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# AS-level **CHEMISTRY**

7404/1 Physical and Inorganic Chemistry  
Report on the Examination

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## General Comments

This was the first paper for the new Chemistry specification. The paper proved more demanding than previous AS papers and, in particular, students found the increased mathematical complexity difficult to cope with. Questions that demanded an extended response also proved tough, and only the best students were able to organize their thoughts into a logical sequence enabling them to score the highest marks. It appeared that many students lacked practical experience and an understanding of procedures in practical chemistry. They were unable to address parts of the questions that tested practical skills. The multiple choice questions placed at the end of the paper drew mixed responses but, as with the rest of the paper, those items requiring level 2 mathematical skill and good practical experience proved the most challenging.

As with the previous specification large numbers of students used additional pages. This was particularly true for question 6.1 where students included too much detail rather than addressing the specific requirements of the question. In some cases additional pages contradicted answers in the main booklet and resulted in students losing marks.

Clarity of answers was an issue for a small but significant number; the instruction to write clearly using black ink or biro still needs pressing home by schools.

## Individual question commentary

### Question 1

Aspects of question 1 were well done but significant numbers were unable to write the electronic configuration of the  $\text{Cr}^{3+}$  ion. Q1.2 was answered well but the unfamiliar formula required in Q1.3 proved tricky for the majority.

### Question 2

Most of this question was answered correctly but many students failed to appreciate that the ions compared in 2.1 had the same number of electrons therefore 1 mark was scored rather than 2. It was pleasing to see over half the students scoring 3 or more marks on question 2.3

### Question 3

Only the most able students answered this question correctly. It was noted that many students selected incorrect titres in Q3.1 limiting them to 1 mark out of 3. Consequential marking allowed students to score full marks for Q3.2 but Q3.3 was answered poorly showing a lack of practical experience. Question 3.4 was marked using a levels of response mark scheme that tested students' ability to give a logical description of a common practical technique. Many students were able to access at least 3 marks but few scored the full 6. It was not uncommon to see some students describe the titration technique itself and in so doing fail to address the question asked.

### Question 4

Most candidates scored some marks here but many made chemical errors such as referring to the breaking of bonds when discussing the boiling of bromine or suggesting that magnesium is ionic. Often, the simple molecular structure point was absent for both weak and strong students showing poor exam technique in terms of addressing the question.

### Question 5

Perhaps because it was similar to questions asked in the previous specification, Question 5.1 was quite well answered but a common mistake was to use values with incorrect units for the variables in the  $pV=nRT$  calculation. Question 5.2 was much less well answered with many students calculating the total volume of the two flasks but failing to answer the question and give the volume of flask P in  $\text{cm}^3$ .

#### Question 6

For Question 6.1 many students wrote a lot of unnecessary detail about aspects of a time of flight mass spectrometer but on the whole it was quite well answered. Questions 6.2 and 6.3 proved mathematically difficult for many although consequential marking allowed large numbers to score on 6.3. The use of probability to predict the ratio of peaks in question 6.4 proved very difficult for students. Some scored 1 mark for giving three peaks but the 1:2:1 ratio was only seen from 11.3% of students. Question 6.5 was answered well with over 60% of students scoring all 4 marks.

#### Question 7

The fairly familiar shapes here proved quite easy for many students and the rest of the question also proved to be quite accessible except for Q7.3 where many were unable to explain the change in the Cl-Al-Cl bond angle.

#### Question 8

This question was answered poorly. Even the half equation in 8.1 was usually not answered correctly and the more challenging equations in 8.2 and 8.3 were only seen from the better students. In 8.4 the explanation that iodide ions are oxidised wasn't seen very often but a reasonable proportion of students scored some marks on this question.

#### Question 9

This question was very poorly answered with few getting to the correct overall answer. The unstructured nature of this calculation proved too difficult for most especially following the requirement to identify correctly  $\text{BaSO}_4$  as the precipitate formed. Only the very best students scored well here.

#### Questions 10-24 Multiple choice

From this section of the paper items 10,11,15 and 18 were usually answered correctly. It was surprising to see that item 17 was answered poorly but it did give further evidence that redox ideas are not well understood by large numbers of students at this level. Item 20 proved difficult showing that the overall dipole possessed by a molecule clearly isn't a well understood concept. Item 22 was also not answered correctly by most; this idea has not been tested often in the previous specification so students may not have had much prior experience of the type of question.

## Mark Ranges and Award of Grades

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