Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

October 2024

Pearson Edexcel International Advanced Subsidiary
In Chemistry (WCH13) Paper 01
Practical Skills in Chemistry I

Introduction

Many students were well prepared for this examination and were able to demonstrate that they had a sound knowledge of the practical aspects of the specification. The mean mark for the paper was 21. The full range of marks were seen and there were no reports of time pressure, the vast majority of candidates completed the final questions.

Question 1(a)(i)

The modal mark for Q1ai was 3, with many candidates making an odd mistake or omitting the charges from the ions. Regularly "red" alone was seen for calcium and this is not accepted. Where more marks were lost it was often due to candidates giving multiple incorrect flame colours or giving Group I metals instead of the Group II.

Question 1(a)(ii)

This question was surprisingly poorly answered considering that this test is asked regularly. Over 30% of candidates failed to score despite a mark, though most gained a mark for "white precipitate". Many candidates did not gain the first mark as they did not acidify the silver nitrate. More able candidates also included the observation for concentrated ammonia solution which was not expected for the three marks available.

Question 1(b)(i)

Candidates found this question very difficult, with many opting for a water displacement method or collecting the hot gas in a gas syringe, both of which are not viable. Some tried to measure the temperature of the carbonate while heating it with a Bunsen burner. Fewer than 30% of candidates gained any credit on this item, with the "same moles" mark most frequently scoring.

Question 1(b)(ii)

Candidates performance on this question was disappointing, with many referring to energy rather than temperature some also implied the whole lab needed to be able to reach the decomposition temperature rather than just a piece of equipment.

Question 2(a)(i)

Many candidates just ignored the point for 0 cm^3 at 17.5°C and drew two lines of best fit. This could not score M1 but if their answers were within tolerance for the volume and maximum temperature change they could still score these marks. A surprising number of candidates did not calculate the temperature change and just gave the maximum temperature so could not score M3.

Question 2(a)(ii)

This question was generally well answered with most candidates gaining credit and many getting both marks.

Question 2(a)(iii)

The majority of candidates knew the equation for M1, though many substituted the incorrect mass so didn't score M2. M3 was often scored, with TE given from 2(a)(ii) and most candidates could convert to kJ mol^{-1} with the negative sign for M4.

Question 2(b)

M1 was frequently awarded but the other marking points were not regularly seen. Surprisingly incomplete reaction and incomplete combustion were often seen, this was unexpected in a titration experiment. Incomplete reaction was ignored but incomplete combustion negated a mark.

Question 2(c)(i)

Many of the marks awarded here were for the allowed answer, rather that the correct one. Diluting the acid was often seen but ignored.

Question 2(c)(ii)

Adding a lid was the common correct answer, though all of the options were seen. Please note that draught excluders are not allowed for reactions where no flame is produced.
NB Some answers for Q2c appeared to be the wrong way around, with candidates not understanding what factors would affect the titre versus the enthalpy change value.

Question 3(a)

The mean mark here was disappointingly low at 1 from the 3. This is mainly to candidates drawings being imprecise and therefore showed equipment that would not allow for distillation. Common errors included gaps between pieces of glassware, closed off tubes for the condenser, a sealed collection vessel, thermometers that entered the flask and a lack of anti-bumping granules or heat labels. Candidates need more practice drawing equipment.

Question 3(b)(i)

Over 70% of candidates gained the mark here. Many of those that didn't just answered about the type of bond rather than the fact that the negative test showed that the bond wasn't present.

Question 3(b)(ii)

This was less well answered but over half of the candidates gained the mark. Again many of those who didn't score just answered "aldehyde" and some who had read ahead stated "it's a ketone" instead of answering the question.

Question 3(c)(i)

There were 5 marking points for the 4 marks to allow candidates to gain as much credit as possible for their answers. The mean mark here was 1.56 with approximately a quarter of candidates not gaining any credit. The most frequently awarded mark was M2 for stating the liquid was oxidised, followed by M5 (carboxylic acid). A few excellent answers were seen that hit every marking point.

Question 3(c)(ii)

This question was poorly answered, despite the vast majority of distillation diagrams showing a thermometer, and over 85% of candidates did not score. It may be that the reason for including a thermometer during distillation needs to be emphasised.

Question 4(a)

The vast majority of candidates labelled these axes appropriately, though "volume of H_2O_2 /cm^3" did not score as this was constant for the experiment with the foam changing volume.

Question 4(b)(i)

A common incorrect answer seen was "fastest rate" and this did not score as candidates weren't showing that they used the graph to gain their answer. Many quoted values from the graph and this was allowed.

Question 4(b)(ii)

A disappointingly small fraction of candidates drew a tangent and even fewer in the correct section of the graph. Most could calculate a rate using their data but many used 50 as their volume – not taking into account the axis starting at 20cm^3. The units were often correct, even when no other mark was gained.

Question 4(b)(iii)

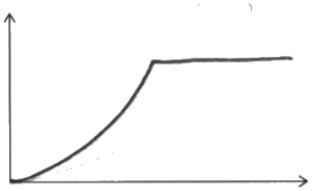
Only the most able candidates gained a mark here. Many stated that more reading should be taken, which is an improvement to the method rather than an answer to the question.

Question 4(c)(i)

Candidates found this question very difficult, with over 85% not scoring the mark. Though some of the very top candidates wrote detailed answers relating to contact area of the catalyst and reactant. Answers relating to exothermic reactions increasing the temperature of the peroxide were also allowed.

Question 4(c)(ii)

Over 65% of candidates gained 1 mark here, often for redrawing the shape from the graph. Though some ignored this and gained M2 for the plateau. Only a small minority of candidates gained both marks, particularly as a sharp transition from increase to plateau was not allowed. The answer shown below only scores M1.



Question 4(d)(i)

Only a third of candidates drawings gained credit here. Many were lacking detail e.g. not showing damage on the block or the hand. Only one diagram was required but the following were required: container, liquid dripping and a hand/block underneath showing some damage / zig zags. Where an incorrect symbol was drawn it was often toxic or irritant/harmful.

Question 4(d)(ii)

Over three quarters of candidates gained the mark here, though many gave multiple answers that were ignored. The type of glove was also ignored. Those that didn't score often stated "avoid touching the equipment/liquid".

Question 4(d)(iii)

Only 17% of candidates scored the mark here, though many stated to decrease the volume and this was ignored.

Question 4(d)(iv)

Many incorrect answers here related to the stability of the measuring cylinders e.g. "to stop the measuring cylinders falling over" and these responses did not score. Considering that the foam went over the scale on the measuring cylinder within 90 seconds for the lead oxide, and the improvement was to use a bigger cylinder to contain all the foam it was surprising that only half of candidates gained a mark here.

Summary

In order to improve their performance, students should:

- read the question carefully and make sure that they are answering the question that has been asked
- practise drawing laboratory equipment with suitable labels
- practise applying reaction conditions to different molecules
- ensure the axes labels are accurate and include units
- practice drawing tangents on rate graphs to calculate rates
- show all working for calculations and give final answers to an appropriate number of significant figures
- consider suitable precautions when working with hazardous substances
- review the hazard symbols so they can be recognised and redrawn
- draft methods for experiments, including what needs to be controlled and measured
- reread questions and answers, where time permits, to avoid careless mistakes.

Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html