## MARK SCHEME for the October/November 2012 series

## 9701 CHEMISTRY

## 9701/52

Paper 5 (Planning, Analysis and Evaluation), maximum raw mark 30

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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| Question | Sections | Indicative material | Mark |
| :---: | :---: | :---: | :---: |
| 1 (a) | PLAN Problem | $\mathrm{PbO} 1: 1, \mathrm{~Pb}_{3} \mathrm{O}_{4} 1: 1.33, \mathrm{PbO}_{2} 1: 2$ <br> All three correct two marks. <br> Two correct one mark. | [2] |
| (b) | PLAN Problem | Correctly labelled axes and three straight lines drawn converging at the origin. <br> Correct order of the lines. If ' O ' is on the $y$-axis, order on axes is $\mathrm{PbO}_{2}$ (steepest gradient), $\mathrm{Pb}_{3} \mathrm{O}_{4}, \mathrm{PbO}$. Allow ' Pb ' on $y$-axis, order reversed. | [2] |
| (c) | PLAN Problem | (i) lead (allow lead oxide or oxide) AND <br> (ii) oxygen (allow $\mathrm{O}_{2} \mathrm{OR}$ lead) | [1] |
| (d) | PLAN Method | Diagram shows a heated piece of apparatus containing some lead oxide with hydrogen passing over it with inlet and outlet shown. <br> Diagram shows apparatus to generate hydrogen using $\mathrm{Mg} / \mathrm{A} / \mathrm{Zn} / \mathrm{Fe}$ AND any dilute acid (labelled) OR group 1 metal/alcohol OR Ca with water or dilute acid. <br> Shows excess hydrogen being burned OR led away from apparatus/collected. | [1] <br> [1] <br> [1] |
| (e) | PLAN Method | Chooses mass (M) of lead oxide between 1 g and 25 g . <br> Re-heats to constant mass. <br> Calculates a volume of hydrogen sufficient to reduce the oxide. (mark is for the method, units are required.) <br> Suggests calculating the moles of Pb and $\mathrm{O} /$ mole ratio of Pb to O . | [1] <br> [1] <br> [1] <br> [1] |
| (f) | Plan Method | Hydrogen is explosive in air, so expel air from the apparatus before lighting flame to burn hydrogen OR lead/lead oxide is harmful/toxic, so wear a mask/use a fume cupboard to prevent inhalation of hydrogen/lead/lead oxide OR acids are corrosive/irritant, use chemically resistant gloves OR reduction tube is hot, allow to cool before handling/use heat resistant gloves/tongs. | [1] |
| (g) | PLAN Method | Columns are: mass/weight of the oxide; mass/weight of lead; mass/weight of oxygen; (mass units needed for these three) moles of lead; moles of oxygen; (no units). <br> If five/four are fully correct, 2 marks, if only three/two are correct, 1 mark. | [2] |
|  | Total |  | [15] |


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| 2 (a) | ACE Data |  | column <br> for the <br> given to <br> B <br> 0.000 <br> 0.101 <br> 0.193 <br> 0.259 <br> 0.370 <br> 0.469 <br> 0.551 <br> 0.573 <br> 0.617 <br> 0.655 | ding as $\log \mathrm{C} / \log$ column in the ta sig figs. (Allow 1 e | $a-x) / \log (1-B)$ <br> le below are or without | [1] [1] |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (b) | ACE Data | Both ax <br> and $y$-a <br> the grid <br> All nine small sq <br> Appropri (If all po the non must be | caled fro <br> as $\log C$ <br> oth dire <br> ts plott .) <br> straigh do not malous roxima | zero with $x$-axis otted points must s. <br> orrectly. (Allow to <br> drawn through th n the line then th ints on each side the same.) | elled as 'time /min' cover at least half <br> rance of $\pm$ of $1 / 2$ <br> origin. net deviation of the best fit line | [1] <br> [1] <br> [1] |
| (c) | ACE <br> Evaluation | $\begin{aligned} & 2 \text { anoma } \\ & t=100 r \\ & \text { is later } \\ & t=210 r \\ & \text { earlier } t h \end{aligned}$ | s point <br> - sam <br> samp <br> - sam <br> sampl | cled at time 100 <br> ken out too early thdrawn. ken out too late drawn. | and 210 min . <br> OR recorded time $R$ recorded time is | [1] [2] |
| (d) | ACE <br> Evaluation | Most of not on | oints <br> e OR | on the line OR on are only a few | a few points are omalies. | [1] |
| (e) | ACE data | Appropri <br> Correctly lines sh actually <br> Correctly with cor | y drawn <br> ad valu allow through <br> Iculated unit (m | es on the graph. <br> fom the graph. (If es from the table int(s) used.) <br> ue of the slope $g$ using the candid | o construction graph drawn does <br> en to 3 sig figs e's figures. | [1] <br> [1] <br> [1] |
| (f) | ACE Conclusion | Stateme line is $p$ | hat the ced. | onship is justifie | ince a straight | [1] |


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\begin{array}{|c|l|l|c|}\hline \text { (g) } & \begin{array}{l}\text { ACE } \\
\text { Conclusion }\end{array} & \begin{array}{l}\text { Draws a straight line from the origin with a different gradient. } \\
\text { Shows shorter elapsed times. (Steeper gradient) }\end{array}
$$ \& {[1]} <br>

{[1]}\end{array}\right]\)|  | Total |  | $[15]$ |
| :--- | :--- | :--- | :--- |

