Q2

1. The Fe^{2+} content of iron tablets was determined by titration with a freshly standardised solution of potassium manganate(VII), **$KMnO_4$.**

The equation for the titration reaction is

$$5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$$

(*a*) Why are iron tablets sometimes medically prescribed? (5)

(*b*) Why must potassium manganate(VII) solutions be standardised? Why was it necessary to standardise the potassium manganate(VII) solution *immediately* before use in the titration? What reagent is used for this purpose? (9)

(*c*) Describe how exactly 250 cm^3 of Fe^{2+} solution was prepared from five iron tablets, each of mass 0.325 g. Why was some dilute sulfuric acid used in making up this solution? (12)

(*d*) Explain why additional dilute sulfuric acid must be added to the titration flask before each titration is carried out. (6)

(*e*) On average, 18.75 cm^3 of 0.01 M potassium manganate(VII) was required to react with 25.0 cm^3 portions of the iron solution prepared from the five tablets.
Calculate
(*i*) the molarity of the Fe^{2+} solution,
(*ii*) the total mass of iron in the 250 cm^3 of solution,
(*iii*) the percentage by mass of iron in the tablets. (18)