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Applied Science SC05

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Unit 5: Choosing and Using Materials

Report on the Examination

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General Comments

The paper differentiated quite well and produced a good spread of marks. The vast majority of candidates attempted every part of every question.

It was pleasing to see that the standard of mathematical calculations has continued to improve, albeit only slightly. Candidates should be encouraged to attempt all calculations: in many cases marks are awarded for selecting the correct formula to use and for providing the correct units, even if the arithmetic is faulty.

It was also pleasing to see that those questions involving straightforward recall of standard definitions were again answered reasonably well by many candidates. This has been a weakness of most candidates in the past. These questions accounted for 20% of the total marks.

Again a lot of candidates were careless in their wording and lost marks as a result. For example, describing an alloy as a mixture of ***one*** or more metals.

Question 1

All parts of this question were answered well by the majority of candidates, with the exception of part (d) where most candidates ticked 'tough' instead of 'hard'.

In (a)(ii) and (b)(ii) candidates were asked to 'give **one** reason for their choice of material'. Candidates need to be made aware of the fact that if they provide more responses than asked for they are producing a 'list' and when examiners mark a list the principle followed is that a wrong answer cancels out a correct answer.

Question 2

Parts (a) and (b) were well answered but a significant number of candidates thought that concrete was a ceramic material.

(c)(i) Again lots of candidates insist on writing that an alloy is a mixture of **one** or more metals. Also, a number of candidates stated that the elements in an alloy are bonded / chemically bonded together.

(c)(ii) 60% of candidates did not score at all on this question. Many candidates do not know that alloying alters the atomic structure of metals which in turn changes their physical properties.

Part (d) was well answered.

Question 3

Parts (a), (b), (c) and (d) were answered well by the majority of candidates.

(e)(i) 90% of candidates scored at least 1 mark on this question. Despite the fact that the question asked 'How would you find the mass of the rock sample using the apparatus shown?' a lot of answers started by saying 'I would use a balance to find the mass'. Very few candidates realised that in order to find the mass of the rock sample it would be necessary to find the extension of the spring due to various masses, draw a graph of mass against extension and use the graph to read off the mass corresponding to the extension of the spring caused by the rock sample alone.

(e)(ii) Only a small number of candidates were able to suggest two ways of making the apparatus arrangement more stable. Most candidates scored 1 mark for saying 'clamp the stand to the bench or add a counterweight to the base of the stand'.

(f) This density calculation was not done as well as similar calculations in the past. The rearranging of the formula 'density = mass ÷ volume' to give 'volume = mass ÷ density' proved problematic for many candidates. Of those who successfully achieved this, a lot then went on to substitute mixed units i.e. mass in 'g' but density in 'kgm^{-3}'.

Question 4

This question was answered quite well with the exception of parts (c)(i) and (c)(ii). Only one-third of all candidates realised that if a polymer is named, say, poly(propene) then the monomer it is made from is called propene. Even fewer candidates could draw the structure of propene.

Question 5

The majority of candidates scored quite well on this question. Only a very small number obtained full marks. Of the list of materials, polycarbonate was the least used.

Question 6

(a) The definitions of *stiffness* and *tensile strength* were reasonably well known.

(b)(i)
(ii)(iii) The definitions of *stress* and *strain* were very well known. In part (iii) a good majority of candidates gave the correct answer to this question. However, a significant number of candidates stated that strain has no unit 'because it is a ratio' rather than 'a ratio of two lengths'.

(b)(iv) Only 25% of all candidates scored both marks for the graph. The most common errors were not plotting the point (0,0) and drawing a 'best fit' straight line for <u>all</u> of the points.

When papers are scanned into the system it is often difficult for the examiner to see the plotted points on a graph. Candidates need to be informed that they must mark the points on a graph very clearly.

(b)(v)
& (c) Although slightly more successful than in the past, the calculations of strain, stress and Young modulus still present a problem to many candidates despite them being well established questions. Candidates' handling of negative indices was particularly weak. A lot of candidates were able to pick up marks in each of these questions by stating a correct formula or by giving the correct unit.

(d) A majority of candidates correctly identified material C as being the least stiff but very few could then go on to explain why.

(e) Quite well answered.

Mark Ranges and Award of Grades

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