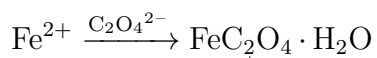


Synthesis of $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3] \cdot \text{H}_2\text{O}$

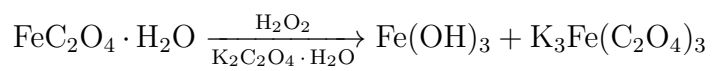
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§ 1 Reaction Theory



Reagent	Moles	Mass
iron(II) ammonium sulphate	0.0127 mol	5 g
oxalic acid dihydrate	0.0396 mol	5 g



Reagent	Moles	Mass or Volume
hydrogen peroxide	0.0179 mol	10 cm ³
potassium oxalate monohydrate	0.0271 mol	3.5 g

§ 2 Experimental Method

§ 2.1 $[\text{Fe}(\text{C}_2\text{O}_4)] \cdot 2\text{H}_2\text{O}$

Oxalic acid dihydrate (5 g) was dissolved in deionised water (50 cm³). Iron(II) ammonium sulphate hexahydrate (5 g) was dissolved in warm deionised water (20 cm³) and then acidified with dilute sulphuric acid (2 M, 1 cm³). The mixture was stirred rapidly. The oxalic acid solution (25 cm³) was added and heated to boiling. The mixture was allowed to settle and then decanted, it was mixed with hot deionised water (15 cm³) before being decanted again. The product was collected via Büchner filtration and washed with hot deionised water followed by acetone before being dried (2.40 g).

§ 2.2 $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3] \cdot \text{H}_2\text{O}$

The iron(II) oxalate from §2.1 was suspended in a warm solution of potassium oxalate monohydrate (3.5 g) in deionised water (10cm³). Hydrogen Peroxide was added dropwise (1.786 M, 10 cm³). The mixture was heated to boiling whilst slowly adding the oxalic acid solution (8 cm³). A further 3 cm³ of the solution was added slowly. The solution was filtered through fluted filter paper and methylated spirits (10 cm³) were added. The solution was allowed to cool and crysatalise before being collected through a Büchner filter and washed with a 1:1 methylated spirits:deionised water solution and acetone. The final product was dried in a vacuum desiccator in the dark (1.80 g).

§ 3 Interpretation

Question N°1. What is the purpose of the H_2O_2 in the preparation of $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3] \cdot 3\text{H}_2\text{O}$

The H_2O_2 oxidises the $\text{Fe}(\text{II})$ in the iron(II) oxalate to $\text{Fe}(\text{III})$, thus converting it to iron(III) oxalate.

Question N°2. In the $(\text{C}_2\text{O}_4)^{2-}$ anion are all four C-O interatomic distances equal or are two shorter than the other two?

As the oxalate anion undergoes resonance the bond lengths will be an average of both the $\text{C}=\text{O}$ double bond and the $\text{C}-\text{O}$ single bond, thus every bond is the same length.