Supporting Information For:

Photochemical Organic Oxidations and Dechlorinations with a μ-Oxo Bridged Heme/Non-Heme Diiron Complex.

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Figure S1. UV-visible spectra showing the photoreduction of $[(^6L)Fe^{III}\text{-}O\text{-}Fe^{III}\text{-}Cl]^+$ (**1**) {λ_{max} 418 (Soret), 575 nm} to $[(^6L)Fe^{II}...Fe^{II}\text{-}Cl]^+$ (**2**) {λ_{max} 415 (Soret) , 432 (sh), 532, 550 (sh) nm} in benzene-triphenylphosphine.

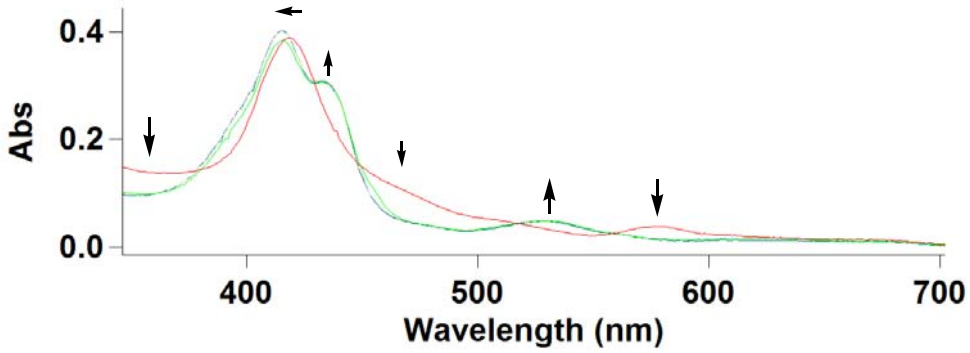

Figure S2. UV-visible spectra showing the photoreduction of $[(^6L)Fe^{III}\text{-}O\text{-}Fe^{III}\text{-}Cl]^+$ (**1**) {λ_{max} 418 (Soret), 575 nm} to $[(^6L)Fe^{II}...Fe^{II}\text{-}Cl]^+$ (**2**) {λ_{max} 415, 430 (sh), 532, 550 (sh) nm} in toluene.

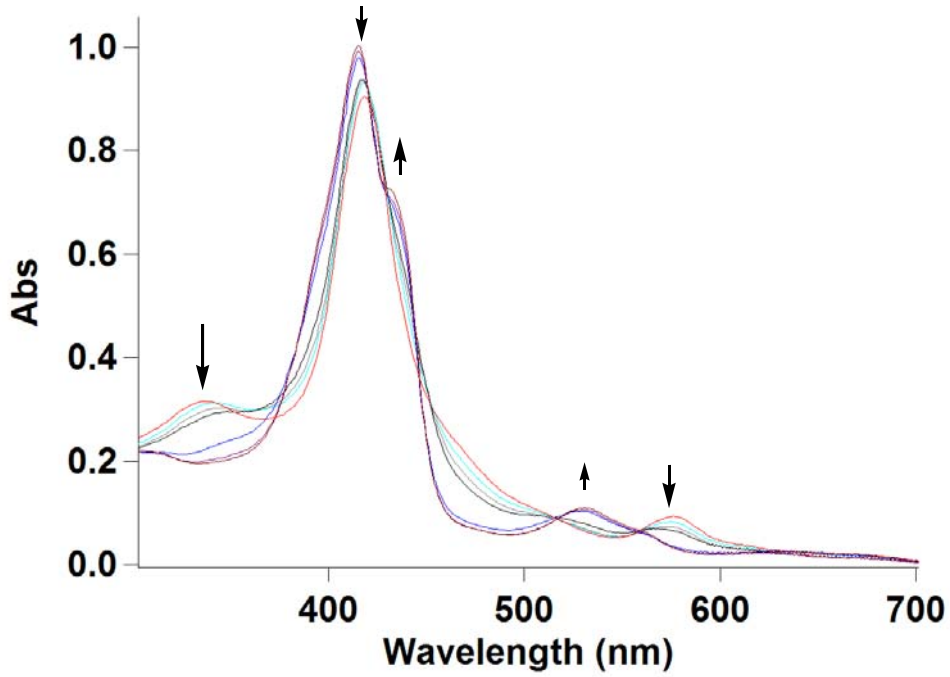

Figure S3. EI-MS spectrum for either biphenyl trichloride product $C_{12}H_7Cl_3$ at *m/z* 256, which is derived from the photolysis of $[(^6L)Fe^{III}\text{-}O\text{-}Fe^{III}\text{-}Cl]^+$ (**1**) in 1,2-dichlorobenzene. The calculated isotope pattern for $C_{12}H_7Cl_3$ is shown at the bottom.

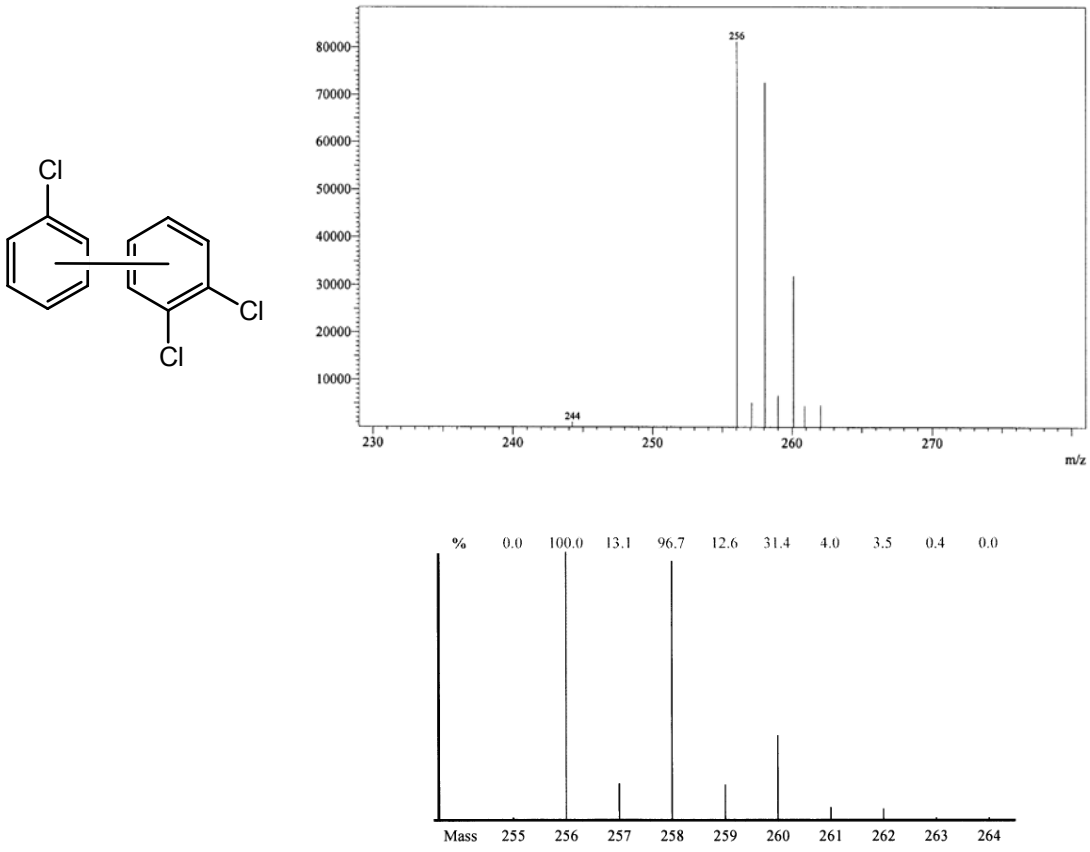

Figure S4. EI-MS spectrum for either biphenyl monochloride product $C_{12}H_9Cl$ at *m/z* 188, which is derived from the photolysis of $[(^6L)Fe^{III}\text{-}O\text{-}Fe^{III}\text{-}Cl]^+$ (**1**) in chlorobenzene. The calculated isotope pattern for $C_{12}H_9Cl$ is shown at the bottom.

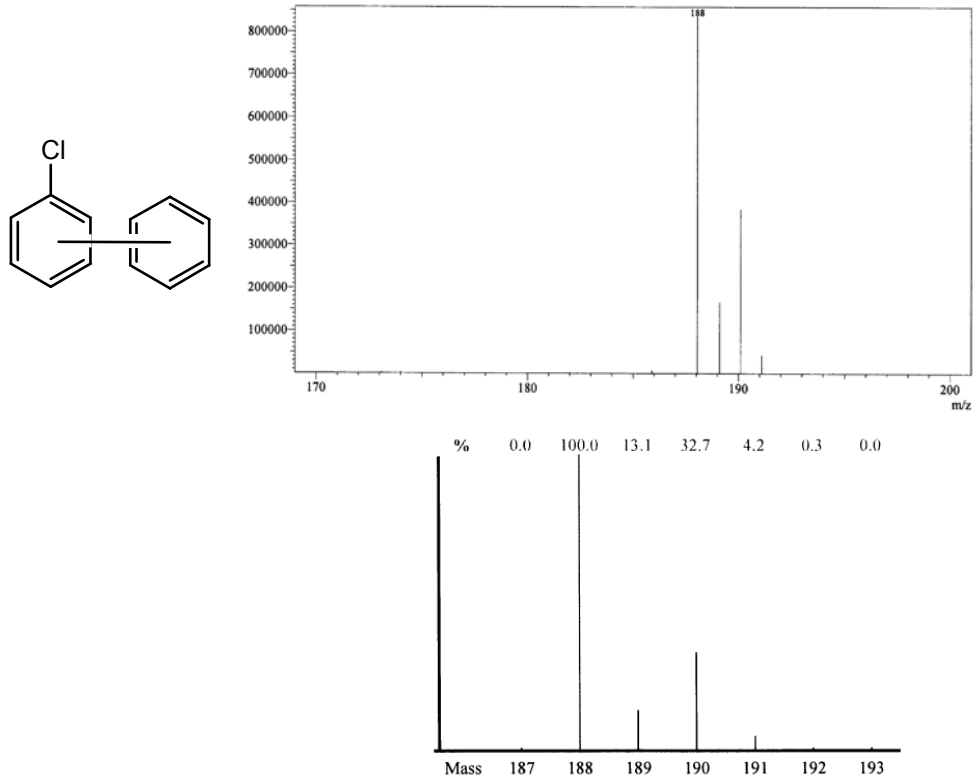

Figure S5. ESI-MS spectrum (positive ion mode) for $\{[(^6L)Fe^{III}\text{-}Cl...Fe^{III}\text{-}Cl]_2O\}^+$ (**3**) in showing the ion peak at *m/z* 1221 which corresponds to the broken-oxo ion $[(^6L)Fe^{III}\text{-}Cl...Fe^{III}\text{-}Cl]^+$. The inset shows the spectrum calculated for $C_{63}H_{40}N_8OFe_2Cl_2F_6$.

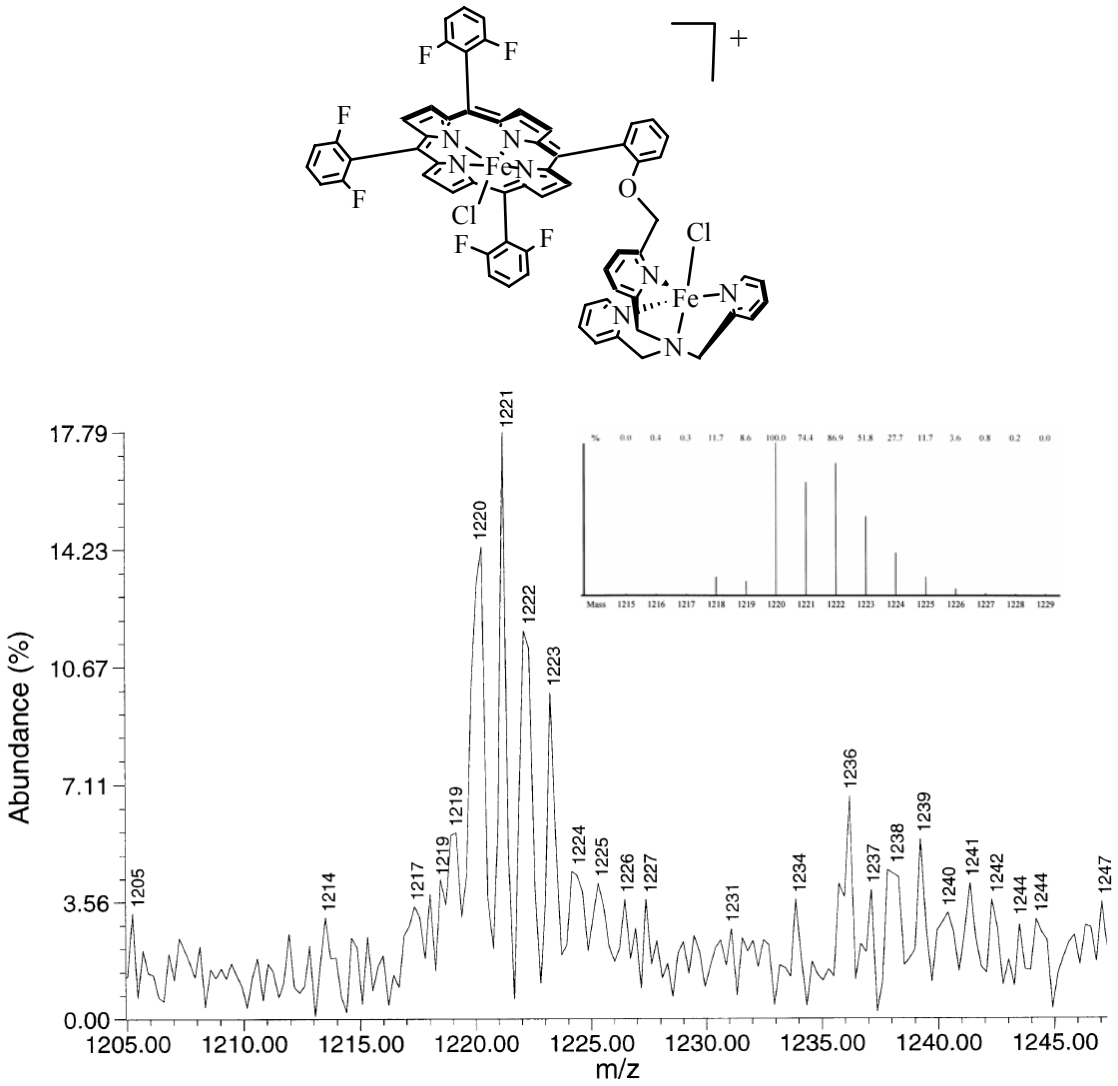

Figure S6. Full ^{1}H-NMR spectrum for $\{[(^{6}L)Fe^{III}\text{-}Cl...Fe^{III}\text{-}Cl]_2O\}^{+}$ (**3**) recorded at 296 K in $CDCl_3$.

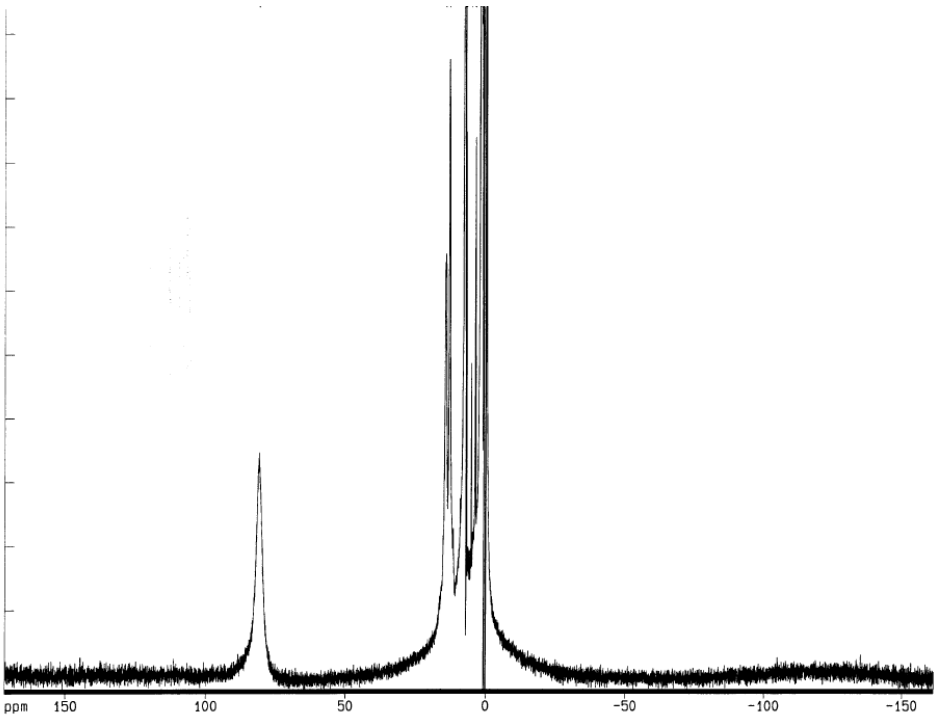

Figure S7. Diamagnetic region ^{1}H-NMR spectrum for $\{[(^{6}L)Fe^{III}\text{-}Cl...Fe^{III}\text{-}Cl]_2O\}^{2+}$ (**3**) recorded in $CDCl_3$.