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General

The paper seemed to be well received. There were some question parts where candidates struggled, but apart from them, all questions attracted the full range of marks. There were a number of questions on areas of the specification which were less familiar to the candidates. There were also several question requiring candidates to apply their knowledge to novel situations.

As always there were questions on practical areas of this unit. There were many excellent answers from centres where practical work is given the priority needed but there were also candidates who showed little experience of working in laboratories.

There were more than the usual numbers of questions where candidates failed to read the question asked.

Multiple choice questions 1 – 20

The easiest question, beginning with the easiest, were:

8 – ionic radii

12 – isoelctronic ions

19 – safety symbols

The hardest items, beginning with the hardest were:

4 – isomers of C_3H_5Cl

7 – evidence for ions

2 – evidence for free radical mechanism

The overall mean on these questions was just over 50%.

Question 21

It was hoped that this question on cyclohexene would be familiar ground to the candidates, as this is the usual chemical used in the laboratory to show alkene reactions.

Regrettably, this did not prove to be the case.

Even part (a)(i) found many candidates unable to give the correct colour change for this familiar test. Better candidates gave both the colour change and the layer formation.

In (a)(ii) to (c) many ignored the cyclohexene and the request for skeletal formulae, even though the latter was in bold.

In (b) there were common errors in precision in the name, omitting the 'an(e)', or the '1,2'.

Question 22

This question examined the preparation of salts, with the usual applications to equation, mole calculations and percentage yields.

Practical details were covered in parts (a)(i) and (b). The common error was to muddle (a)(i) with the addition of sodium to an alcohol with a white solid forming, and to omit the second filtration stage in (b).

Only better candidates were able to give the ionic equation in (a)(ii). The main problem seemed to be on what to do with the hydrogen in sulfuric acid.

The yield calculation was complicated by the water of crystallisation in the formula of zinc sulfate which often led to incorrect molar masses and yields above 100%. Many lost the last mark for giving their answer to more than two significant figures.

Question 23

This question on the familiar alkanes, propane and butane, included a novel application to hot air balloons.

Parts (a) (i) and (ii) tested the understanding of the terms homologous series and isomers which weaker candidates found difficulty to express succinctly.

Part (b)(i) was well done though some found difficulty in balancing for oxygen.

In (b)(ii) there were two problems; the molar mass of propane and the conversion of kg to g.

Surprisingly many candidates divided by the number of moles in (b)(iii).

The problem in (iv) was not the first step, but the conversion of seconds to hours!

In (b)(v) only better candidates managed to apply their knowledge of incomplete combustion and lower volatility of butane. Very good candidates realised that the higher molar mass of butane means less heat is given out per gram.

In parts (c)(i) and (ii) the Hess cycle to obtain a standard enthalpy of atomisation was examined. Part (i) threw many weaker candidates who trotted out the elements as the lower entities. Multiplicative factors were often omitted in (ii), and signs were often confused.

The multiplicative factor was also often omitted or incorrect in (iii), where the other common error was to think butane contains four C-C bonds.

Though frequently asked only better candidates gave that bond energy varies with environment in (v).

Question 24

Parts (a)(i) and (ii) were straightforward with only weak candidates giving wrong values or the insufficient answer that isotopes have the same atomic number but different mass number.

In part (iii) a simple equation was often used where x is the percentage of 39, and (100 – x) the percentage of 41.

Parts (b)(i) and (ii) are specifically mentioned in the required mathematical areas in the specification. Common errors were to simply take the logarithms of the values from the graph in (i) and to fail to appreciate the large range of the values in (ii).

Weak candidates added electrons in (iii). Some omitted or gave the incorrect state symbols.

The common ways of scoring in (iv) were the decreasing ionic radius and greater attraction of the nucleus for electrons.

In (v) the common problem was not to give any detail of subshells despite it being specifically requested in the question.

Part (c)(i) was straightforward, weaker candidates omitted the charges on the ions or had them the incorrect way round.

Part (ii) also appears straightforward but was not well done. Many thought 'potassium metals conducts' where reference to the solid state was needed.

In (iii) the similarity of electrostatic attraction was often correctly given but the lattice arrangements were usually omitted.

In (iv) the key point of mobile electrons in potassium was often missed.

Advice to candidates

- Read the question carefully
- Practice writing ionic equations
- Practice calculations to find volumes, concentrations, and masses of reactants and products for familiar and unfamiliar reactions
- Learn details of how to carry out experiments, considering why procedures are being used and how they work