

- An aqueous solution of iron(III) nitrate is pale yellow/brown. Upon addition of three mole equivalents of potassium thiocyanate (KSCN) a bright red colour develops. Draw the metal complex responsible for the red colour, including any stereoisomers.

Thiocyanate, SCN^- , has a lone pair on both the S and N ends and so can form Fe-SCN and Fe-NCS complexes, which are linkage isomers.

$\text{Fe}^{3+}(\text{aq})$ contains octahedral $[\text{Fe}(\text{OH}_2)_6]^{3+}$ ions and addition of 3 SCN^- will lead to $[\text{Fe}(\text{OH}_2)_3(\text{SCN})_3]$. There are 2 possible stereoisomers (i.e. ignoring possible linkage isomers):

