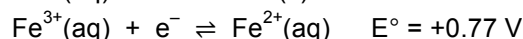
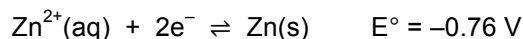




## ELECTROCHEMISTRY (B)

Solutions containing  $\text{Fe}^{3+}$  can be reduced to  $\text{Fe}^{2+}$  using zinc.

Half cells for the following redox half equations were connected using a wire and salt bridge under standard conditions. The  $\text{Fe}^{3+}/\text{Fe}^{2+}$  half cell also contained a piece of platinum.



a Write the standard cell notation (cell representation) for this cell.



b Calculate the emf of this cell. **+1.53 V** (1)

c What was the role of the platinum in the  $\text{Fe}^{3+}/\text{Fe}^{2+}$  half cell? **to provide a surface for electron transfer** (1)

d What was the role of the salt bridge in this cell and how does it work?

**to complete the circuit; inert ions move through the salt bridge** (2)

e Write a balanced equation for the reaction that takes place in this cell.  **$\text{Zn} + 2\text{Fe}^{3+} \rightarrow \text{Zn}^{2+} + 2\text{Fe}^{2+}$**  (2)

f The  $\text{Fe}^{3+}/\text{Fe}^{2+}$  half cell contained a mixture of iron(III) sulfate and iron(II) sulfate. Give the concentration of each reagent in the mixture for this to be done under standard conditions.

iron(III) sulfate  **$0.5 \text{ mol dm}^{-3} \text{Fe}_2(\text{SO}_4)_3$**

iron(II) sulfate  **$1.0 \text{ mol dm}^{-3} \text{FeSO}_4$**  (2)

g If the concentration of  $\text{Zn}^{2+}$  ions was changed from  $1.0 \text{ mol dm}^{-3}$  to  $0.5 \text{ mol dm}^{-3}$ , how would this affect the emf of the cell. Explain your answer.

**$\text{Zn}^{2+}/\text{Zn}$  equilibrium moves left  
releasing more electrons so making  $\text{Zn}^{2+}/\text{Zn}$  potential more negative  
making emf greater** (3)