Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2021

Pearson Edexcel Advanced Subsidiary GCE
In Chemistry (8CH0)
Paper 01: Core Inorganic and Physical Chemistry

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Introduction

A relatively small numer of candidates sat this examination paper. A full range of ability was seen, with some candidates clearly having prepared very well.

Question 1
This question was generally well answered.

1(a) All candidates recognised that there is a difference in the number of neutrons in an isotope. Most were able to answer the question fully and state the correct number of protons, 35, and the difference in the number of neutrons, 44 and 46.

1(b)(i) The importance of electronic configuration was recognised by some candidates but some answers were unclear and related chemical reactivity to chemical properties rather than to electronic structure.

1(b)(ii) Many candidates answered the question about how the relative abundance was used to find the relative atomic mass. Those who read the question carefully were able to score the mark for the mass spectrometer but few were able to say how the relative abundance was found from a mass spectrum.

1b(c)(i) and (ii) The electronic configuration of bromine was very well understood.

Question 2
This question centred on practical techniques in titration and those candidates who had been able to gather experience of these practicals will have been at an advantage.

2(a) The first item in question 2 was a question very commonly asked at this level. Unfortunately, few candidates were able to make a good start to it and it was answered poorly.

2(b)(i) and (ii) These questions concerning titration were much better understood.

2(b)(iii) and (iv) While the average titre was often calculated correctly not all candidates were able to use this in the next part of the calculation to find the molecular mass of the sodium carbonate.

2(c)(i) and (ii) These calculations were relatively straightforward and was accessible to many candidates.

2(d)(i) and (ii) The final calculation for this question was more accessible but still challenging for some.

Question 3
This question concerned the shape of ammonia molecules and the amide ion.

3(a)(i) This balanced equation was approached with confidence and some good answers were seen.

3(a)(ii) The diagrams were less well understood than the equation, with the wrong numbers of lone pairs of electrons quite common.

3(a)(iii)-(iv) The bond angles formed by the two species was relatively well known by those candidates that knew the numbers of lone pairs, with candidates recognising the pattern of 2.5 degree reductions in bond angle with each additional lone pair of electrons.

3(b) This was a challenging item with few candidates able to suggest that the sodium amide would react vigorously with water or oxygen.

Question 4
Questions were about ionisation energy requiring consideration of the attraction between the nucleus of the atom or ion and the electron being removed. This is affected by the number of protons in the nucleus, the distance of the electron from the nucleus, the number of shells of elctrons repelling or shielding the electron and whether the electron is alone in an orbital or paired with another electron with opposite spin. Some of these factors will be the same when comparing the ionisation energy of two different atoms or ions.

4(a)(i) This multiple choice question was well answered.

4(a)(ii) In this question, the key feature was the increased shielding and distance of the electron from the nucleus.

4(a)(iii) Candidates who were able to identify the importance of the number of protons in the nucleus in a comparison of first ionisation energies of sulfur and chlorine scored well.

4(a)(iv) It was the pairing of electrons in an orbital which explained the ionisation energy difference.

4(b) This calculation provided considerable challenge with relatively few candidates able to work their way to the final answer.

4(c) The graph, which was expected to be familiar to candidates, proved quite challenging. The use of a suitable scale and plotting of points in 4(c)(i) was well attempted, but the estimation of melting temperature in 4(c)(ii) proved more challenging.

Question 5
At this level, questions about bonding and structure usually discriminate very well, with the best candidates answering confidently with precision, while less confident candidates sometimes use incorrect terminology, for example confusing bonds with intermolecular forces.

5(a) Here the idea that diamond is a giant structure with atoms held together by strong covalent bonds, while iodine is a simple molecular structure where molecules are held together by weaker intermolecular forces, in this case London forces discriminated candidates.

5(b) This item linked the property of electrical conductivity to diamond and graphite. Many candidates were familiar with this and were able to answer well, though some did not describe why there were electrons free to move in graphite.

Question 6
This question concerned redox and oxidation number.

6(a) Many of the candidates were able to assign oxidation numbers and could answer (a)(i) as a result, but the chemistry required to answer (a)(ii) was less commonly remembered and understood.

6(b) Again, assigning oxidation numbers and using them to explain disproportionation proved to be relatively straightforward in (b)(i) but the equation in (b)(ii) provided much more challenge.

6(c) These calculations proved difficult for even the best candidates.

Question 7

7(a) Candidates were able to recall the definition of an ionic bond and so scored marks here.

7(b) This multiple choice item also scored relatively well.

7(c) These multiple choice questions also proved accessible to many candidates, with the answer to (c)(ii) proving the most straightforward.

7(d) This proved very challenging with few candidates scoring any marks for the idea that solutions containing Group 2 metal ions would give precipitates on addition of, for example, sodium hydroxide or sodium sulfate. The action of heat on a nitrate was understood a little better.

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