

# 含硫、磷配位基之單亞硝基鐵化合物的 製備和反應性探討

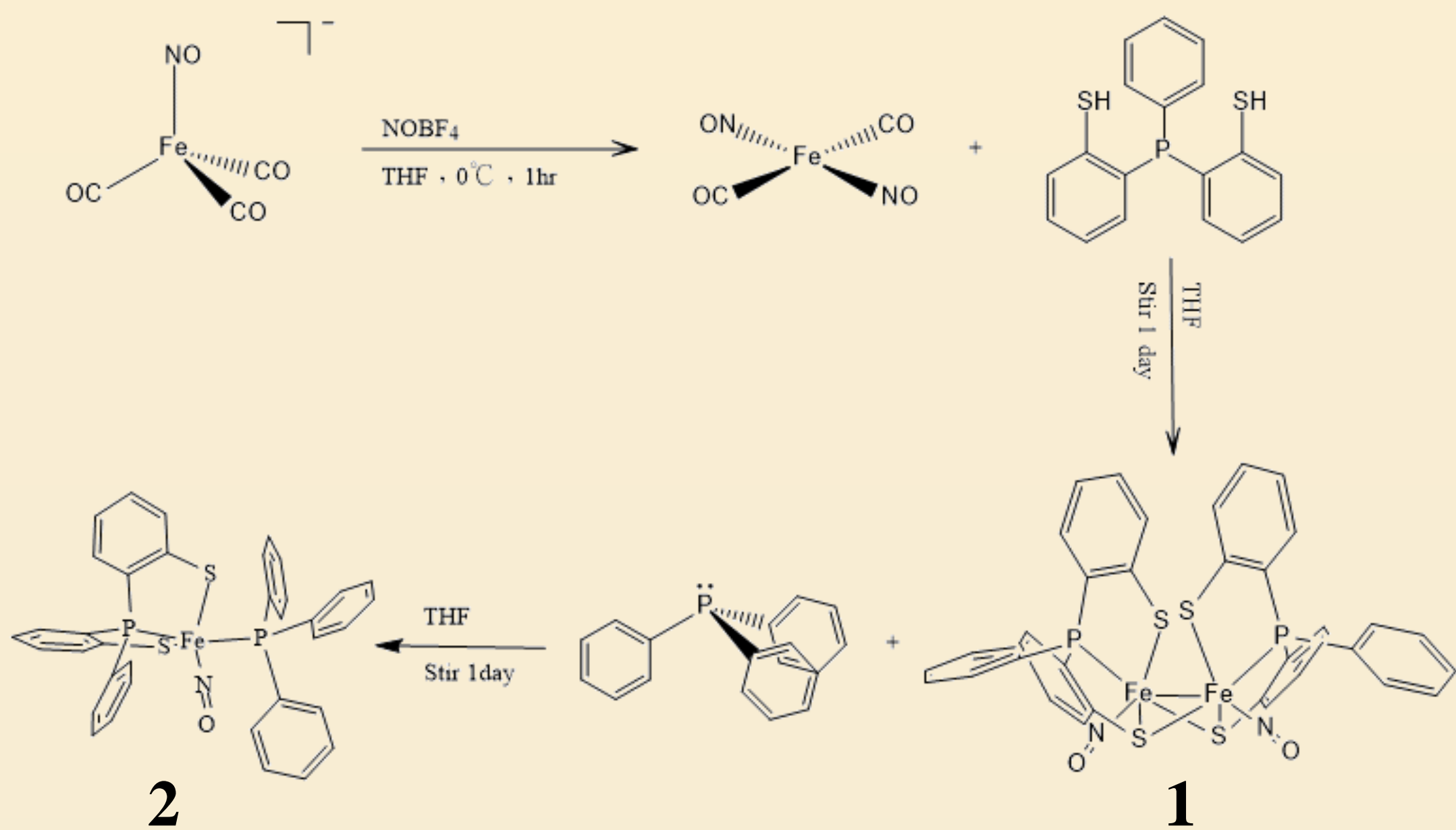
## 摘要：

本實驗利用雙核鐵  $\text{Fe}_2((\text{NO})\text{P}(\text{C}_6\text{H}_4\text{-}2\text{-SH})_2(\text{C}_6\text{H}_5))_2$ ，與路易斯鹼  $\text{P}(\text{C}_6\text{H}_5)_3$  反應後，進行配位反應，生成單核鐵  $\text{Fe}(\text{NO})\text{P}(\text{C}_6\text{H}_4\text{-}2\text{-SH})_2(\text{C}_6\text{H}_5)(\text{P}(\text{C}_6\text{H}_5)_3)$ 。

我們的目標是透過以配位取代的方式讓雙核鐵生成單核鐵，並且探討其反應性。

## 實驗與結果：

### 實驗總流程圖



### 合成配位基 $\text{P}(\text{C}_6\text{H}_4\text{-}2\text{-SH})_2(\text{C}_6\text{H}_5)$

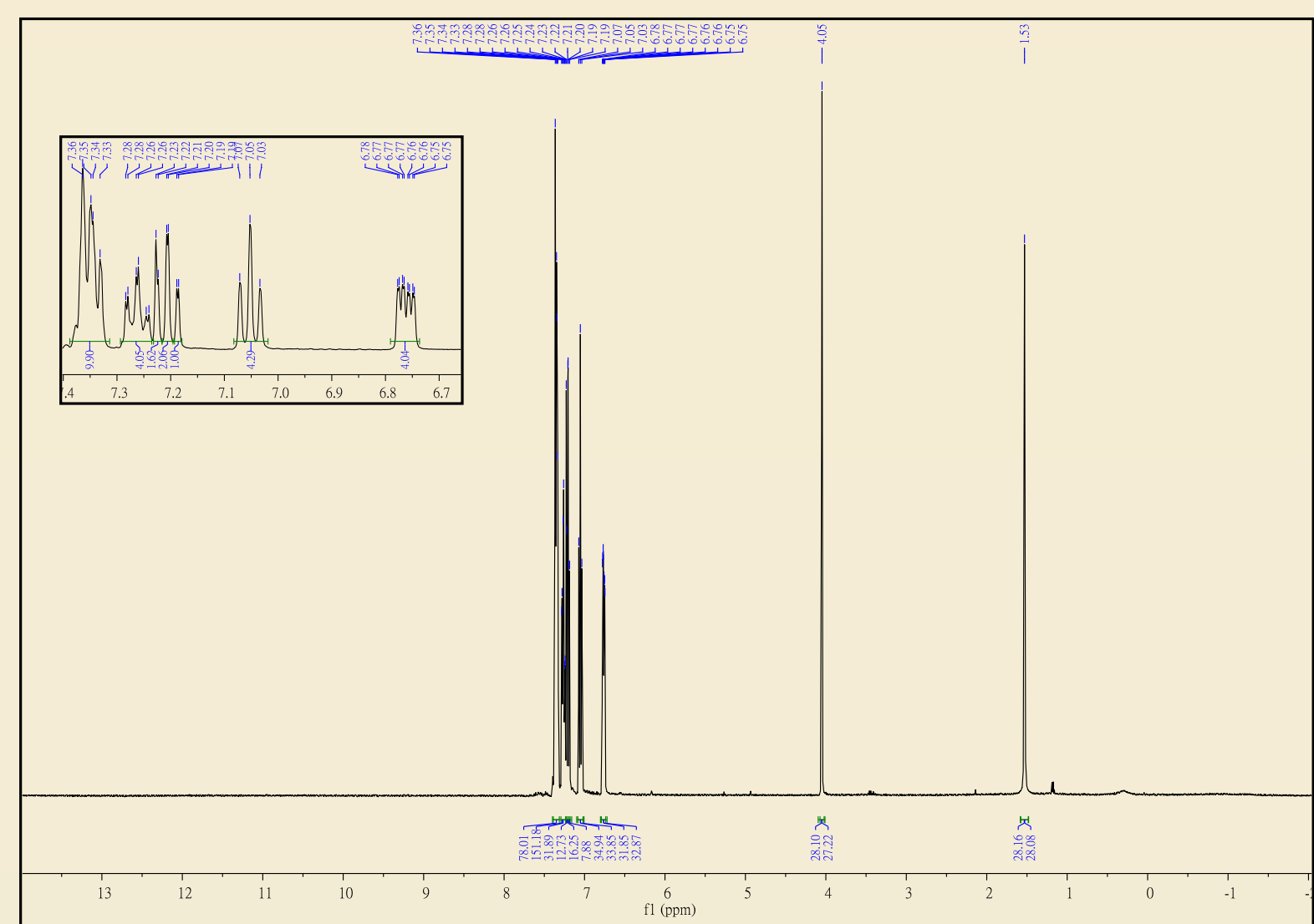
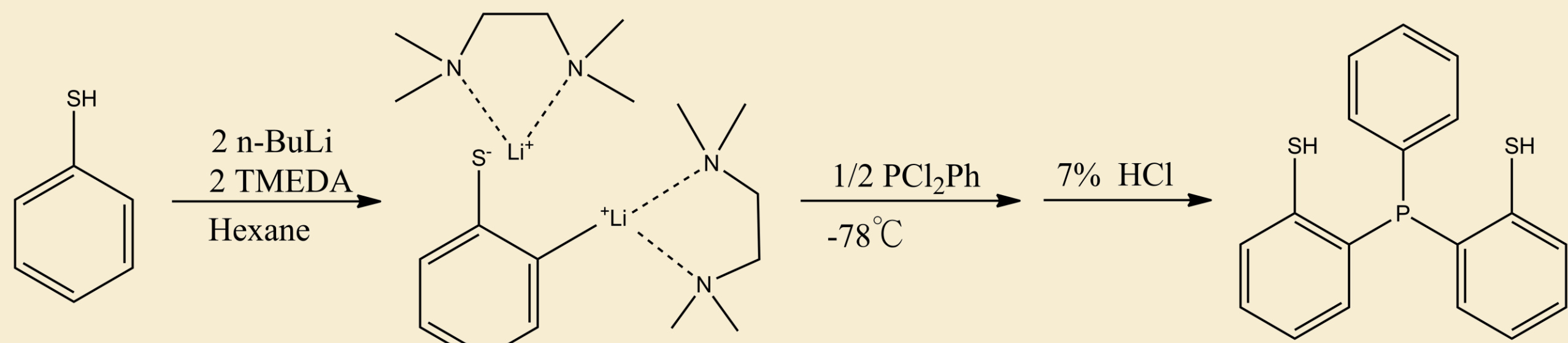


圖1  $^1\text{H-NMR}$  光譜圖  $\text{P}(\text{C}_6\text{H}_4\text{-}2\text{-SH})_2(\text{C}_6\text{H}_5)$  in  $\text{CDCl}_3$

### 合成 $\text{Fe}_2((\text{NO})_2\text{P}(\text{C}_6\text{H}_4\text{-}2\text{-SH})_2(\text{C}_6\text{H}_5))_2$

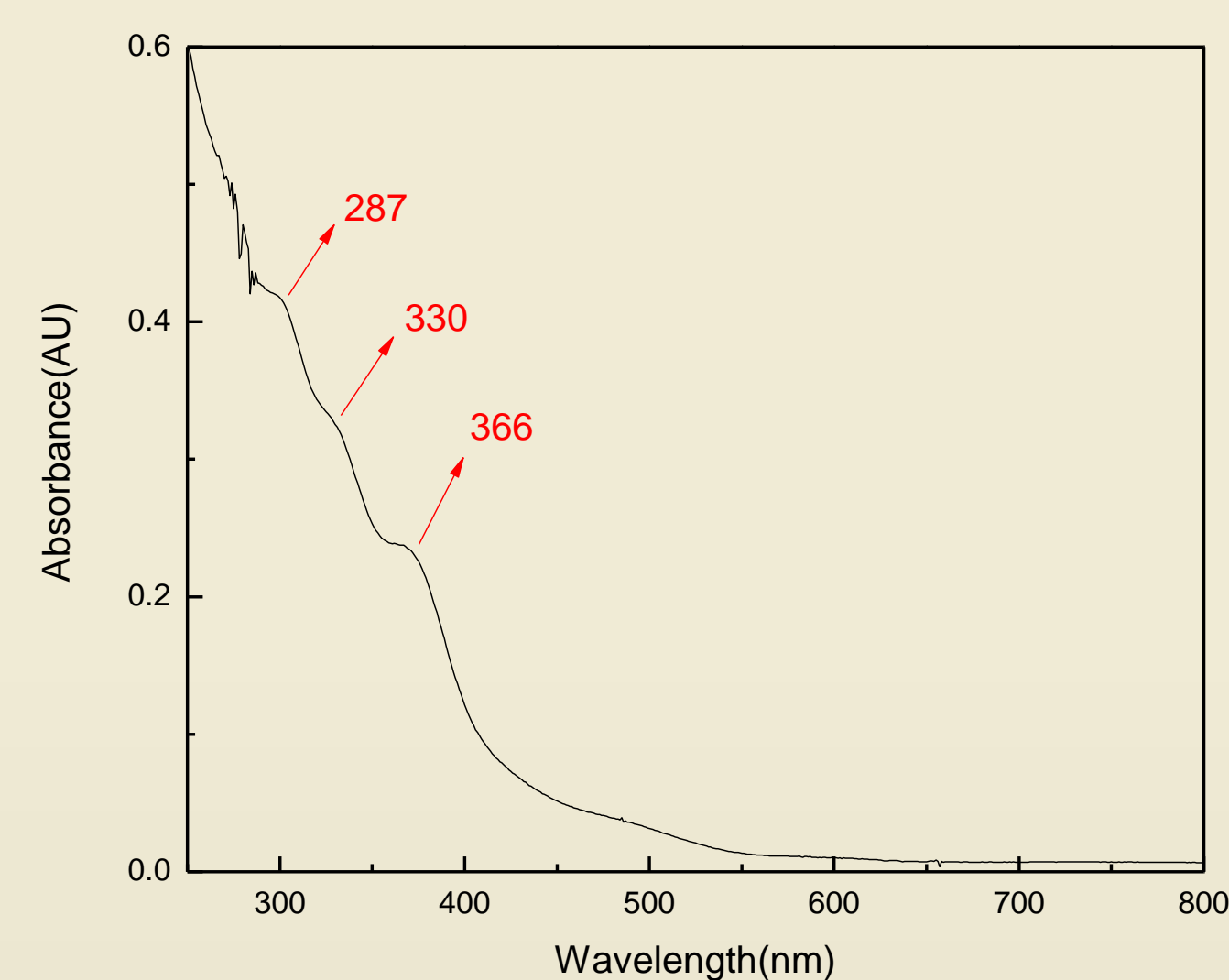
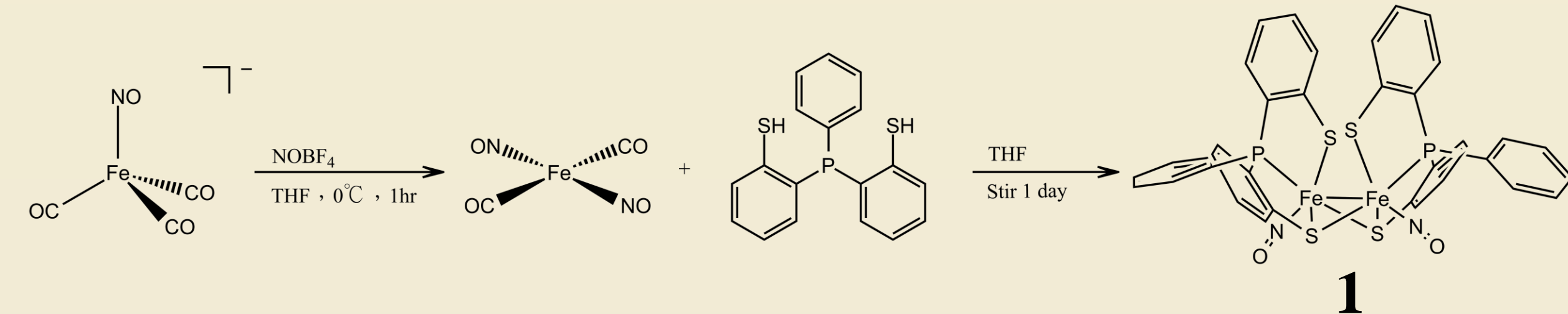


圖2 UV-Vis 光譜圖\_1 in THF

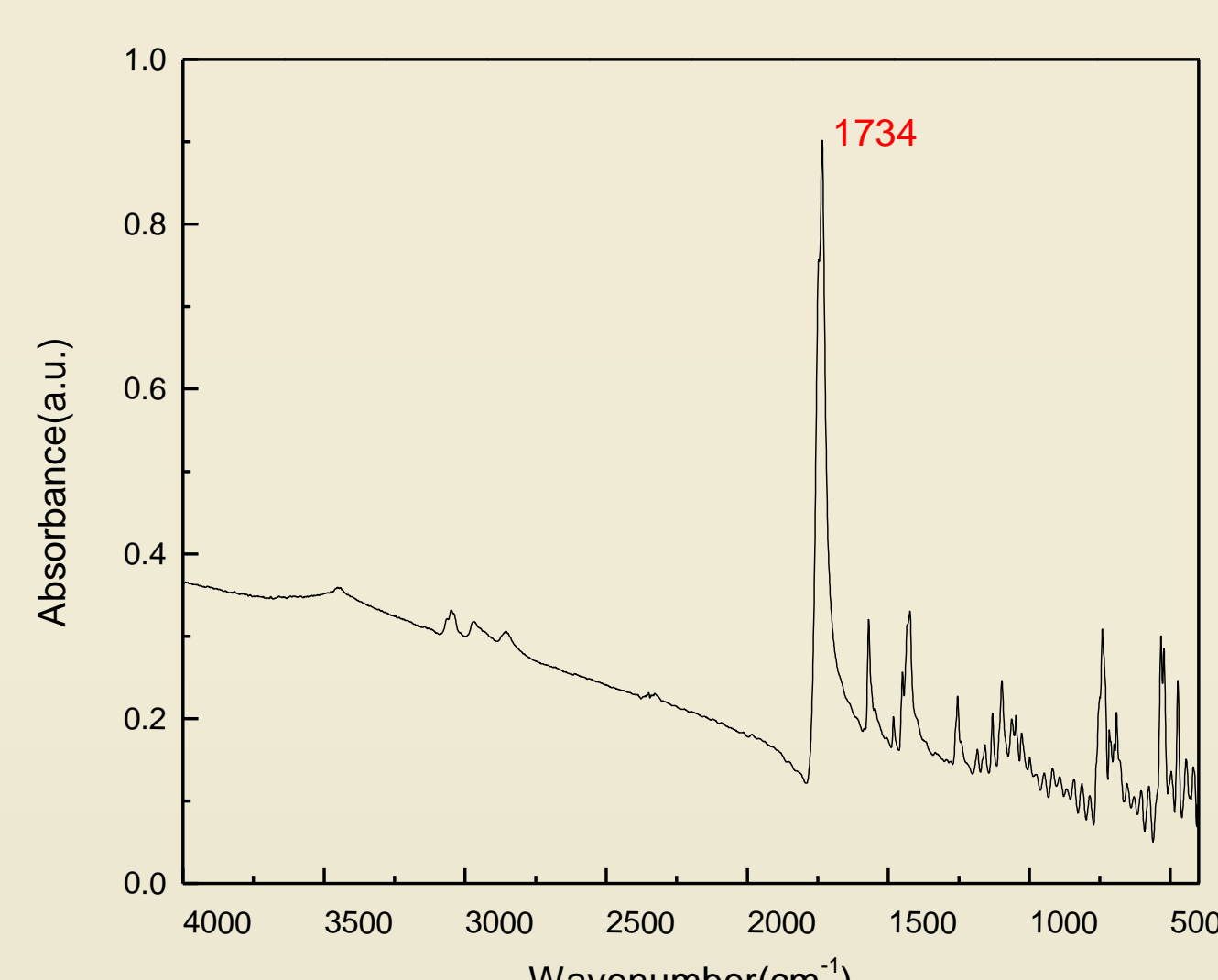


圖3 FT-IR 光譜圖\_1 in KBr

## 參考文獻：

- [1] Kim, E., & Fitzpatrick, J. Synthetic Modeling Chemistry of Iron-Sulfur Clusters in Nitric Oxide Signaling. *Acc. Chem. Res.*, **2015**, *48*, pp 2453-2461
- [2] Tonzetich, Z. J., Heroguel, F., Do, L. H., & Lippard, S. J. Chemistry of Nitrosyliron Complexes Supported by a  $\beta$ -Diketiminato Ligand. *Inorg. Chem.*, **2011**, *50*, pp 1570-1579

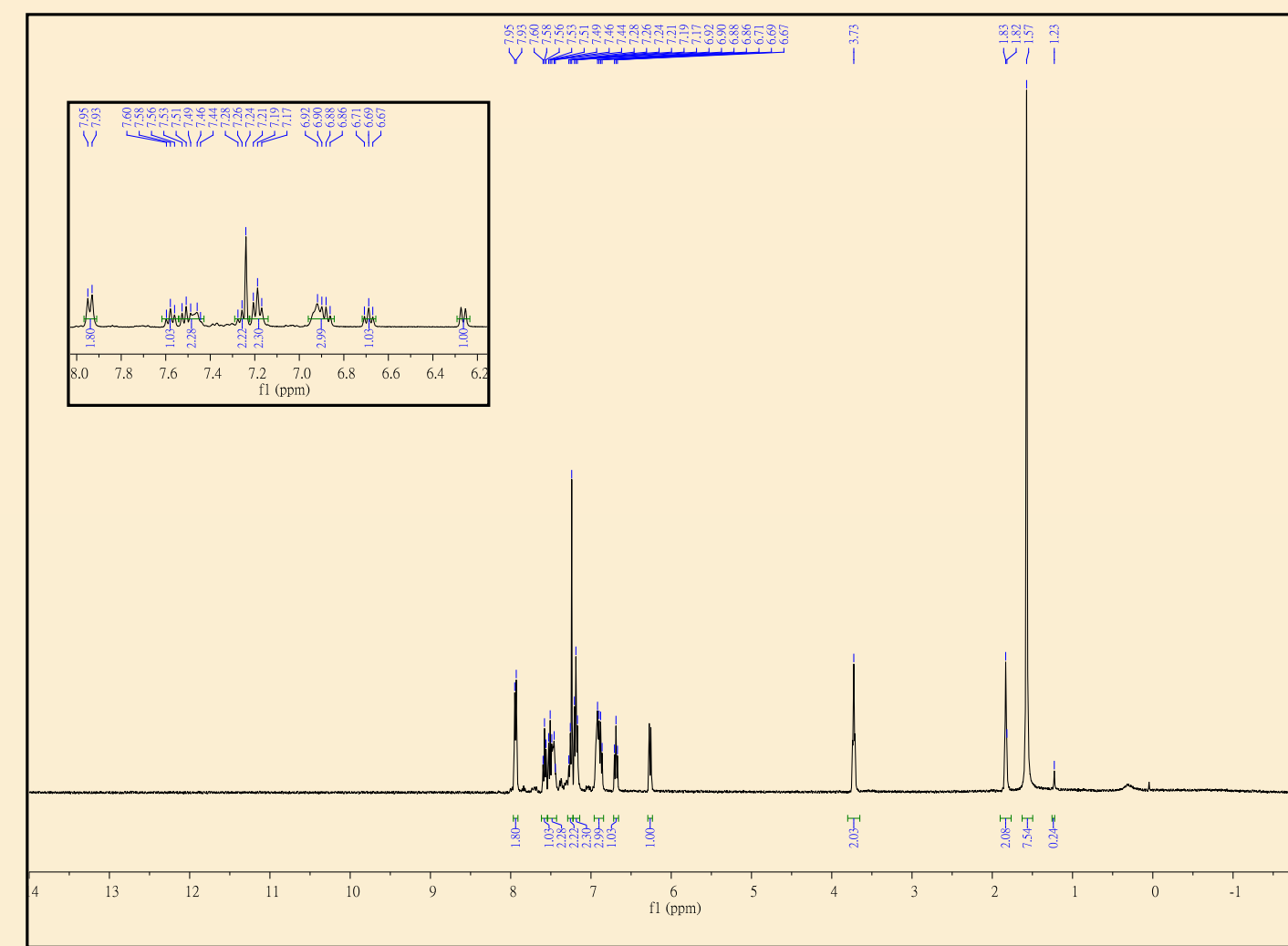


圖4  $^1\text{H-NMR}$  光譜圖\_1 in  $\text{CDCl}_3$

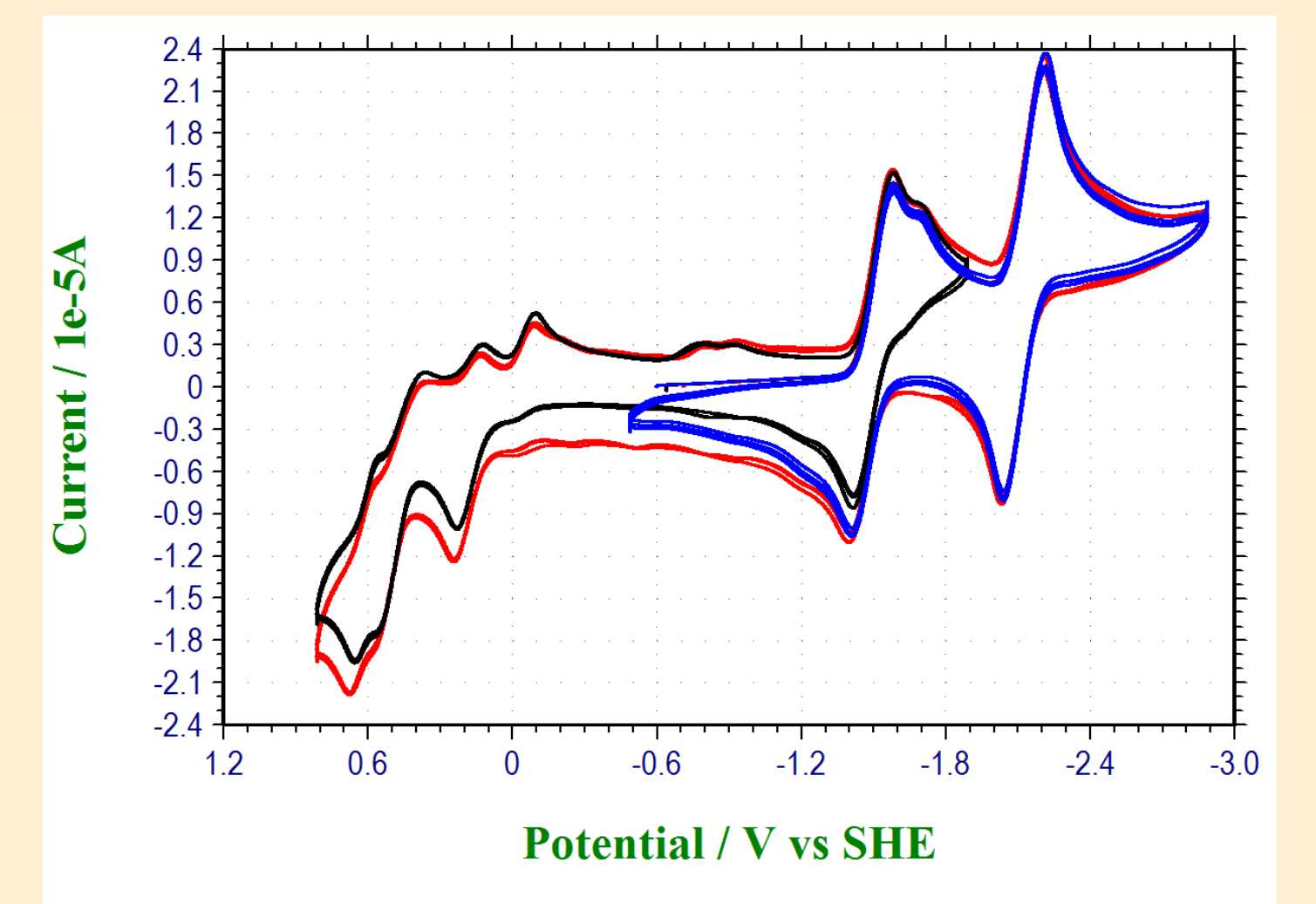


圖5 CV 光譜圖\_1

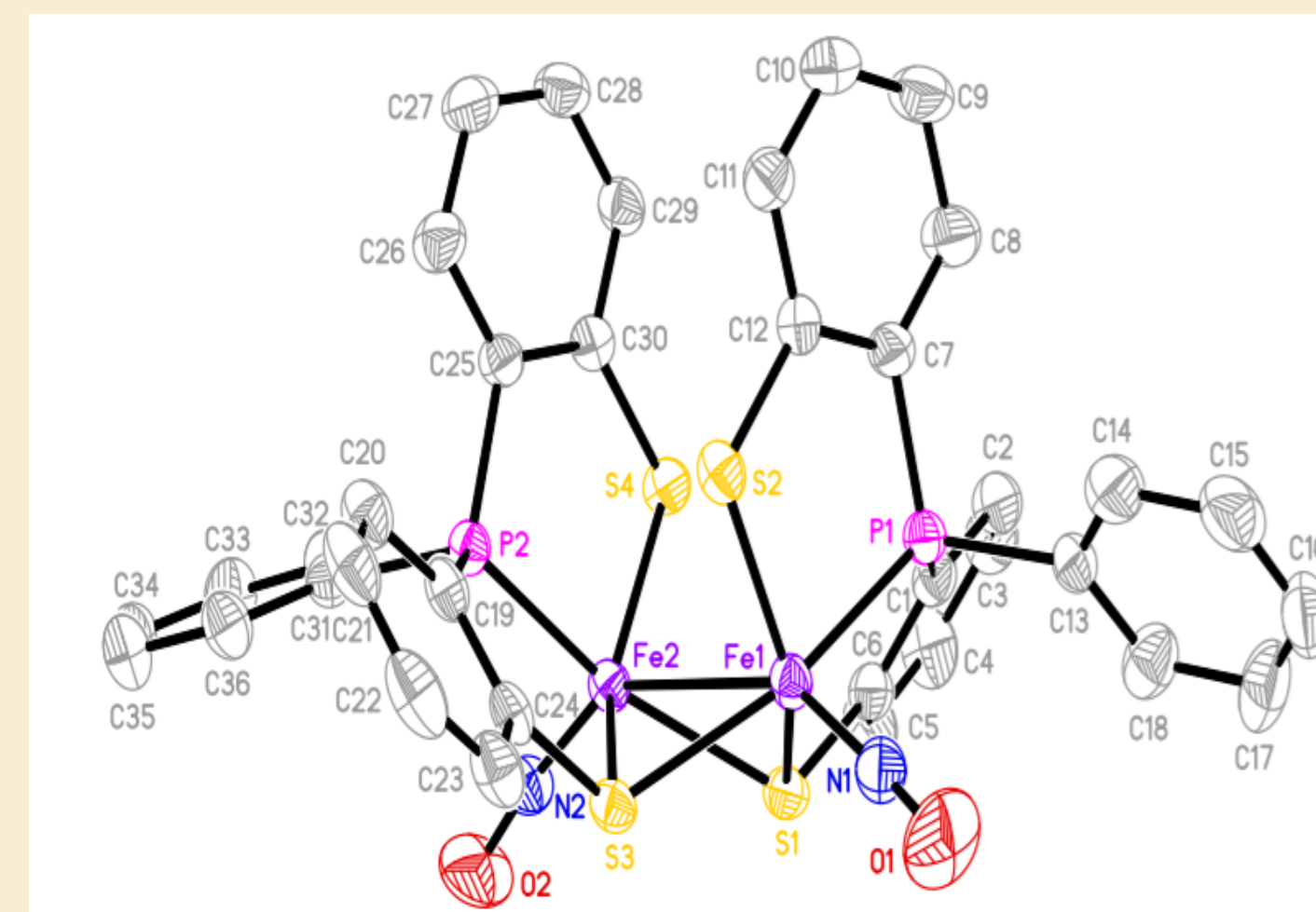


圖6 X-ray 晶體結構圖\_1

Fe(1)-Fe(2)	2.6896(5)
N(1)-O(1)	1.156(3)
N(2)-O(2)	1.160(3)
O(1)-N(1)-Fe(1)	176.9(3)
O(2)-N(2)-Fe(2)	168.1(2)

### 合成 $\text{Fe}(\text{NO})\text{P}(\text{C}_6\text{H}_4\text{-}2\text{-SH})_2(\text{C}_6\text{H}_5)(\text{P}(\text{C}_6\text{H}_5)_3)$

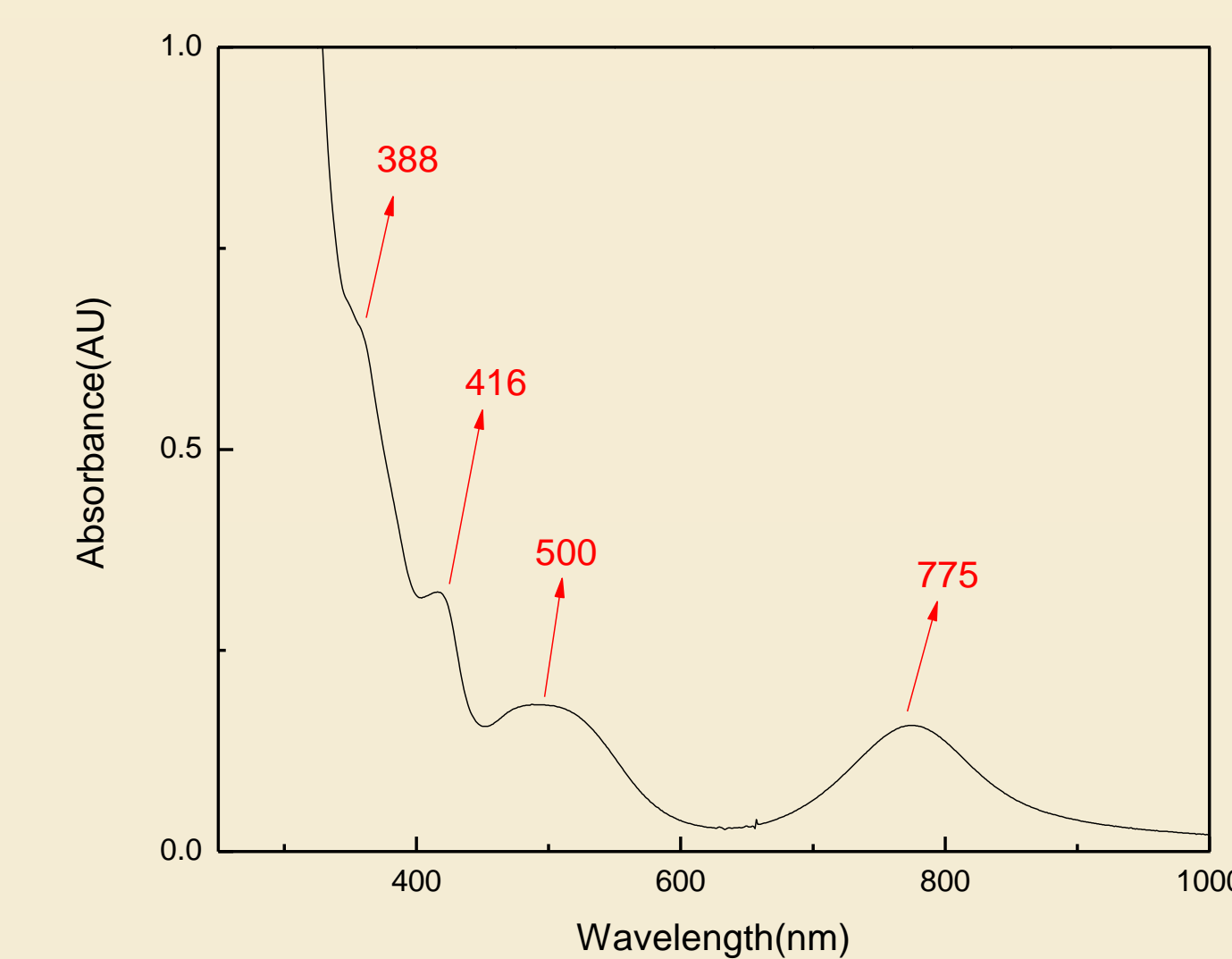
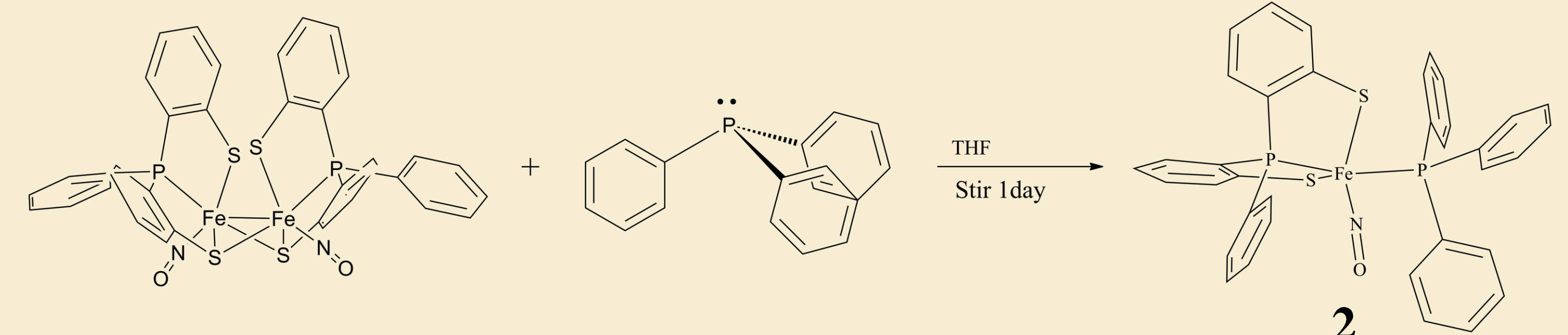


圖7 UV-Vis 光譜圖\_2 in THF

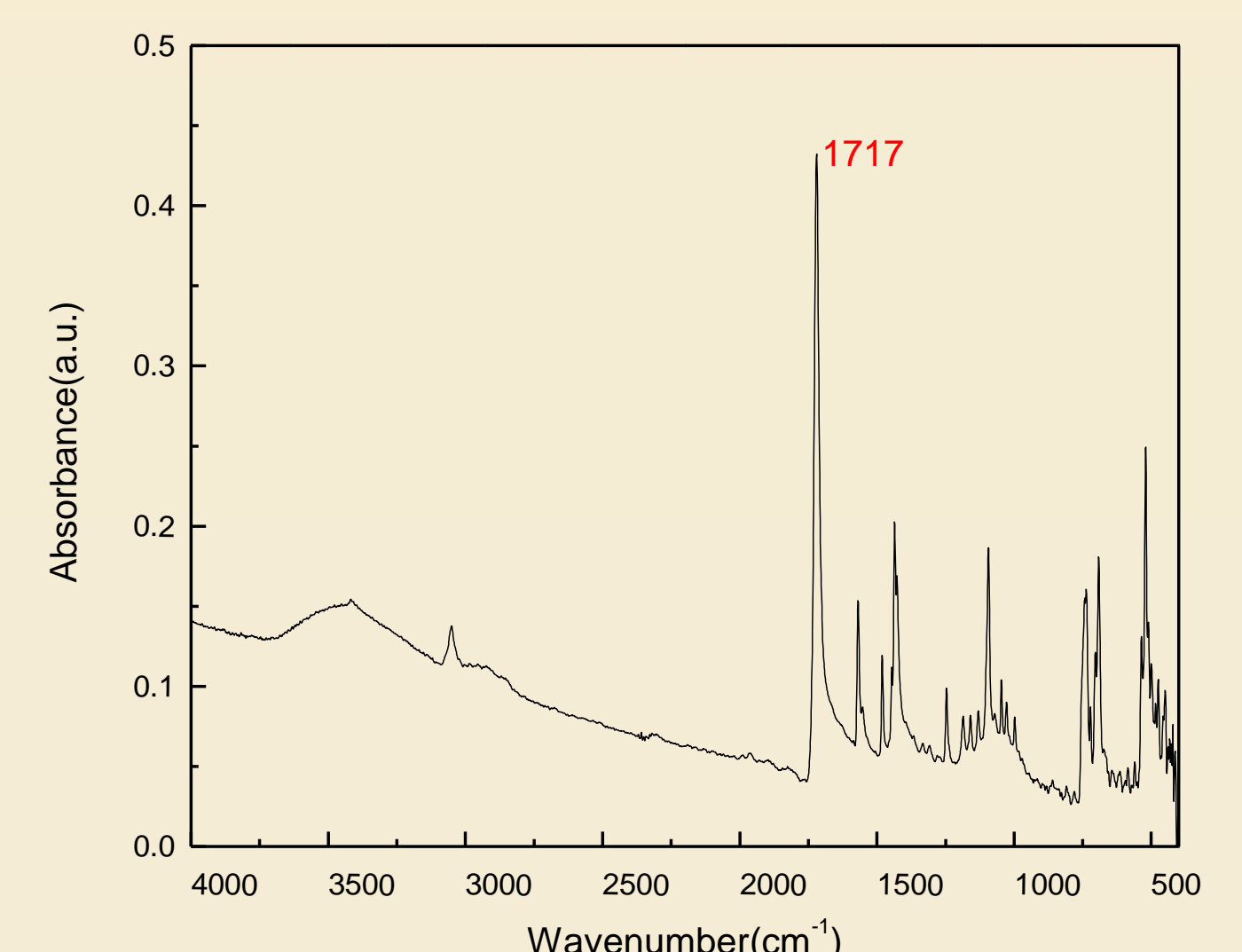


圖8 FT-IR 光譜圖\_2 in KBr

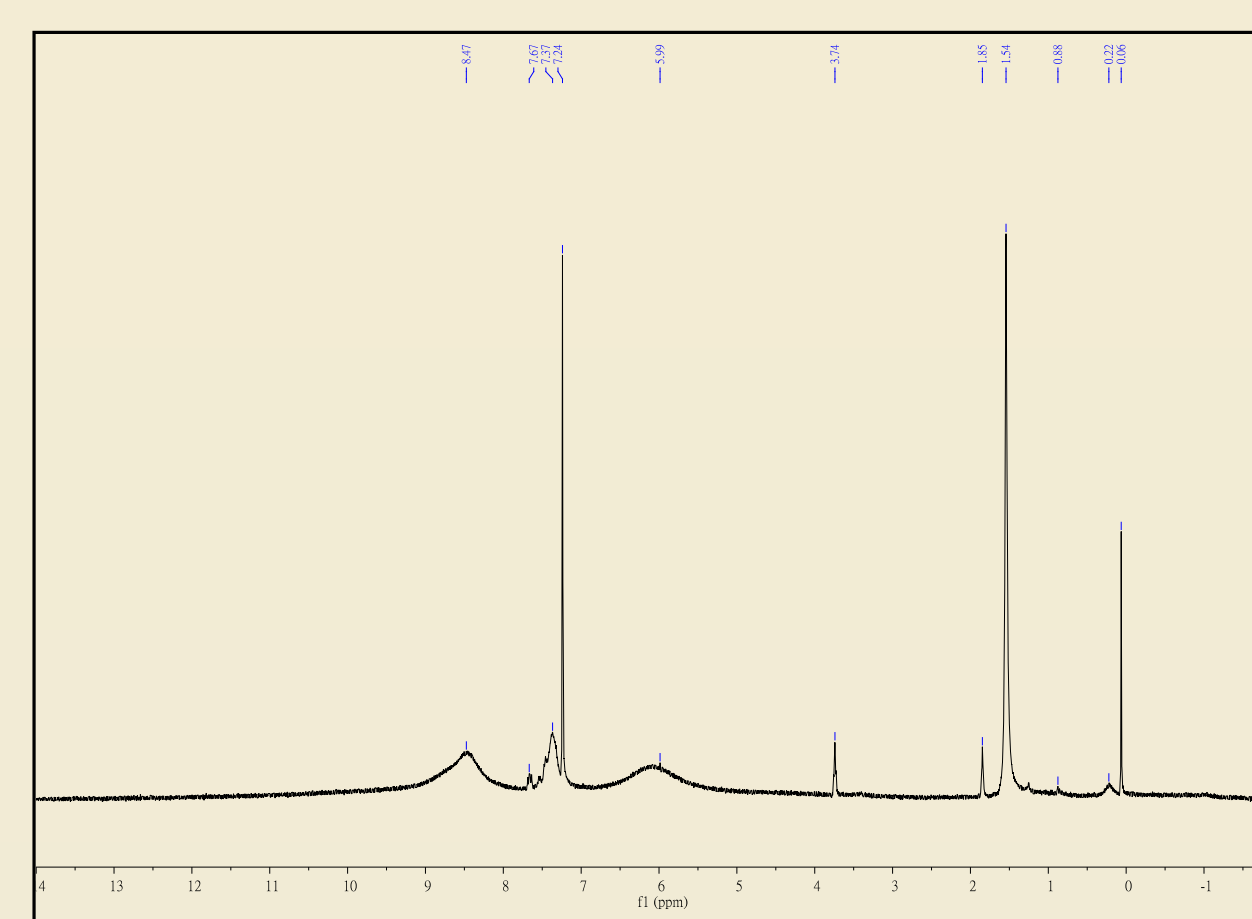


圖9  $^1\text{H-NMR}$  光譜圖\_2 in  $\text{CDCl}_3$

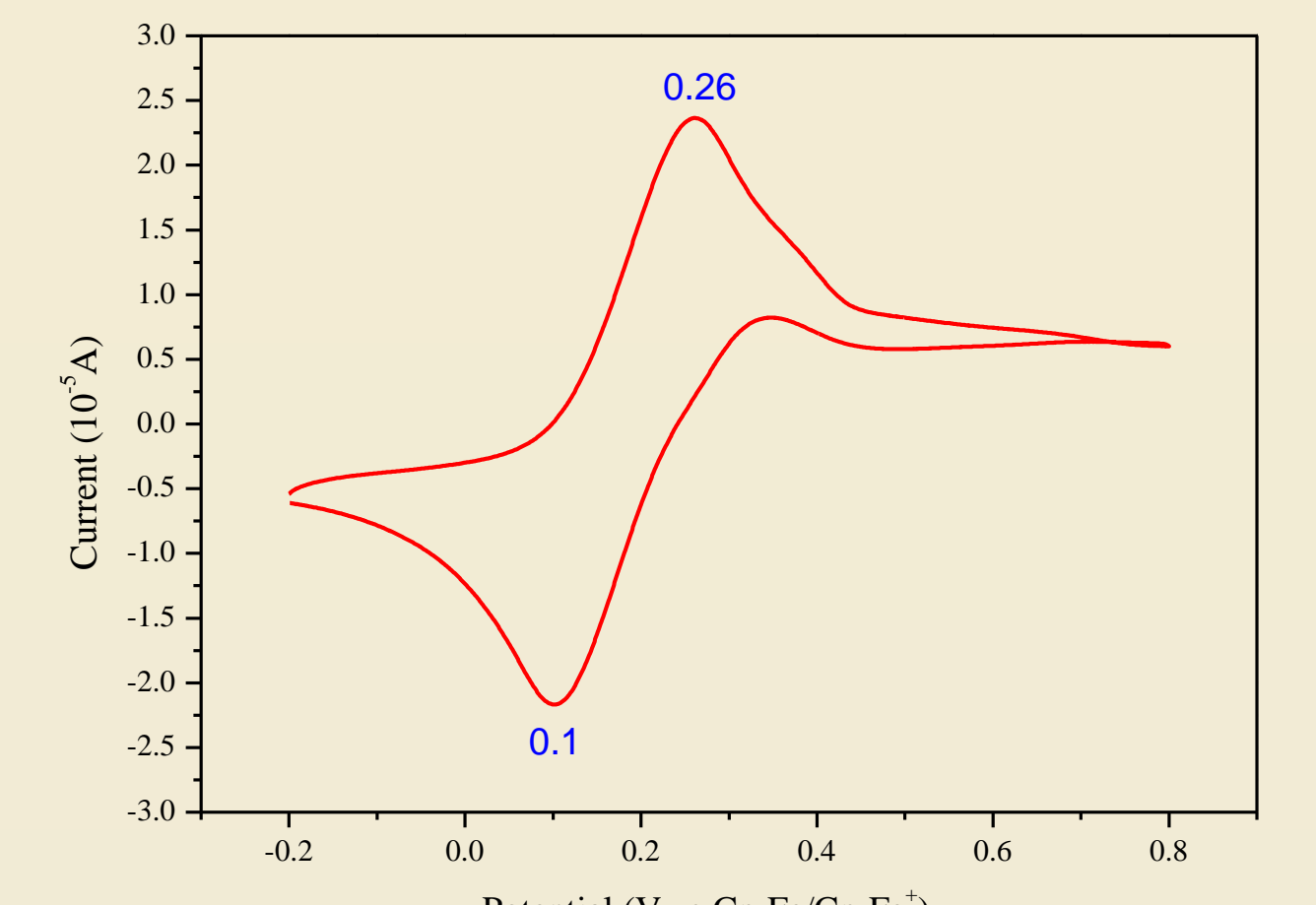


圖10 CV 光譜圖\_2

N(1)-O(1)	1.153(3)
O(1)-N(1)-Fe	176.0(2)

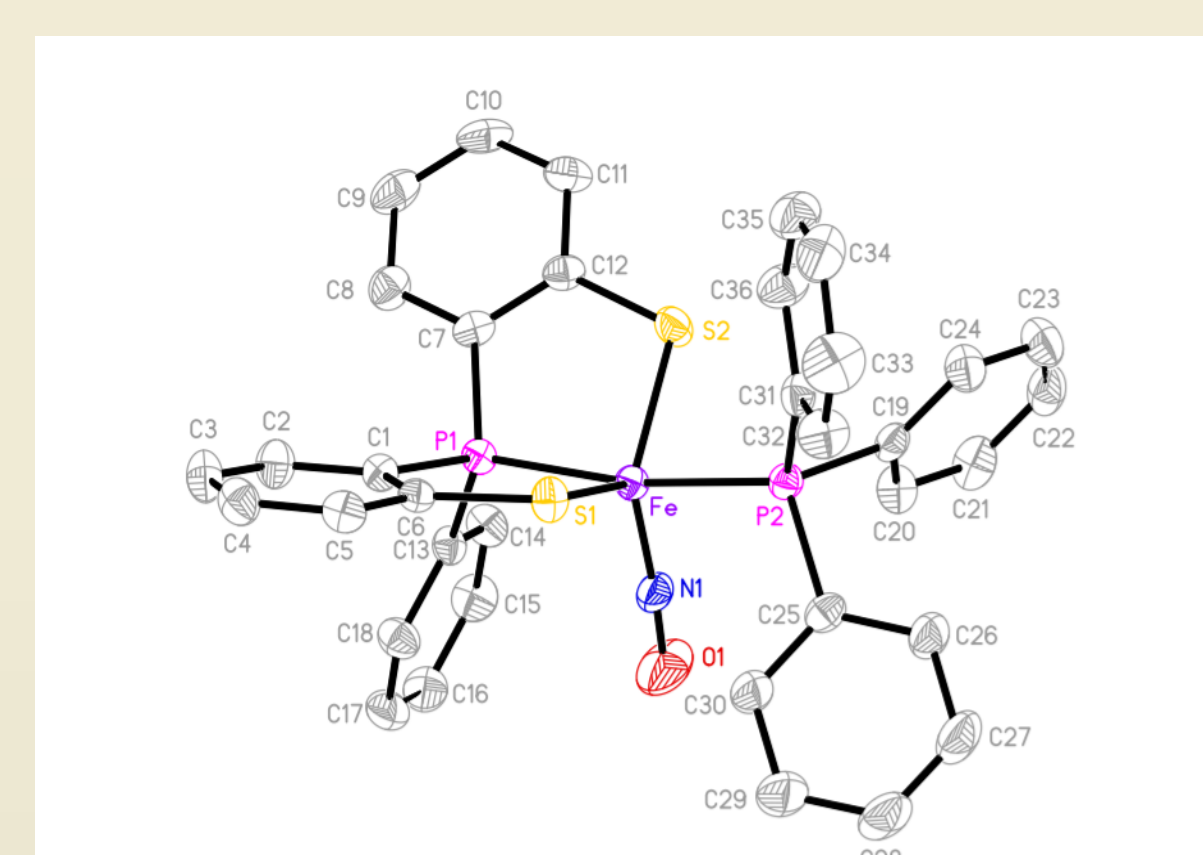


圖11 X-ray 晶體結構圖\_2

## 結論：

本實驗利用  $\text{P}(\text{C}_6\text{H}_4\text{-}2\text{-SH})_2(\text{C}_6\text{H}_5)$  為配位基合成出了1種單核鐵錯合物以及1種雙核鐵錯合物，並藉由光譜來鑑定其性質。

我們成功將雙核鐵(1)利用改變配位環境的方式形成單核鐵(2)，根據Enemark-Feltham所提出的表示法，雙核鐵(1)和單核鐵(2)表示為  $\{\text{FeNO}\}^7$ 。