



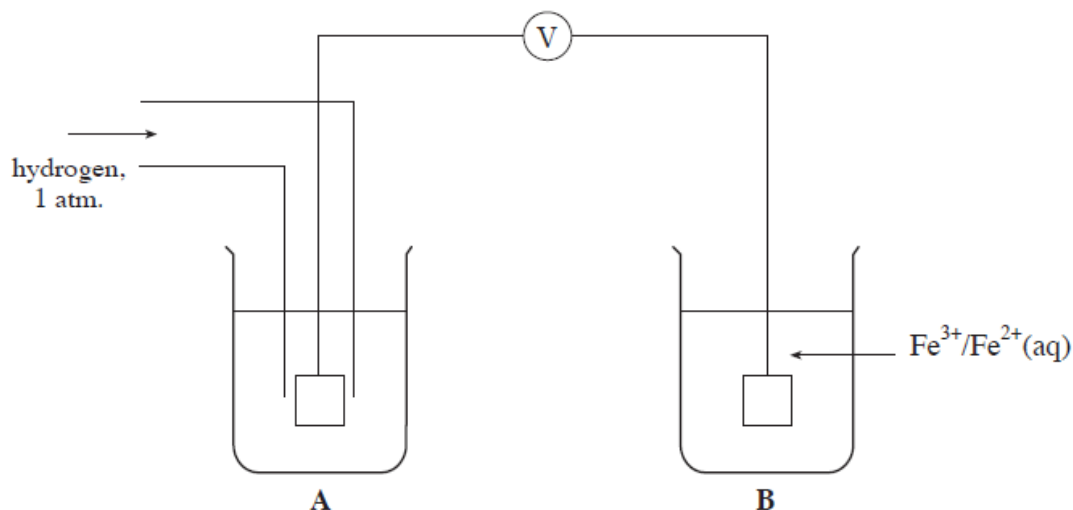
F325 Module 3: HW16

2.

Another transition metal characteristic is the ability to show variable oxidation states.

The diagram below shows part of the apparatus that was used to measure the standard electrode potential of the  $\text{Fe}^{3+}(\text{aq})/\text{Fe}^{2+}(\text{aq})$  half cell.

The standard electrode potential of the half cell was +0.77V.



- (i) Name a solution that must be placed in beaker **A** and state its concentration. [1]
- (ii) Name a metal that could be used as an electrode in beaker **B**. [1]
- (iii) Name the part of the cell that is missing and state its purpose. [1]
- (iv) State, giving a reason, the direction in which the electrons flow along the wire through the voltmeter. [1]
- (v) The standard electrode potential for the  $\text{Cu}^{2+}(\text{aq})/\text{Cu}(\text{s})$  electrode is +0.34 V. If the hydrogen electrode is replaced by the  $\text{Cu}^{2+}(\text{aq})/\text{Cu}(\text{s})$  electrode, calculate the new reading on the voltmeter, V. [1]
- (d) Some standard electrode potentials,  $E^\ominus$ , are given below.

System	$E^\ominus$ / volts
$\frac{1}{2} \text{I}_2(\text{s}) + \text{e}^- \rightleftharpoons \text{I}^-(\text{aq})$	0.54
$\frac{1}{2} \text{Br}_2(\text{l}) + \text{e}^- \rightleftharpoons \text{Br}^-(\text{aq})$	1.09
$\frac{1}{2} \text{Cl}_2(\text{g}) + \text{e}^- \rightleftharpoons \text{Cl}^-(\text{aq})$	1.36

Using the information from the table, state which of the halides will reduce  $\text{Fe}^{3+}$  to  $\text{Fe}^{2+}$ . Give a reason for your answer. [2]