

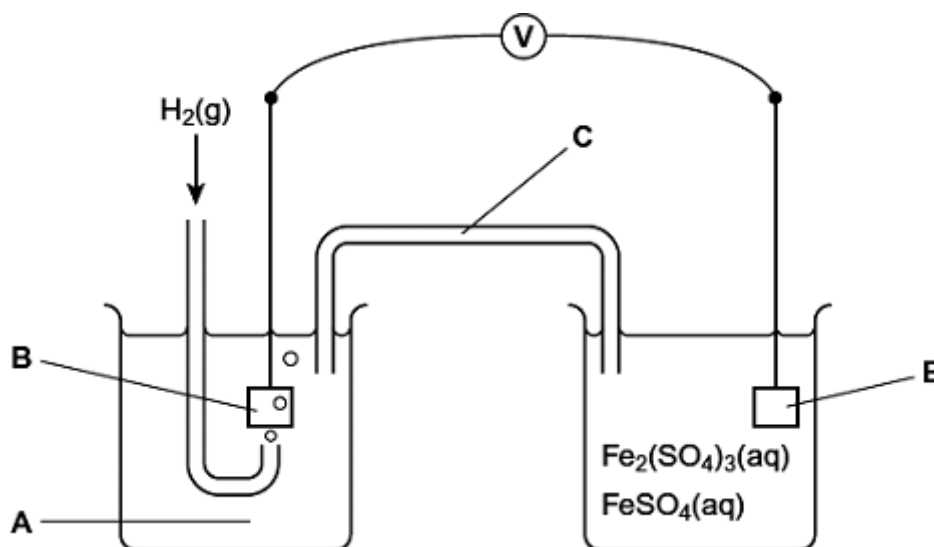
Name of the Student: _____

Max. Marks : 14 Marks

Time : 14 Minutes

Q1.

The diagram below shows a cell that can be used to measure the standard electrode potential for the half-reaction $\text{Fe}^{3+}(\text{aq}) + \text{e}^{-} \longrightarrow \text{Fe}^{2+}(\text{aq})$. In this cell, the electrode on the right-hand side is positive.



- (a) Identify solution **A** and give its concentration. State the other essential conditions for the operation of the standard electrode that forms the left-hand side of the cell.

Solution **A** _____

Conditions _____

(3)

- (b) Identify the material from which electrodes **B** are made. Give **two** reasons why this material is suitable for its purpose.

Material _____

Reason 1 _____

Reason 2 _____

(3)

- (c) Identify a solution that could be used in **C** to complete the circuit. Give **two** reasons why this solution is suitable for its purpose.

Solution _____

Reason 1 _____

Reason 2 _____

(3)

- (d) Write the conventional representation for this cell.

(1)

- (e) The voltmeter **V** shown in the diagram of the cell was replaced by an ammeter.

- (i) Write an equation for the overall cell reaction that would occur.

(1)

- (ii) Explain why the ammeter reading would fall to zero after a time.

(1)

(Total 12 marks)

Q2.

The table below shows some standard electrode potentials.

			$E^\ominus / \text{V}$
$\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^-$	$\longrightarrow$	$\text{Mn}^{2+} + 4\text{H}_2\text{O}$	+1.51
$\text{Cl}_2(\text{g}) + 2\text{e}^-$	$\longrightarrow$	$2\text{Cl}^-(\text{aq})$	+1.36
$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^-$	$\longrightarrow$	$2\text{Cr}^{3+} + 7\text{H}_2\text{O}$	+1.33

A student determined the concentration of iron(II) ions in a solution of iron(II) chloride by titration with acidified potassium dichromate(VI) solution. A second student titrated the same solution of iron(II) chloride with acidified potassium manganate(VII) solution.

By reference to the table, explain why the second student obtained a greater value for the concentration of iron(II) ions.

(Total 2 marks)