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## Teacher Guide: Unit 12 Electrons in Action

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### Guidance for Teachers

- Guidance on delivery – Page 149-151 – or reference to this from the specifications
- Resources - Page 155 – or reference to this from the specifications.

### Guidance on Assessment

- Assessment guidance – Page 152-154 – or reference to this from the specifications
- Assessment Evidence grid Unit 12 – attached.

### Assignment Work

- The assignment briefs included with this unit are expected to give ideas on how to cover the required assessment criteria
- It is important that the time spent on the topic area links to the mark awarded
- It is hoped that centres will use these ideas as a starting tool
- Outline guidance included with this unit gives help to support the requirements of the assignment. It is hoped that this should be used to help to support the standard required.

### Suggested Time Allocation

- Based on 50-60 hours spent on this unit
- Includes work on assignment + teaching and learning time
- Some time should also be reserved for feedback and return of work after/before moderation.

Assessment Objective to be Covered	Mark Awarded	Possible Time Allocation
AO1	10	12
AO2	14	16
AO3	26	30

## Teacher Resource Material

- Assessment Recording Sheet – suggestion of a possible method to collate marks from assignments
- Assignment No. 12.1: Production of Cell of Known Voltage
- Assignment No. 12.1: Outline Guidance/Commentary on Mark Allocation
- Assignment No. 12.2: Copper Plating
- Assignment No. 12.2: Outline Guidance/Commentary on Mark Allocation
- Assignment No. 12.3: Scooters for a Shopping Centre
- Assignment No. 12.3: Outline Guidance/Commentary on Mark Allocation
- Assignment No. 12.4: Efficiency of Commercial Cells.

Unit 12: Electrons in action				
What you need to do:				
<p><b>You need to produce</b> evidence of your investigation into the principles and applications of electrochemical changes [50 marks].            This evidence needs to include:  <b>AO1:</b> a presentation outlining the applications of stated electrochemical changes [10];  <b>AO2:</b> a comparison of commercial cells: non-rechargeable, rechargeable and fuel, including construction, resources, uses, sustainability, efficiency, safety and environmental issues [14];  <b>AO3:</b> practical investigations into:            (a) the factors which can change the potential difference of a cell and those which have no effect;            (b) the factors which affect the efficiency of a simple laboratory experiment in which an object is copper plated [26].</p>				
How you will be assessed:				
Assessment Objective	Mark Band 1	Mark Band 2	Mark Band 3	Mark Awarded
AO1	You will investigate redox equilibria and demonstrate a basic knowledge and understanding of the principles underlying at least <b>two</b> of the applications of electrochemical changes, including correct scientific terminology and conventions; [0 1]	you will investigate redox equilibria and demonstrate a sound knowledge and understanding of the principles underlying the full range of applications of electrochemical changes identified in this unit; you will give clear explanations and will use appropriate scientific terms and conventions accurately; [2 3]	you will investigate redox equilibria and demonstrate a thorough knowledge and understanding of the principles underlying the full range of applications of electrochemical changes identified in this unit; you will give clear explanations and will use appropriate scientific terms and conventions accurately throughout. [4 5]	/10
	You will demonstrate research into the production of electricity and metals, using some appropriate examples, selecting information and presenting it clearly; [0 1]	you will demonstrate research into the production of electricity and metals, using a range of examples, selecting and interpreting information and presenting it clearly; [2 3]	you will demonstrate research into the production of electricity and metals, using the full range of examples given, selecting and interpreting information and presenting it clearly. [4 5]	
AO2	You will describe at least <b>one</b> example of each of <b>two</b> types of commercial cells, make some comparisons and give a limited interpretation of information; [0 1 2 3 4]	you will describe <b>three</b> different commercial cells, make comparisons, give a good explanation and interpretation of information; [5 6]	you will describe a wide range of cells, make all comparisons, give a full explanation and interpretation of information. [7 8]	/14
	You will carry out some straightforward calculations of EMF of cells and quantity of charge; you will obtain and use data to compare the efficiency of commercial cells; [0 1 2]	you will carry out calculations of EMF of cells, quantities of charge and mass of products; you will obtain and use data to compare the efficiency of commercial cells and obtain correct solutions; [3 4]	you will carry out complex calculations of EMF of cells, quantities of charge and mass of products; you will obtain and use data to compare the efficiency of commercial cells and obtain correct solutions to the appropriate degree of accuracy. [5 6]	

<b>Unit 12: Electrons in action (continued)</b>				
<b>Assessment Objective</b>	<b>Mark Band 1</b>	<b>Mark Band 2</b>	<b>Mark Band 3</b>	<b>Mark Awarded</b>
<b>AO3</b>	Using risk assessments, you will carry out measurements of EMF of cells and mass of copper plate; you will change at least <b>one</b> of the conditions of each experiment to obtain <b>two</b> sets of results for measurement of EMF and <b>two</b> sets of results for the measurement of copper plate;  <b>[0 1 2 3 4]</b>	you will produce risk assessments, consistent with COSHH guidelines; you will carry out measurements of EMF of cells and mass of copper plate; you will change conditions to obtain more than <b>two</b> sets of results for measurement of EMF and more than <b>two</b> sets of results for the measurement of copper plate; you will work with an appropriate degree of accuracy;  <b>[5 6]</b>	you will produce your own detailed risk assessments, consistent with COSHH guidelines; you will carry out a wide range of measurements of EMF of cells and mass of copper plate; you will consider and change a range of conditions to obtain corresponding sets of results for measurement of EMF and for the measurement of copper plate – at least <b>one</b> set of results show no effect; you will explain any practical techniques that will improve results; you will work with an appropriate degree of accuracy.  <b>[7 8]</b>	
	You will make and record relevant observations and measurements from the above experiments; you will display the data appropriately, with help;  <b>[0 1 2 3]</b>	you will make and record relevant observations and measurements from the above experiments, using precision in your measurements; you will display the data obtained accurately in a range of ways;  <b>[4 5 6]</b>	you will make and record relevant observations and measurements from the above experiments, using precision in your measurements; you will display the data obtained accurately in a range of ways.  <b>[7 8 9]</b>	
	You will give some interpretation of the results; you will evaluate your procedures;  <b>[0 1 2 3]</b>	you will interpret the results and draw basic conclusions; you will evaluate your procedures;  <b>[4 5 6]</b>	you will interpret the results in detail and draw conclusions; you will evaluate your procedures and suggest alternatives.  <b>[7 8 9]</b>	<b>/26</b>
<b>Total mark awarded:</b>				<b>/50</b>