Student 5: Low Achieved

When fresh iron(II) sulfate solution is added to acidified potassium permanganate solution, a pale green solution and a purple solution react to form an orange solution.

Justify why this is an oxidation-reduction reaction. Your answer should include:

- Species linked to the provided observations
- An explanation of oxidation and reduction in terms of electron transfer or oxidation number change
- Balanced half and full equations

Answer:

The potassium permanganate is purple because the MnO_4^- ion is purple. During the reaction purple permanganate ions changes to colourless Mn^{2+} ions. (1)
When this change happens the MnO_4^- ion gains electrons and is reduced. Reduction is a gain of electrons. (2)

The electrons that the MnO_4^- ion gains comes from the Fe^{2+} ion.

The pale green Fe^{2+} ion loses electrons and changes to the Fe^{3+} ion which is orange. The loss of electrons by the Fe^{2+} ion means that it is the reductant. (1)