Section B

Answer **all** questions in the spaces provided.

7 This table shows some standard electrode potential data.

Electrode half-equation	$E^{\ominus}$/ V
$Au^+(aq) + e^- \longrightarrow Au(s)$	+1.68
$\frac{1}{2}O_2(g) + 2H^+(aq) + 2e^- \longrightarrow H_2O(l)$	+1.23
$Ag^+(aq) + e^- \longrightarrow Ag(s)$	+0.80
$Fe^{3+}(aq) + e^- \longrightarrow Fe^{2+}(aq)$	+0.77
$Cu^{2+}(aq) + 2e^- \longrightarrow Cu(s)$	+0.34
$Fe^{2+}(aq) + 2e^- \longrightarrow Fe(s)$	−0.44

7 (a) Draw a labelled diagram of the apparatus that could be connected to a standard hydrogen electrode in order to measure the standard electrode potential of the Fe^{3+}/Fe^{2+} electrode.

In your diagram, show how this electrode is connected to the standard hydrogen electrode and to a voltmeter. Do **not** draw the standard hydrogen electrode.

State the conditions under which this cell should be operated in order to measure the standard electrode potential.

Conditions ....

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(5 marks)

7 (b) Use data from the table to deduce the equation for the overall cell reaction of a cell that has an e.m.f. of 0.78 V.
Give the conventional cell representation for this cell.
Identify the positive electrode.

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(4 marks)

7 (c) Use data from the table to explain why Au⁺ ions are **not** normally found in aqueous solution.
Write an equation to show how Au⁺ ions would react with water.

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(3 marks)

7 (d) Use data from the table to predict and explain the redox reactions that occur when iron powder is added to an excess of aqueous silver nitrate.

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(3 marks)

Turn over for the next question

15

Turn over ▶