



GCSE

COMBINED SCIENCE: TRILOGY

8464/C/2F (Chemistry)

Report on the Examination

November 2021

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General Introduction to the November Series

This has been another unusual exam series in many ways. Entry patterns have been very different from those normally seen in the summer, and students had a very different experience in preparation for these exams. It is therefore more difficult to make meaningful comparisons between the range of student responses seen in this series and those seen in a normal summer series. The smaller entry also means that there is less evidence available for examiners to comment on.

In this report, senior examiners will summarise the performance of students in this series in a way that is as helpful as possible to teachers preparing future cohorts while taking into account the unusual circumstances and limited evidence available.

Overview of Entry

The cohort of entries was significantly smaller than usual. Each summer approximately 180,000 students usually sit the 8464/C/2F paper. This session had an entry of just under 200 students.

Comments on Individual Questions

Question 1 (low and standard demand)

The reversible symbol was well known, but many students did not recognise that the starting point for the reaction was the anhydrous form of copper sulfate, so were unable to identify the colours of the salts. They did not appreciate the link between the reversible reaction and the storage of the anhydrous salt. Most students referred incorrectly to the toxicity of the salt.

The topic of water treatment was not well understood. Credit was given for the idea of filtering removing large insoluble solid material from the water and sterilising removing bacteria and pathogens, but not germs.

Question 2 (low and standard demand)

This was a skills-based question and most students were able to draw a bar chart and calculate a mean. Only around half of the students gained full marks in the mean calculation as they determined the mean for the full week rather than Monday to Friday as required.

Many students appreciated that pollution levels were lower at the weekend but did not give a reason, or link this to reduced traffic levels for the second mark.

Question 3 (low and standard demand)

Students generally answered this question well. The topic of climate change and its effects were well understood. The impact of increased temperature was well known. No credit was given for the

common answer of “The Earth gets hotter” as the response needed to be a for consequence of this.

Many students were able to correctly describe the trend in the graph for 2 marks. However, a significant number ignored the initial section of the graph where the percentage was constant. The use of the data from the graph was good overall. Credit was not given for predictions made from the graph if the instruction to extend the graph line had not been followed, as the reading could not be checked and verified.

Question 4 (low and standard demand)

Very few students were able to explain why scientists were uncertain about the percentage of gases in the early atmosphere. The idea of there being a lack of evidence was rarely seen. ‘No proof’ alone was insufficient to gain credit. Students tended to focus their answers on the changes happening a long time ago, which did not gain credit as answers needed to indicate that they occurred billions of years ago. Students used the data in this question well.

Question 5 (low and standard demand)

The interpretation of data and the associated calculations were generally well done, and many students scored highly on this question. The exception was question 05.3, where no credit was given for sulfur dioxide being toxic or harmful, as these are not the most significant reasons for reducing the global emissions of the gas.

Question 6 (standard demand)

Very few students were able to identify the variables. Most copied out the stages of the experiment from the rubric and did not go on to elaborate.

Graphs were usually accurately plotted and an appropriate line of best fit drawn. No credit was given for a bar chart as the first point had already been plotted for the students to follow.

The last part of the question required students to explain the effect of increasing the temperature on the reaction rate. Most students gained the first marking point for stating how temperature affected the rate of reaction but many did not go further to give a reason for this change. The idea of a higher temperature increasing the frequency of particle collisions was rarely seen.

Question 7 (low and standard demand)

Students found this question challenging, with a significant number of scripts left blank.

Knowledge of the hydrocarbons was very limited. Very few students knew what decomposed to form crude oil – many appeared to confuse “decomposition” with “composition” and gave hydrocarbons as their answer. Similarly, in question, 07.2 Lithium was a common answer as

students had used the Periodic Table to find the third element rather than naming the third hydrocarbon.

Students often failed to address the command word to compare the structure and properties of the two hydrocarbons. Many students rewrote the information provided in the rubric without elaboration, for which no credit was given.

Concluding Remarks

The demand of this paper was similar to that of papers set for this specification in previous series.

Students scored well on questions involving the use of data and knowledge of the Earth's atmosphere and climate change, but often had difficulty in making links between each stage of a question. Very few students recognised in question 01.3 that the anhydrous copper sulfate would react with any moisture in the air as in the equation in question 01.1.

Practical work is at the heart of the specification. The importance of the use of variables in experiments is paramount. In question 06.1, when identifying control variables students should refer back to the method provided, where in this instance the volume of hydrochloric acid was given. Many answers referred to the "amount" of acid or metal which is insufficient to gain credit, likewise, adding a "piece" of magnesium which does not indicate that either the length or mass has been controlled. Reading through the method will also reveal what is being changed in subsequent repeats as the independent variable.

Students adopted a range of methods to answer the mathematical questions, which is to be encouraged as credit can be gained by showing working. They should also take careful note of any additional instructions. In question 04.6, the final mark was often not gained because their answer was not given to 2 significant figures.

In questions, such as question 07.3, where comparisons are to be made from given data, students should be encouraged to answer accordingly using a comparative and not rewrite the information that is provided without any elaboration. This does not gain any credit as the student has not added any value to their answer. Some excellent answers were seen where the students expanded upon the data, for example, to explain why the molecules had different melting and boiling points or they deduced their physical states.

Mark Ranges and Award of Grades

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