second box was the wrong one ticked (road conditions).

Question 10

10 (a) The vast majority of candidates scored both marks on this question. A few candidates allowed the 0.9 to creep in even though not needed at this point – so answers of 45 and 27 were occasionally seen.

10 (b) Again the calculation was carried out correctly by most candidates. Occasionally candidates thought they needed to divide by two to isolate the left arm but careful reading of the question might have made this clear to them.

Question 11

11 (a) There were very few two mark answers seen. Many got zero, simply talking about the seatbelt holding Ray in place. There were some attempts to describe the slight extension of the seatbelt in terms of transferring kinetic energy into elastic potential energy but missing the required point about the longer time over which the force acts. The idea of lower acceleration was seen in only a small number of answers.

11 (b) About half of candidates scored this mark. The most common incorrect answers were 10N and 40N.

Question 12

12 (a) This question was well answered particularly by more able candidates. The idea that electricity generation or power stations cause pollution was credited for two marks in a lot of answers. Some candidates made reference to the charging process causing pollution or to the manufacturing process or battery disposal for one mark.

12 (b) This question was well answered. A number of candidates correctly used the formula with incorrect numbers. A number of candidates simply used the co-ordinates at the top right hand corner of the grid (16, 35) as their data.

Question 13

13 (a) Significant numbers of candidates scored both marks, despite the complication of having to combine two formulae with the data given. 450m was a common incorrect answer, where candidates failed to understand the difference between weight (mg) and mass (m).

13 (b) (i) Some candidates lost marks here for imprecise language – for example, instead of saying that the KE was constant, they stated that it "stops increasing" – not quite the same thing. Likewise in the second part, instead of stating constant speed, they said that she was falling at maximum speed.

13 (b) (ii) This was very poorly answered. The idea of the dynamic relationship between gravitational potential energy, kinetic energy and the transfer of energy to the surroundings is conceptually very difficult, and so it proved. Most candidates simply re-stated the information in the question that gravitational potential energy is converted to kinetic energy or that gravitational potential energy decreases.

B624/01 Foundation Tier

General Comments

The paper differentiated well and performance across the three sections of the paper appeared to be fairly consistent, allowing candidates to demonstrate their knowledge and understanding of science. The average mark for this examination paper was 30, and the marks awarded covered almost all the mark range.

Candidates performed well on questions that involved analysis and interpretation. In some questions candidates needed to have a more secure knowledge of aspects of the specification.

Candidates used their knowledge and skills appropriately to respond to the questions on decay & food preservation, costs in manufacturing, ammonia, electricity and ultrasound.

Questions about transport in plants, water purity and radioisotopes were less well known.

Comments on Individual Questions

SECTION A – MODULE B4

Question 1

This question tested ideas about decay and food preservation and, in some parts, required candidates to interpret information.

(a) To gain the mark in part (i) candidates needed to read the scale on the y-axis of the graph accurately and then to apply the information from the graph to the question. When candidates did not gain the mark it was usually because they gave an answer of 30 (obtained by simply reading off the y-axis), rather than appreciating that the number of bacteria had increased from 30,000 to 60,000, ie had doubled. In part (ii) most candidates correctly identified that if the temperature was changed from 25ºC to 30ºC the new line on the graph would be above the original line.

(b) Most candidates scored 1 mark for the idea that drying apricots preserves them by decreasing or slowing down the rate of decay. When candidates did not score both marks it was usually because they thought that drying apricots removes bacteria, rather than moisture or water, from the fruit.

(c) Most candidates correctly identified that fungicides kill fungi that cause decay and that pesticides are used in intensive farming.

Question 2

This question was about transport in plants and also, in some parts, required candidates to interpret information.

(a) Most candidates correctly identified part X as a chloroplast in part (i). In part (ii) candidates needed to explain that stomata are important for photosynthesis because they allow gas exchange.

(b) To gain the mark in part (i) candidates needed to appreciate that water evaporates or diffuses through the stomata during photosynthesis. Answers that described the physical movement of water through the plant did not gain credit. In part (ii) candidates needed to explain clearly that as light intensity increases, the rate of transpiration increases. Simply stating that 'it' or just 'light intensity' increases the rate of transpiration was insufficient. Good responses to part (iii) described that plants need phosphates for good root growth and to prevent discoloured leaves. In part (iv) many candidates correctly identified nitrogen. Carbon, carbon dioxide and potassium were common errors.

Question 3

This question was about farming.

(a) Battery, intensive or factory farming was usually correct.

(b) To gain both marks in this question, candidates needed to correctly label the pyramid of biomass and to draw the bar sizes accurately to scale. Most candidates gained the labeling mark, but candidates often did not draw the bar sizes accurately for the second mark.

(c) Many candidates scored the mark in this question for the fact that micro-organisms or bacteria break down sewage. When candidates did not gain the mark it was often because they had misread the question as 'what organs break down sewage' and gave an organ in the human body.

(d) Good responses to this question identified biological control and described the idea that a predator feeds on the pest or red poultry mite in an enclosed space such as a greenhouse. Others needed to develop their answers beyond superficial references to the red poultry mite being killed, without the link to the predator.

SECTION B – MODULE C4

Question 4

This question focused on acids and alkalis and incorporated aspects of the fundamental chemical concepts from the specification.

(a) 4 was usually correct in part (i). 11 was a common error. In part (ii) many gave the correct answer of 20, although a wide range of incorrect answers were also seen.

(b) Many candidates correctly identified ammonia or ammonium hydroxide in part (i). Ammonium salts were a common error. Neutralisation was usually correct in part (ii).

Question 5

Many candidates scored both marks in this question, which focused on the costs of manufacture. Answers that referred to advertising, transport, storage, packaging, or made vague references to the environment, did not get marks.

Question 6

This question was about ammonia. Some interpretation of data was required.

(a) Continuous was usually correct.

(b) Many candidates appreciated that nitrogen comes from the air/atmosphere in part (i). In part (ii) the word equation for the reaction in the Haber process was well done. The inclusion of '+ iron catalyst' was the most common error. The idea of a reversible reaction as a reaction that goes both ways was well understood by many candidates in part (iii). Answers that simply restated the question and described that the reaction can be reversed did not gain credit. 15 and 43 were common errors in part (iv).

(c) Most candidates interpreted the table of data correctly and gained the mark for the idea that the percentage yield of ammonia decreases as the temperature increases.

Question 7

This question focused on water purity.

(a) In part (i), many candidates correctly explained that drinking water is chlorinated to kill microbes or bacteria. Explanations in terms of cleaning the water or making it safe to drink did not gain credit. Part (ii) differentiated well with other types of fertiliser and sewage/urine/faeces being common answers that did not score.

(b) All three incorrect answers were common errors in part (i). In part (ii), forgetting to multiply by 100, or multiplying or subtracting the two masses were common errors.

Question 8

This question was about diamond and graphite.

(a) Carbon was usually correct. Buckminster fullerene was a common error.

(b) In part (i), most candidates correctly identified that diamond is suitable for use in cutting tools because it is hard or has a high melting point. Uses of graphite were well known in part (ii).

SECTION C – MODULE P4

Question 9

This question tested ideas about static electricity.

(a) Many candidates correctly chose B.

(b) Most candidates gave a correct use of static electricity. Sticking balloons to walls or making your hair stand on end did not gain credit.

(c) Good responses to this question described that the sweatshirt, made from an insulating or synthetic material, becomes charged by rubbing against the skin and/or other materials and that Amy gets a shock when the charge moves to Earth. When candidates did not gain full credit it was usually because they described a sweatshirt made from a natural material (eg wool or cotton) and did not appreciate the idea that Amy is earthed.

Question 10

This question was about electricity.

(a) Candidates showed a sound understanding of why the metal case of the toaster must be earthed.

(b) Most candidates correctly calculated the resistance of the heating element. One mark was awarded for the correct working out if 50 ohms was not correct.

Question 11

This question focused on ultrasound.

(a) Compression and frequency were often correct.

(b) Many candidates scored 1 mark for one or two boxes ticked correctly. To gain 2 marks candidates needed to tick the **three** boxes that indicated the correct uses of ultrasound.

Question 12

This question was about radioactivity.

(a) Nucleus was usually correct.

(b) Good responses to part (i) described that alpha cannot penetrate or is absorbed by the skin/soft tissue, whereas gamma can penetrate or is not absorbed by the skin/soft tissue. When candidates did not get marks it was because they simply quoted data from the question, without using the information to explain their answer. Most candidates gave a correct use for gamma radiation in part (ii).

(c) Radiographer was usually correct.

Question 13

This question focused on radioisotopes.

(a) To gain the mark candidates had to appreciate that materials can be made radioactive by putting them into a nuclear reactor or radioactive core.

(b) Many candidates gave a correct example of how a tracer is used in industry.

(c) Background radiation was usually correct. Natural radiation was a common error.

B624/02 Higher Tier

General Comments

This was a slightly larger entry paper than last year. The mean mark for the paper was 32.8. Candidates had been entered appropriately for the higher tier. Very few candidates scored less than 10. All questions scored and there were no "dead" marks. Candidates should be reminded to show all their working in calculations, as there are working marks that can be awarded when an arithmetic error occurs in the final answer. They should also be reminded to read the questions carefully, so that they answer the question that has been asked rather than the question they thought was being asked.

Comments on Individual Questions

Section A

Question 1

1a(i) The majority of candidates knew that stomata allow gas exchange although a significant number thought it was to help diffusion. In part 1a(ii) the majority of candidates stated that increasing light intensity increased transpiration, however, several candidates thought of light intensity as a chemical with statements such as "light intensity increases transpiration" without saying increase in or decrease in intensity. Some candidates answered the question in terms of photosynthesis and failed to score. 1a(ii) proved difficult for the majority of candidates. Examiners were looking for the idea that guard cells took in water by osmosis from surrounding cells, this made the guard cells turgid and become kidney shaped, opening the stomatal aperture. A common error was that it was controlled by light. 1a(iv) gave many correct answers but a significant number of candidates said that it stopped water loss which is not correct. In part 1b the majority of candidates were able to give a correct reason for needing phosphates. The main answers were growth, photosynthesis and to avoid discolouration of the leaves.

Question 2

2a Most candidates knew that intensive farming involved maximising yield from the resources available. In 2b the majority of candidates scored full marks although several did not make the area of the blocks in the pyramid correspond to the biomass and several candidates failed to use a ruler even though this is a requirement on the front of the paper. Only the more able candidates could explain why food chains were short in length (2c) or name the type of bacteria that converts ammonia to nitrates in part 2(d). In part 2e approximately half the candidates gave a valid advantage of biological control.

Question 3

The majority of candidates correctly calculated the number of bacteria after 20 hours. In part 3b(i) few were able to state that lack of water prevented bacteria multiplying, a common error was that it killed the bacteria. In 3b(ii) most candidates scored one of the two marks. 3c was answered well by the top 25% of candidates but the remainder found difficulty in explaining active transport or osmosis. Far too often candidates started their answer with "it" making marking difficult as the examiner did not know which process "it" referred to.

Section B

Question 4

In 4a the majority of candidates identified the alkali as ammonia or ammonium hydroxide. Only about 50% were able to give the correct number of atoms in part (b) and approximately the same number were able to calculate the % nitrogen in 4c.

Question 5

All but the weakest candidates were able to describe the process of extracting and purifying chemicals from plants. Examiners accepted both chromatography and distillation as methods of purification. Some candidates got the process mixed up with purifying water and filtered it through sand before adding chlorine. Part 5b was answered correctly by about 50% of candidates.

Question 6

6a was answered correctly by most candidates. As in previous years some candidates tried to write a formula equation and inevitably made a mistake. There is no advantage in this and candidates should be advised to do exactly as asked by the question. In b(i) most candidates were able to give the correct conditions for the highest yield and in part b(ii) state that the yield would decrease. Part 6c proved difficult for all but the most able to explain why compromise conditions were chosen. Most candidates stated a catalyst speeded up the reaction, some candidates stated that above 200 atmospheres safety and engineering costs became prohibitive, but few stated that the best yield for temperature gave too slow a reaction.

Question 7

In 7a candidates were able to identify fertiliser run off as a reason for nitrate pollution. In b(i) the majority of candidates gave a correct symbol equation but a significant number failed to realise that the case and size of the letters is important along with the size and position of the numbers. 7b(ii) gave a large number of correct answers for percentage yield.

Question 8

Weak candidates found it difficult to explain why the pH increased in 8a. Examiners were looking for the idea of neutralisation. A common error was that the pH of the acid and the alkali averaged out. In 8b approximately half the candidates correctly gave the ionic equation. Several candidates tried to write a balanced symbol equation using sodium hydroxide and hydrochloric acid which failed to score.

Section C

Question 9

In 9a most candidates correctly identified B as the answer. There was confusion about the processes of earthing and insulation in (b). Examiners were looking for the idea that the television would be earthed and the engineer insulated. Several candidates earthed the engineer which would make matters worse. In 9c most candidates scored well and very few failed to score. A simple diagram would have helped many candidates improve their score.

Question 10

In 10a examiners were looking for the simple statement that it prevents the case becoming live. Many candidates spent time describing what happens if there is a fault. In 10b the majority (over 90%) correctly calculated the resistance as 50ohms.

Question 11

Candidates correctly identified compressions and rarefactions on the diagram but in part b only the more able were able to explain what is meant by frequency.

Question 12

Candidates were able in 12a to explain why alpha emitters are not used as tracers. Candidates should distinguish between the radiation (alpha) and the radioisotope (alpha emitter) and often stated alpha emitters will not penetrate skin. On this occasion this error was ignored. Part (b) was answered well by about half the candidates, with many knowing how X-rays are produced and why they are preferred to gamma rays for hospital treatment. Some weaker candidates confused X-radiation with X-ray images.

Question 13

Only the top quartile successfully answered 13a. Examiners were looking for the idea that it absorbed neutrons. In 13b most candidates gave the answer that it is used to find a blockage or a leak in an underground pipe. In 13c(i) the most common source of natural radiation was rocks and the most common source of man made radiation (13c(ii)) was nuclear power stations.

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