GradeMax

Cambridge International AS & A Level

**Cambridge International Examinations**
Cambridge International Advanced Subsidiary and Advanced Level

**CHEMISTRY** **9701/52**

Paper 5 Planning, Analysis and Evaluation **May/June 2017**

MARK SCHEME

Maximum Mark: 30

**Published**

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| Question | Answer | Marks |
|---|---|---|
| 1(a) | Any **two** from<br>Hazard: toxic to aquatic organisms<br>**And**<br>Precaution: do not dispose of (lead and lead compounds) into the water waste / down the drain<br><br>Or<br><br>Hazard: may cause long-term damage to aquatic environment<br>**And**<br>Precaution: do not dispose of (lead and lead compounds) into the water waste / down the drain<br><br>Or<br><br>Hazard: harmful by inhalation<br>**And**<br>Precaution: carry out in fume cupboard, well-ventilated room<br><br>Or<br><br>Hazard: harmful by swallowing<br>**And**<br>Precaution: wear gloves | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 1(b) | <table><tr><th>Lead oxide</th><th>mass of lead / g</th><th>mass of oxygen / g</th><th>mass of lead combining with 1.00 g oxygen / g</th></tr><tr><td>A</td><td>3.78</td><td>0.27</td><td>14.0</td></tr><tr><td>B</td><td>3.36</td><td>0.48</td><td>7.0</td></tr><tr><td>C</td><td>4.83</td><td>0.46</td><td>10.5</td></tr></table> | |
| | All values correct in mass of lead and mass of oxygen columns. and shown to two decimal places. | **1** |
| | Correct values in the final column to 1 decimal place | **1** |
| 1(c)(i) | 2.0; 1.0; 1.5;<br>OR<br>4:2:3 | **1** |
| 1(c)(ii) | Yes<br>and<br>The simple whole number ratio is 4:2:3 | **1** |
| 1(d) | (The different) lead oxide(s) | **1** |
| | Mass of lead combined with 1 g of oxygen | **1** |
| 1(e)(i) | $PbO_2$ | **1** |
| 1(e)(ii) | Relative formula mass or relative molecular mass / $M_r$ | **1** |
| 1(f) | To prevent oxidation or re-oxidation (of lead) | **1** |
| 1(g) | Re-heat the lead (oxide) and re-weigh until there is no further loss in mass. | **1** |
| | **Total:** | **12** |

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| Question | Answer | Marks |
|---|---|---|
| 2(a)(i) | To calibrate the instrument | **1** |
| 2(a)(ii) | In case some of the light is absorbed by the water / fingerprints / dirt | **1** |
| 2(b)(i) | 4.74 g | **1** |
| 2(b)(ii) | Dissolve (4.74 g / answer to 2(b) of) $KMnO_4$ in (a container with) (distilled water) (in less than 1 $dm^3$ of water) | **1** |
| | (Transfer / add to) a (1 $dm^3$) volumetric flask; make to mark (with [distilled] water) (and shake)<br>NOTE: Distilled/deionised/purified water must be mentioned for 2 marks to be awarded. | **1** |
| 2(b)(iii) | The mass of $KMnO_4$ is too small to weigh accurately (on a 2dp balance). | **1** |
| 2(c) | 529.5 | **1** |
| 2(d)(i) | All points plotted correctly | **1** |
| | Line of best fit drawn | **1** |
| 2(d)(ii) | The concentration is (directly) proportional to the absorbance, | **1** |
| | The more ions there are, the more light is absorbed (ora) | **1** |
| 2(d)(iii) | Yes because most of the points lie close to the line. | **1** |
| 2(e)(i) | **22.50** ($cm^3$) **2.50** ($cm^3$) | **1** |
| 2(e)(ii) | Burette (with 0.1 $cm^3$ graduations) | **1** |
| 2(f)(i) | Read value from graph.<br>Expected result $2.50 \times 10^{-4}$ mol $dm^{-3}$ | **1** |
| 2(f)(ii) | $2.50 \times 10^{-4} \times 54.9 \times (100 / 1000) = 1.37 \times 10^{-3}$ g | **1** |

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| Question | Answer | Marks |
|---|---|---|
| 2(g) | $\frac{1.37\times10^{-3}}{1.209}\times100$ = 0.113% | **1** |
| 2(h) | So that any excess oxidising agent will not react with / oxidise the $Fe^{2+}(aq)$ | **1** |
| | **Total:** | **18** |

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