



General Certificate of Secondary Education

**Applied Science (Double Award)
4861**

APSC/2H Science for the Needs of Society

Report on the Examination

2010 examination – January series

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General comments

The paper was well answered and the mean mark is higher than in previous series. This may be due to the smaller amount of equations necessary to complete the paper. Overall the candidates found the chemistry questions the hardest on this paper with question 5(a) (draw a labelled diagram of an atom) being the most poorly answered.

Question 1

- (a) (i) Almost all of the candidates correctly identified an unhealthy snack.
- (a) (ii) The three most common responses were sugar, salt and fat. No common incorrect answers.
- (b) (i) This was another question where the vast majority of candidates picked up the mark.
- (b) (ii) Most candidates identified the correct word to score the mark for this question.
- (b) (iii) Less than a quarter of the candidates gained both marks here. Almost half of the candidates scored one mark.
- (c) Nerve cells, neurons, the nervous system, by the brain, platelets and red blood cells were all common mistakes. Over a quarter of the students did not get this mark.
- (d) Most candidates supplied a great long list of things that our body does to cool down but provided no explanations so were only awarded one mark. Some candidates answered the opposite question of heating up. A lot of candidates assume that capillaries rise to the surface of the skin. Only a third of the candidates got two marks.

Question 2

- (a) Most candidates scored at least one mark, however, only a fifth were credited with full marks
- (b) (i) A fifth of the candidates did not achieve the mark and most candidates scored one mark.
- (b) (ii) Half of the candidates gained no marks for this question. Only a few candidates were able to pick up both marks.
- (c) (i) Most candidates were able to answer this question correctly.
- (c) (ii) Most incorrect responses referred to insulation, water proofing, cost, attractiveness or strength. The most common correct response was it does not rot.
- (c) (iii) The most common response was it can be painted.

Question 3

- (a) Most candidates were able to answer this question correctly.
- (b) (i) Most wrong answers were 'because it is radioactive'. Some candidates assumed that harmful gasses were emitted. The most common correct response was 'cancer'. A few gave a too general answer of 'it can penetrate the skin' or 'it affects the cells'.
- (b) (ii) Only half of the students got this mark.
- (b) (iii) Mostly candidates wrote 'treatment for cancer', with the second most common answer being 'sterilising'. The most common incorrect response was x-rays. Some candidates repeated themselves so only got one mark. Others thought that chemotherapy or power stations were correct.
- (c) (i) The most common incorrect responses were wind power and hydroelectric. Just over half of the candidates got no mark here.
- (c) (ii) It is quite obvious that a lot of candidates have no idea of what hydroelectric power is, many think it needs strong waves or fossil fuels. Very few candidates gained all three marks. A few candidates just wrote 'no light' which is not a disadvantage of solar power or just 'unreliable' without justification.

Question 4

- (a) (i) Almost half of the candidates achieved full marks, cell membrane was often being substituted for cell wall, nucleus often being substituted for vacuole and chloroplast and chloroplast were both being substituted for cytoplasm.
- (a) (ii) Many candidates were able to name two cell components found in both plant and animal cells.
- (b) Many candidates referred to the 'tail', others just to the 'shape' in general. The most common correct response was 'no chloroplasts as no light underground'. A few candidates believe that the shape of the root hair cell is to help it swim or manoeuvre underground.
- (c) (i) About a third of candidates scored full marks for this question. Many candidates correctly stated that the red blood cell has no nucleus to carry more oxygen. A few candidates vaguely mentioned shape or size in that it helps the red blood cell to fit around the body. A few responses were about these cells carrying a lot of blood.
- (c) (ii) Most incorrect responses were just general comments eg 'so it can send signals to the brain'. Others wrongly assumed that nerve cells travel around the body and others wrote about the cells having 'root hairs'. A few thought that the fatty outer layer was for protection from damage. Almost a third of candidates picked up both marks.

Question 5

- (a) (i) Mostly candidates who picked up one mark received it for having 7 ‘things’ around a central ‘thing’. Very few candidates labelled their diagram and so only picked up a maximum of two marks. Those that gained two marks here mostly correctly identified 7 electrons round the outside but nothing else. Those that gained three marks lost a mark for not indicating how many nuclear particles there were. The most common mistake included drawing something resembling the atomic arrangement of a hydrocarbon. Under a fifth of the candidates gained all four marks.
- (a) (ii) Most candidates did not answer this question correctly.
- (a) (iii) There was a very wide variety of responses with little in common with each other apart from their incorrectness. Alarming, few candidates wrote anything about electrons at all. Some responses referred to losing or gaining ions, others lost atoms and a few lost or gained protons. Most of the candidates did not pick up any marks here and almost a fifth of the candidates left this answer blank.
- (a) (iv) Only a third of the candidates gained this mark.
- (b) Only a third of the candidates were able to answer ‘covalent’ as the bond between two nitrogen atoms to gain this mark.
- (c) Not many candidates mentioned fertiliser but most of them knew that nitrogen was needed for healthy growth. A large number of responses referred to nitrates being needed by the plant and not nitrogen. Also nitric acid came up many times in the responses. A reasonable proportion of the candidates did not respond to this question at all.

Question 6

- (a) (i) Most candidates selected the correct Sankey diagram gaining a mark.
- (a) (ii) Mostly the correct answers indicated that the normal light bulb wastes more heat. Incorrect responses mentioned efficiency but not explained why one bulb was more efficient or just described in general terms that a light bulb needs to give off more light.
- (b) (i) Most incorrect responses were due to not labelling electrical energy at all or just calling it input energy. Other incorrect responses included noise, picture and vision. The majority of candidates gained at least one mark from the question.
- (b) (ii) Most of the candidates gained full marks for this question. Very rarely candidates scored two marks, of those that only gained one mark, most incorrectly calculated the total energy as being $90 + 90 + 250$.
- (c) (i) Many of the candidates got two marks. If one mark was lost it was for 'kettle has the most wasted energy'. A few candidates responded 'computer' and even less gave 'hair dryer'. There were no other devices mentioned. 'Wasting more energy than actually goes in' was another common mistake.
- (c) (ii) There was an error in this question, which meant that there were only two available marking points. All candidates were awarded the first two marks, and then awarded further marks according to a revised mark scheme.

Please check with Chris/Stuart for further details.

Question 7

- (a) (i) The vast majority of candidates scored this mark.
- (a) (ii) Most of the correct responses were along the lines of alcohol is a depressant and/or it slows down reaction time. Some responded blurry vision which was not given the mark. Messes with your head was also not worthy of a mark. Lowers your reaction time was a frequent response.
- (a) (iii) Most candidates recognised that the nicotine causes addiction.
- (a) (iv) Many responses were to do with damage to the respiratory system in some way. Some candidates correctly identifying the connection with oxygen but this is not enough for the mark. A few candidates just indicated that it is poisonous or that it affected the red blood cells, but not how. Most candidates did not gain a mark for this question and a significant number failed to write anything.
- (b) (i) Common mistakes include answering the next question but not this one or by writing something about percentage deaths. Some candidates just quoted numbers from the table without quantifying them. A few candidates referred to the ease of obtaining alcohol and tobacco.
- (b) (ii) A third of candidates got the mark for this question. There were many responses referring to the manufacturers wanting to make more money or that people do not own up to their drug intake. Some candidates explained that it was not the alcohol that killed the people in the table it was drink driving or binge drinking.
- (c) (i) The most common correct response was penicillin spelt in a number of ways. Incorrect responses included aspirin, paracetamol, ibuprofen, amphetamines.
- (c) (ii) Incorrect responses referred to addiction to paracetamol or side affects or overdose from it or the temporary effect of paracetamol. More than half of the candidates did not get a mark.
- (c) (iii) Common answers were about strength or stated 'antibiotics only kill infections'. There were many references to viruses becoming immune. Some candidates suggested that an antibiotic is a pain killer, while others indicated that antibiotics are not strong enough. Only half of candidates got this mark.
- (c) (iv) Not many candidates were able to answer this question correctly. Wrong answers include: the body becomes resistant to them; they are addictive; they cause damage to the body.

Question 8

- (a) (i) Most candidates gained at least one mark with just over half of candidates obtaining full marks.
- (a) (ii) 'Destroys the ozone layer' was the most common incorrect answer. Other incorrect responses referred to gases made in a greenhouse, gases that are harmful to the environment, gases that are trapped in the ozone layer or a man made gas. Less than half of candidates gained a mark here.
- (a) (iii) Quite a few candidates mentioned nuclear power stations, cars and factories. Mining was given the mark. Most candidates got nothing for this question, a tenth of candidates did not respond.
- (b) Most incorrect responses were due to the candidates not understanding the question. A common incorrect answer was describing how the liquid is dispensed out of the can rather than the composition of the mixture. Other common mistakes were describing the mixture as a gas in a liquid or remarking that the liquid turns into a gas. About a quarter of the candidates got two marks and many of the candidates did not respond.
- (c) (i) Lots of rays but very few waves. Through the atmosphere was a common mistake. Most of the candidates gained no marks.
- (c) (ii) There were many examples of the effects eg it can cause skin cancer without explaining why. Some candidates assumed that it is more dangerous because we cannot see UV rays or because they can penetrate the skin. Other candidates just wrote about UV being more powerful without justification. The majority of candidates got scored zero for this question.

Question 9

- (a) (i) Only a third of candidates gained this mark but correctly stated conduction. A lot of candidates did not respond.
- (a) (ii) Again only a third of candidates gained this mark, with many candidates not attempting the question.
- (b) It is clear that very few candidates know anything about convection currents. The responses of the exceptional candidates that wrote something sensible down were mostly to do with hot water rising but nothing about density. Almost all of the candidates did not achieve any marks here.
- (c) (i) Many candidates were able to gain full marks for this question. The most common incorrect responses were 'steel' and 'conducts electricity'.
- (c) (ii) Not many candidates gained two marks, however the majority were able to obtain one mark. 'Easy to mould' was a common answer that was not given the mark as were high boiling point and malleable. Some candidates wrote insulator then poor conductor so were only awarded one mark. Poor conductor of electricity after poor conductor of heat was given by many and only awarded one mark. There was some confusion over conductors and insulators.
- (d) (i) Many candidates answered copper, foil, metal, all of which were awarded no mark. The mark was given to white metal but not to black metal. A few candidates answered solar panels or 'white things'. About a third of candidates got the mark.
- (d) (ii) Most candidates failed to get a mark for this question. A lot of candidates wrapped something round their pipes. Some candidates wrote about bouncing and were given no mark. A few candidates mentioned absorbing the heat so were given no mark.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website