

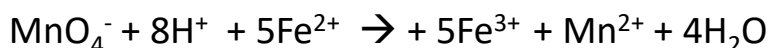
Iron(II) titration against permanganate solution

- Imagine you had an unknown amount of Fe(II) solution. An example of this might be a solution of FeSO₄ used to treat iron-deficiency anaemia.
- Fe has two common oxidation states: Fe(II) and Fe(III). Fe(II) loses one electron to form Fe(III)
- Manganese has many available oxidation states. In potassium permanganate (KMnO₄), it starts off in oxidation state +7



Element	Formal oxidation state	Total contribution
K	+1	+1
O	-2	4 × (-2) = -8
Mn	?	+7

- It will end up getting reduced (reduction is gain of electrons) through all of its oxidation states until it reaches Mn²⁺. This takes 5 electrons.
- This means for each oxidation (oxidation is loss) that happens when iron(II) is oxidised to iron(III), there is one electron given up to manganese. This needs to happen 5 times. The equation for this is:



- Why can't you use chloride containing compounds with manganese?
Similarly, potassium permanganate solutions have to be used soon after they have been made. Why? (Hint, think about which dissolved gases there are in water).
- Is potassium permanganate an oxidising or reducing agent?
- How many Fe(II) ions will need to be oxidised to reduce 1 mol of potassium permanganate?