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General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Report on the Examination

2011 examination – January series

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Science B / Chemistry
Foundation Tier CHY1F

General

There were seven questions on this paper. The first five were targeted at grades G, F and E. The last two were common to Foundation and Higher Tiers. These were targeted at grades D and C.
The mark scheme was designed to allow candidates to gain marks for showing knowledge, understanding and application of chemistry. The majority of candidates appeared to have sufficient time to complete the paper and very few questions were left unattempted. Most candidates followed the instruction to draw a ring around the correct answer to complete the sentence, although a few candidates selected more than one answer.
Basic knowledge and understanding of how science works in everyday situations, including in the laboratory, are tested throughout this paper. This means that it is essential that candidates read and analyse the information provided, then read the question before writing their response. Many candidates would have gained better marks had they been able to express clearly what they appear to understand. Candidates should read through their answers, especially those that are descriptions or explanations. Candidates often do not appear to understand the meaning of basic terms, for example, 'alloy', 'atom', molecule', 'compound', 'mixture', 'heat', 'temperature', 'decomposition', 'unsaturated', 'distillation', 'evaporated', 'condensed' and 'abundant'.

Question 1 *(Low Demand)*

a) Most candidates appreciated that the gases hydrogen and helium must be less dense than air to allow the airship to float in air.

b) (i) It was surprising that about only half of the candidates were able to correctly name the product H_2O. The acceptable answers were 'water' and 'hydrogen oxide'. The most common incorrect answer was 'hydroxide'.

b) (ii) The majority of candidates knew that helium does not burn in oxygen because it is 'unreactive'.

c) Most candidates knew that a hydrogen molecule is made up of two hydrogen 'atoms'.

d) The majority of candidates correctly labelled the 'nucleus' and an 'electron' in a helium atom.

Question 2 *(Low Demand)*

a) (i) Almost all of the candidates knew that copper is used for the wires in an electric plug because it 'conducts electricity'.

a) (ii) This part was not answered well. The Specification indicates that alloys are 'mixtures' and are 'metals mixed with other metals or carbon (in the case of steels)'. Therefore candidates' answers needed to indicate that an alloy is a mixture. Many candidates just stated that an alloy 'contained two metals' or was 'two metals joined together'. Several candidates gave descriptions of smart alloys or just gave a property of an alloy, such as, 'it is harder' or 'it is a conductor of electricity'.

b) Most candidates wrote creditworthy answers and seemed to appreciate the problems that could result. 'Noise' and 'dust' pollution were the most common answers. Credit was not awarded when candidates gave the reason that people would not like to live near the mine because of 'pollution' without indicating the type of pollution.

Question 3 ***(Low Demand)***

a) The majority of candidates correctly labelled the 'crust' and the 'core' on the diagram of the Earth's layered structure.

b) The majority of candidates drew a bar chart and labelled it correctly. Candidates who did not use a ruler sometimes lost a mark because their freehand line was wavy and so was often outside the tolerance of half a square. A few candidates correctly plotted the three points and then lost a mark for drawing a line graph.

c) (i) Many candidates did not know that calcium carbonate is 'decomposed' to release carbon dioxide.

c) (ii) The majority of candidates knew that 'global warming' is caused by more carbon dioxide in the Earth's atmosphere.

Question 4 ***(Low Demand)***

a) (i) Most candidates answered correctly that a hydrocarbon contains only 'carbon' and 'hydrogen'.

a) (ii) Most candidates managed to state that ethene is unsaturated because it has a 'double' bond. The most common incorrect answers were 'covalent', 'chemical', 'ionic', 'single' or 'strong'.

b) The majority of candidates knew that when many ethene molecules join together a polymer called 'poly(ethene)' is formed.

c) Most candidates gained a least one mark. There was confusion between the terms 'recycling' and 'reusing' the plastic bags. Popular but incorrect answers were that 'plastic bags are not strong or break easily' or that 'plastic bags cannot be recycled'. No marks were awarded for vague answers, such as, 'pollution', 'cost', and 'harms the environment'. The most common correct answers referred to plastics being 'non biodegradable', 'a litter problem' or 'a landfill problem'. There were some excellent responses showing candidates' knowledge and understanding of the method by which plastics are made and the use of limited resources. Very few candidates presented the idea that supermarkets were advised to stop handing out plastic bags to encourage customers to reuse bags or to use their own bags.

Question 5 ***(Low Demand)***

a) (i) Most candidates managed to gain both marks. Most descriptions of the effect of using the pestle and mortar were accepted. For the second mark most candidates correctly stated that the mixture was 'filtered', however, 'funnelled' did not gain the mark.

a) (ii) Most candidates could not describe how to use the tap on the funnel to separate the oil from the water. Many candidates gained both marks here for stating that the water came through first and the oil was left behind in the funnel. Several

candidates seemed to be under the impression that the oil particles were 'too big' or 'too thick' to go through the funnel. Another common error was for candidates to state that 'oil is denser than the water so the oil floats on water'. A few candidates incorrectly thought that stage 3 was the same as the stage 2 so they described a method for separating the solid parts of the sunflower seeds from the liquids.

b) (i) Most candidates correctly stated that three colours had been added to the crisps. The most common incorrect answer was 'five'.

b) (ii) Most of the candidates managed to correctly state that one of the colours was unsafe and the other two were safe. However, there was disagreement on whether the crisps were safe to eat or not. It was disturbing to think that many candidates believed that two safe colours outweighed one unsafe colour so the crisps were safe to eat without further investigation. There were some vague answers stating that 'there are more safe than unsafe colours' or 'the majority of colours are safe'. A few candidates got confused between colours and crisps so stated that 'we should just eat crisps 1 and 3 as crisp 2 was unsafe'.

b) (iii) Generally this part was well answered but some candidates concentrated on the 'appeal to customers' or 'looking nice', rather than on the importance to the manufacturer of 'increased sales' or 'more profit'.

Question 6 ***(Standard demand)***

a) (i) Many suggestions were incorrectly linked to the amount of copper metal in the Earth's crust; however, several candidates understood that there was very little metal available in the copper ore. A few candidates were more concerned with pollution caused by the waste gases produced from copper sulfide, and made reference to sulfur dioxide and acid rain.

a) (ii) There was a wide variety of correct suggestions with most candidates stating that iron is 'more useful', 'more in demand', 'cheaper' or 'stronger'. A few candidates correctly stated that iron is 'easier to extract'. However, candidates should be advised to be precise and not to write vague statements, such as, 'easier to get'.

b) (i) Far too many candidates just stated that it turned into a liquid because 'it is hot' or 'at 950^{o}C'. This was just restating the information in the question. The best answers came from candidates who appreciated that they had to compare the temperature of the electrolysis cell to the melting point of aluminium. Candidates were awarded the mark for suggesting that the aluminium 'melts' or that the temperature in the cell is either at or above the melting point of aluminium. Marks were consistently lost for answers that were otherwise good but where candidates referred to boiling point rather than melting point, for example, 'aluminium has a low boiling point so it melts'.

b) (ii) This question was poorly answered by candidates. Very few candidates gained two marks for realising that the 'electrode(s) are made of carbon' and that 'carbon reacts with oxygen' to produce carbon dioxide. Most candidates who managed to gain a mark here got it for mentioning that the 'electrode(s) are made of carbon'. There were several common incorrect ideas, these included 'aluminium burns to give off carbon dioxide', 'oxygen burns to form carbon

dioxide', 'carbon dioxide is released because of heating' and 'we use up oxygen when we breathe in and breathe out carbon dioxide'.

b) (iii) The reasons for recycling appeared to be well understood. Most candidates gained at least one mark usually for 'saves resources or aluminium is non-renewable'. There were too many vague answers including 'to save money', 'to reuse', 'less pollution' and 'good for the environment'.

Question 7 ***(Standard demand)***

a) This part was poorly answered with very few candidates gaining three marks. Candidates were told to use the words 'evaporated' and 'condensed' but often there was confusion as to where or when the evaporation process and condensation process occurred. Several candidates thought that 'the gases evaporated' and 'the liquids condensed' when the crude oil was heated. Many candidates realised that the different fractions boil/condense at different temperatures but very few linked this to the idea that the fractions had to be cooled in order to condense. Other candidates contradicted themselves, when they tried to use the words 'evaporated' and 'condensed' for example 'heat causes crude oil to evaporate and heat causes crude oil to condense'. A few candidates thought that the crude oil 'burns' to form the fractions.

b) (i) Answers were often confused because candidates did not make clear whether they were referring to one fraction or to all four fractions. Many candidates had great difficulty in expressing themselves clearly and made statements such as, 'they have a large number of carbon atoms' or 'they have more than one carbon atom'. A few candidates also stated melting point instead of boiling point.

b) (ii) This question was well answered with a majority of candidates realising that as the number of carbon atoms increases the boiling point increases or vice versa. There was confusion between the terms 'atoms and molecules' and 'heat and temperature'. Candidates did not gain credit if they wrote that 'the more carbon atoms in a molecule then the longer it takes to boil'. A few candidates just stated 'it got higher' or 'it increases it' but without giving any explanation of what 'it' is.

c) (i) This question was poorly answered by most candidates. Common incorrect answers were 'heat reaction', 'thermal decomposition', 'distillation' and 'evaporation'.

c) (ii) Many candidates managed to get one mark for mentioning that fuel oil was 'heated'. A few candidates who stated that it was 'catalytic cracking' got both marks. The most common incorrect answer was one based on a description of fractional distillation.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.