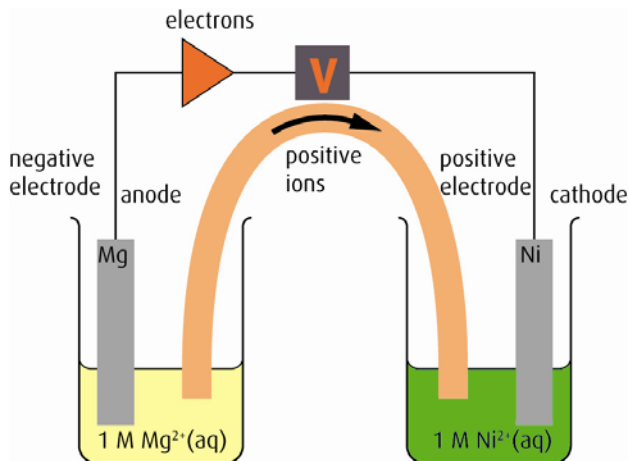


## Marking scheme for Core Worksheet – Chapter 9

- |          |                                |  |     |
|----------|--------------------------------|--|-----|
| <b>1</b> | <b>a</b>                       | –4   | [1] |
|          | <b>b</b>                       | +4   | [1] |
|          | <b>c</b>                       | +1   | [1] |
|          | <b>d</b>                       | +6   | [1] |
|          | <b>e</b>                       | +2   | [1] |
|          | <b>f</b>                       | +5   | [1] |
|          | <b>g</b>                       | +5   | [1] |
|          | <b>h</b>                       | +3   | [1] |
|          | <b>i</b>                       | –3   | [1] |
|          | <b>j</b>                       | +6   | [1] |
|          | <b>k</b>                       | +7   | [1] |
|          | <b>l</b>                       | +5   | [1] |
| <b>2</b> | oxidation is loss of electrons |  | [1] |
|          | reduction is gain of electrons |  | [1] |
| <b>3</b> | <b>a</b>                       | $\text{O}_2 + 4\text{e}^- \rightarrow 2\text{O}^{2-}$  | [1] |
|          | <b>b</b>                       | $\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$                    | [1] |
|          | <b>c</b>                       | $\text{Hg}_2^{2+} \rightarrow 2\text{Hg}^{2+} + 2\text{e}^-$   | [1] |
| <b>4</b> | <b>a</b>                       | reduced  | [1] |
|          | <b>b</b>                       | oxidised   | [1] |
|          | <b>c</b>                       | oxidised   | [1] |
|          | <b>d</b>                       | oxidised   | [1] |
| <b>5</b> | <b>a</b>                       | $\text{Cr}_2\text{O}_3$ oxidising agent, Al reducing agent   | [1] |
|          | <b>b</b>                       | $\text{HNO}_3$ oxidising agent, $\text{H}_2\text{S}$ reducing agent  | [1] |
|          | <b>c</b>                       | $\text{ClO}_3^-$ oxidising agent, $\text{SO}_3^{2-}$ reducing agent  | [1] |
|          | <b>d</b>                       | CuO oxidising agent, $\text{NH}_3$ reducing agent  | [1] |
| <b>6</b> | <b>a</b>                       | $\text{U}^{4+} + 2\text{H}_2\text{O} \rightarrow \text{UO}_2^{2+} + 4\text{H}^+ + 2\text{e}^-$                   | [1] |
|          | <b>b</b>                       | $\text{O}_2 + 2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2\text{O}_2$  | [1] |
|          | <b>c</b>                       | $\text{XeO}_3 + 6\text{H}^+ + 6\text{e}^- \rightarrow \text{Xe} + 3\text{H}_2\text{O}$                           | [1] |
|          | <b>d</b>                       | $\text{HNO}_2 + \text{H}_2\text{O} \rightarrow \text{NO}_3^- + 3\text{H}^+ + 2\text{e}^-$                        | [1] |
| <b>7</b> | <b>a</b>                       | $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$      | [1] |
|          | <b>b</b>                       | $\text{HCOOH} \rightarrow \text{CO}_2 + 2\text{H}^+ + 2\text{e}^-$   | [1] |
|          | <b>c</b>                       | $\text{HCHO} + \text{H}_2\text{O} \rightarrow \text{HCOOH} + 2\text{H}^+ + 2\text{e}^-$                          | [1] |
|          | <b>d</b>                       | $4\text{H}_2\text{SO}_3 + 4\text{H}^+ + 6\text{e}^- \rightarrow \text{S}_4\text{O}_6^{2-} + 6\text{H}_2\text{O}$ | [1] |

- 8 a  $5\text{Fe}^{2+} + \text{MnO}_4^- + 8\text{H}^+ \rightarrow 5\text{Fe}^{3+} + \text{Mn}^{2+} + 4\text{H}_2\text{O}$  [1]  
 b  $10\text{I}^- + 2\text{ClO}_3^- + 12\text{H}^+ \rightarrow 5\text{I}_2 + \text{Cl}_2 + 6\text{H}_2\text{O}$  [1]  
 c  $2\text{MnO}_4^- + 6\text{H}^+ + 5\text{H}_2\text{O}_2 \rightarrow 2\text{Mn}^{2+} + 8\text{H}_2\text{O} + 5\text{O}_2$  [1]  
 d  $5\text{NO}_2^- + 2\text{MnO}_4^- + 6\text{H}^+ \rightarrow 5\text{NO}_3^- + 2\text{Mn}^{2+} + 3\text{H}_2\text{O}$  [1]

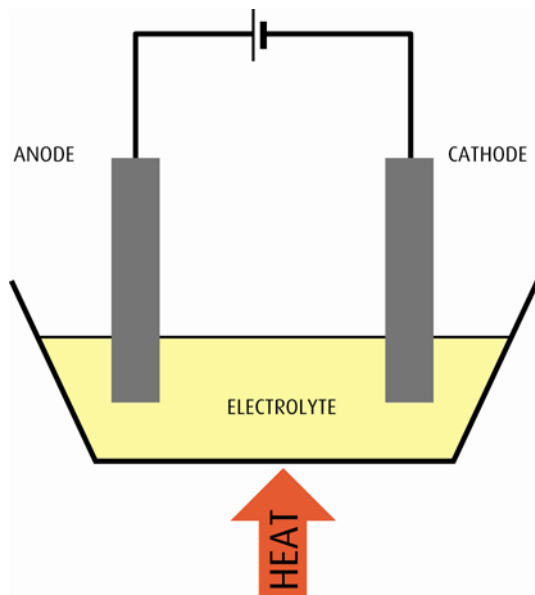
9 a



- anode and cathode correct [1]  
 negative and positive electrode correct [1]  
 b provides an electrical connection between the half cells/completes the circuits [1]  
 allows ions to flow into/out of half cells [1]  
 c from Mg to Ni [1]  
 d from Mg to Ni [1]  
 e increase [1]  
 there is a bigger difference in reactivity between Mg and Cu than between Mg and Ni [1]

- 10 a so it melts [1]  
so the ions are free to move [1]

b



- anode and cathode correct [1]  
electrolyte [1]
- c sodium ions are positive and therefore attracted to the cathode [1]  
sodium forms at the cathode [1]  
chloride ions are negative and therefore attracted to the anode [1]  
chlorine forms at the anode [1]
- d cathode:  $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$  [1]  
anode:  $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$  [1]