

## Application of electrolysis in industry

### Exercise

1. Edi wants to plating nickel key using the silver. Explain the plating process that takes place on the nickel key.

Electrolyte used is \_\_\_\_\_

|                   | Anode   | Cathode   |
|-------------------|---|---|
| Electrode         |   |   |
| Particle selected | Click at the correct particle selected in anode<br><input type="checkbox"/> Ni <input type="checkbox"/> Ag <input checked="" type="checkbox"/> Ag <sup>+</sup> <input type="checkbox"/> H <sup>+</sup> <input type="checkbox"/> OH <sup>-</sup> | Click at the correct particle selected in cathode<br><input type="checkbox"/> Ni <input type="checkbox"/> Ag <input checked="" type="checkbox"/> Ag <sup>+</sup> <input type="checkbox"/> H <sup>+</sup> <input type="checkbox"/> OH <sup>-</sup> |
| Explanation       | Choose the correct explanation<br><br>E <sup>o</sup> value is more positive<br><br>E <sup>o</sup> is less positive<br><br>Electrode used is active electrode<br><br>Concentration of ion is higher  | Choose the correct explanation<br><br>E <sup>o</sup> value is more positive<br><br>E <sup>o</sup> is less positive<br><br>Electrode used is active electrode<br><br>Concentration of ion is higher  |
| Half equation     | Choose the correct half equation<br><br>$Ag \rightarrow Ag^+ + e$<br><br>$Ag^+ + e \rightarrow Ag$<br><br>$OH^- \rightarrow 2H_2O + O_2 + 4e$<br><br>$2H^+ + 2e \rightarrow H_2$<br><br>$Ni \rightarrow Ni^{2+} + 2e$                           | Choose the correct half equation<br><br>$Ag \rightarrow Ag^+ + e$<br><br>$Ag^+ + e \rightarrow Ag$<br><br>$OH^- \rightarrow 2H_2O + O_2 + 4e$<br><br>$2H^+ + 2e \rightarrow H_2$<br><br>$Ni \rightarrow Ni^{2+} + 2e$                             |
| product           | Choose the correct product<br><br>silver ion formed<br><br>silver atom is formed<br><br>Oxygen gas is released<br><br>Hydrogen gas is released<br><br>Nickel ion is formed  | Choose the correct product<br><br>silver ion formed<br><br>silver atom is formed<br><br>Oxygen gas is released<br><br>Hydrogen gas is released<br><br>Nickel ion is formed  |

|             |   |   |
|-------------|---|---|
| Observation | Choose the correct observation<br>Electrode become thinner<br>Brown gas is released<br>Electrode become thicker<br>Colourless and odourless gas is released | Choose the correct observation<br>Electrode become thinner<br>Brown gas is released<br>Electrode become thicker<br>Colourless and odourless gas is released |
|-------------|---|---|

2. Ash has impure copper. He wants to purify the metal. Determine the electrolyte and electrode in anode and cathode

Electrolyte used is \_\_\_\_\_

|                   | Anode   | Cathode   |
|-------------------|---|---|
| Electrode         |   |   |
| Particle selected | Click at the correct particle selected in anode<br><input type="checkbox"/> Cu <input type="checkbox"/> Ag <input type="checkbox"/> Cu <sup>2+</sup> <input type="checkbox"/> H <sup>+</sup> <input type="checkbox"/> OH <sup>-</sup> | Click at the correct particle selected in cathode<br><input type="checkbox"/> Cu <input type="checkbox"/> Ag <input type="checkbox"/> Cu <sup>2+</sup> <input type="checkbox"/> H <sup>+</sup> <input type="checkbox"/> OH <sup>-</sup> |
| Explanation       | Choose the correct explanation<br>E <sup>o</sup> value is more positive<br>E <sup>o</sup> is less positive<br>Electrode used is active electrode<br>Concentration of ion is higher  | Choose the correct explanation<br>E <sup>o</sup> value is more positive<br>E <sup>o</sup> is less positive<br>Electrode used is active electrode<br>Concentration of ion is higher  |
| Half equation     | Choose the correct half equation<br>$Cu \rightarrow Cu^{2+} + e$<br>$Cu^{2+} + 2e \rightarrow Cu$<br>$OH^- \rightarrow 2H_2O + O_2 + 4e$<br>$2H^+ + 2e \rightarrow H_2$<br>$Ni \rightarrow Ni^{2+} + 2e$                              | Choose the correct half equation<br>$Cu \rightarrow Cu^{2+} + e$<br>$Cu^{2+} + 2e \rightarrow Cu$<br>$OH^- \rightarrow 2H_2O + O_2 + 4e$<br>$2H^+ + 2e \rightarrow H_2$<br>$Ni \rightarrow Ni^{2+} + 2e$                                |

|             |   |   |
|-------------|---|---|
| product     | Choose the correct product<br><br>Copper atom is formed<br><br>Oxygen gas is released<br><br>Hydrogen gas is released<br><br>Copper ion is formed                           | Choose the correct product<br><br>Copper atom is formed<br><br>Oxygen gas is released<br><br>Hydrogen gas is released<br><br>Copper ion is formed                           |
| Observation | Choose the correct observation<br><br>Electrode become thinner<br><br>Brown gas is released<br><br>Electrode become thicker<br><br>Colourless and odourless gas is released | Choose the correct observation<br><br>Electrode become thinner<br><br>Brown gas is released<br><br>Electrode become thicker<br><br>Colourless and odourless gas is released |

3. Bidin want to extract aluminium from aluminium oxide. Explain you're the extraction process take place

Electrolyte :

|                  | Anode   | Cathode   |                  |                 |   |   |    |                  |                 |   |
|------------------|---|---|------------------|-----------------|---|---|----|------------------|-----------------|---|
| a) Ion presents  | Click at the correct ion present in anode<br><br><table border="1" style="margin-left: auto; margin-right: auto;"><tr><td>Al</td><td>Al<sup>3+</sup></td><td>O<sup>2-</sup></td><td>O</td></tr></table>       | Al  | Al <sup>3+</sup> | O <sup>2-</sup> | O | Click at the correct ion present in anode<br><br><table border="1" style="margin-left: auto; margin-right: auto;"><tr><td>Al</td><td>Al<sup>3+</sup></td><td>O<sup>2-</sup></td><td>O</td></tr></table> | Al | Al <sup>3+</sup> | O <sup>2-</sup> | O |
| Al               | Al <sup>3+</sup>  | O <sup>2-</sup>   | O                |                 |   |   |    |                  |                 |   |
| Al               | Al <sup>3+</sup>  | O <sup>2-</sup>   | O                |                 |   |   |    |                  |                 |   |
| b) Half equation | Choose the correct half equation<br><br>$Al \rightarrow Al^{3+} + e$<br>$Al^{3+} + 3e \rightarrow Al$<br>$OH^- \rightarrow 2H_2O + O_2 + 4e$<br>$2H^+ + 2e \rightarrow H_2$<br>$2O^{2-} \rightarrow O_2 + 4e$ | Choose the correct half equation<br><br>$Al \rightarrow Al^{3+} + e$<br>$Al^{3+} + 3e \rightarrow Al$<br>$OH^- \rightarrow 2H_2O + O_2 + 4e$<br>$2H^+ + 2e \rightarrow H_2$<br>$2O^{2-} \rightarrow O_2 + 4e$ |                  |                 |   |   |    |                  |                 |   |

|                     |   |   |
|---------------------|---|---|
| c) Product          | Silver ion<br>Aluminium metal<br>Oxygen gas | Silver ion<br>Aluminium metal<br>Oxygen gas |
| d) Type of reaction | Oxidation<br>Reduction                      | Oxidation<br>Reduction                      |