

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.

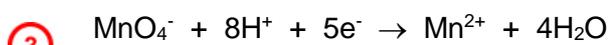
Justify why this is an oxidation-reduction reaction. Your answer should include:

- 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:

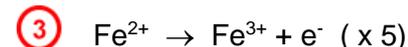
② The purple potassium permanganate changes to colourless Mn^{2+} .

① Each MnO_4^- gains five electrons, so the MnO_4^- is reduced.



② The pale green Fe^{2+} changes to orange Fe^{3+} .

① Each Fe^{2+} loses one electron, so the Fe^{2+} is oxidised.



The overall balanced equation for the redox reaction is:

