Version 1.0: 0708

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Applied Science 8771/8773/8776/8779

SC05 Choosing and Using Materials

Report on the Examination

2008 examination - June series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

General Comments

The paper appeared to differentiate well and provided a good spread of marks. Most candidates attempted every part of every question, with the exception of Question 3.

The legibility of candidates scripts seemed to be more of a problem this year, with some candidates' writing being so small or so untidy that it was often very difficult to decipher what they had written.

After several Principal Examiner's reports referring to a lack of learning of basic definitions, it was pleasing to see that this year the situation seems to have improved.

There are some occasions when candidates are hedging their bets by writing down several answers in the hope that one of them may be correct. A good example of this was in Question 2 (b) where candidates were offering several suggestions. Candidates should be aware that examiners mark lists on a +1 –1 basis.

The concept of bonding and linking bonding/structure to properties appears to be poorly understood. (Ionic bonding in Question 1, metallic bonding in Question 2 and covalent bonding in Question 6). Polymer Science is also a weakness. (Question 6 parts (b) (i)).

Many candidates appear to be either careless with units or do not understand how to use units. This was particularly noticeable in Question 2 (d) and Question 5 (b).

Arithmetical skills were generally good except when it comes to negative indices, for example Question 5 (b).

Question 1

(a) Most candidates could score both marks on this part of the question. A surprising number of candidates included aluminium as one of their answers.

(b) Most candidates responded by talking about a mixture of materials.

(c) Most candidates could score one mark here, usually for the idea that crude oil is a valuable or non-renewable resource. Quite a few candidates were concerned about the rising cost of crude oil. Only the better candidates scored two marks.

(d)(i) Responses to this part of the question were very much centre-dependent. In some centres nearly all candidates referred to the combination of a metal and a non-metal. Most of the incorrect answers were those that described covalent bonding - some candidates even stating that covalent bonding was another word for ionic bonding.

(ii) A good response to this part of the question with most candidates correctly referring to the ability of ceramics to withstand very high temperatures.

(e)(i) About 50% of the candidates either used the term 'amorphous' or correctly described it.

(ii) A few candidates misinterpreted the intention of this question and simply described the tempering process. Most candidates however realised that the glass becomes stronger or tougher.

(iii) Most candidates correctly labelled the inside of the curved surface.

(iv) Only the better candidates realised that when broken the pieces of the glass would remain attached to the plastic. Many believed the plastic was present to protect the lower layer of glass.

(v) Most candidates were able to obtain one mark for mentioning the reduced chance of injury to the driver or passengers. Only the better candidates realised that it would also be safer because the driver would still be able to see through the windscreen. Many candidates referred to the lower cost of repair.

Question 2

(a) 'Good thermal conductivity': most candidates simply stated that this meant the material was a good conductor of heat.

'Malleability' and 'ductility' were poorly explained or often confused, with candidates giving the definitions the wrong way round.

'Strong in tension' was poorly answered, with few candidates showing that they understood what was meant by the word tension. The most common answers were *this means that it is strong when a tension force is applied* or *takes a lot of weight/force.*

(b)(i) Many candidates talked about aluminium being a light metal, rather than the fact that it had a low density.

(ii) Most candidates identified the fact that copper had a high value of electrical conductivity.

(iii) Almost all candidates realised that iron was a good metal to use for a saucepan because it had a high melting point.

(c)(i) Most candidates scored one mark for the mention of ions. Positive and negative electrons was a common response. Only the better candidates earned two marks.

(ii) Most of the better candidates earned a mark for mentioning free electrons, but comparatively few earned the second mark for saying what happens to these electrons when a current flows.

(d)(i) Most candidates could correctly identify the copper and the zinc atoms in the diagram.

(ii) The implications for the properties of a metal by the introduction of a foreign atom was poorly understood and explained by the majority of candidates. Only the best candidates scored a mark here and very few of these were able to score two marks.

(iii) A pleasing response to this part of the question, with a high proportion of candidates scoring both marks. These candidates realised that the steel had to be heated to a high temperature and then cooled rapidly. A few candidates rather overheated their steel and either raised it to the melting point or in a few cases to the boiling point.

(iv) A rather mixed response to this part of the question, with some candidates clearly not understanding what was required by the reference to 'property'. Thus it was common to see answers referring to the weight of the steel.

(v) A pleasing number of candidates were able to recall the correct equation and correctly complete the arithmetic. Sadly however many candidates were careless with the unit. Thus it was common to see kg m^3 instead of kg m^{-3} or kg/m^3.

Question 3

Strangely, this was the only question on the paper where a significant number of candidates had made no attempt whatsoever at an answer.
About half of the candidates were able to give a reasonable account of how the investigation should be carried out, and a mark of six out of eight was quite typical.
A few candidates thought that the investigation was a Hooke's Law experiment, and so wanted to measure the extension of the different threads. Others were sidetracked with Searle's Apparatus.

Question 4

(a) Most candidates scored one mark for this part of the question (usually the mark for resistance to high temperature); the better candidates scored both marks.

(b) Rather poor responses to this part of the question. A number of candidates simply used phrases from the question showing poor examination technique.

Most candidates believed that the reason the platinum electrode would reduce air pollution was because it would not itself undergo any chemical reactions.

Many candidates, on seeing the use of platinum in connection with a car engine, thought that it was something to do with catalytic converters in the exhaust system.

(c) Again, some rather disappointing answers, although most candidates were able to score at least half of the available marks.

(d) Most candidates identified that platinum is an expensive metal.

Question 5

(a) Most candidates were able to give a correct definition of stiffness.

(b)(i) Most candidates were able to give a correct definition of stress, although a few candidates simply wrote F/A.

(ii) Most candidates were able to give a correct definition of strain. The commonest mistake was to refer to the new length of material rather than the extension.

(iii) Many candidates were able to score all three marks here, even though some candidates made life difficult for themselves by choosing very awkward scales for their graph.

The most common mistake was failure to include the origin on the graph.

(iv) Most candidates could correctly derive the value of the strain from their graph.

(v) Most candidates earned one mark for knowing the equation for the Young modulus. However, many candidates failed to calculate the correct numerical value because they either failed to notice that the strain values were x 10^{-5} or could not manipulate this correctly. Candidates often failed to gain the unit marks, either because the candidates failed to put in the M for mega, or wrote MN m^2 instead of MN m^{-2}.

(vi) Most candidates were able to score one mark for this question.

(c) Usually well answered. A few candidates believed ‘corrosion resistance’ to be a physical property.

Question 6

This was by far the worst answered question on the paper.

(a)(i) Most candidates realised that this was covalent bonding.

(ii) Most candidates could correctly talk about electrons being shared. Some of the less able candidates talked about atoms or molecules being shared.

(iii) Rather poorly answered, except by the best candidates. The most common answer was that a single bond is one link and a double bond is two.

(b) Some candidates were able to score a mark for 'monomers', but some misread the question and named the process of polymerisation instead.

(c) Some candidates could correctly put C_5H_8, but many tried to put a structural formula and failed to write it down correctly.

(d) A pleasing number of candidates realised that it was the double bonds that allowed polymerisation.

(e) Very few candidates could suggest the correct name of the polymer in natural rubber.

(f) Not a well-answered part of the question. The better candidates could score one mark, but very few candidates scored two. There was often confusion between vulcanising and plasticizing.

(g) Similar to part (f).

(h)(i) Apart from the few who thought that plastic was a better electrical conductor than metal, most candidates correctly answered this part of the question.

(ii) Most realised that electric sockets should be made from thermosetting plastic.

(i) About half of the candidates correctly answered this question.

(j) Usually most candidates could earn this mark. A number provided fully labelled graphs showing elastic behaviour, yield point etc.

Mark Ranges and Award of Grades

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