
MECHANISTIC AND KINETIC INSIGHTS OF [Cu(PDTC)L]

Dr. Matt Queen, Biological and Physical Science, Montana State University Billings, Billings

Daniel Willems, Biological and Physical Science, Montana State University Billings, Billings

Alexander Fryett *, Biological and Physical Science, Montana State University Billings, Billings

Carbon tetrachloride (CT) is a known carcinogen. It is known that when pyridine-2,6-bis(thiocarboxylic acid) (PDTC) forms square planar coordinate complexes with copper(II) the combination can dechlorinate CT stoichiometrically. In this study three different complexes, where the position four ligands are varied Cu(PDTC)L (L= Cl-, CN-, and PPh₃), were used to probe the mechanism of the dichlorination reaction. GC-MS kinetic assays were performed to assess the aqueous dechlorination kinetics while organic solvents were used in UV-Vis assays to test organic based solvents. Results on the UV-Vis show that Cu(PDTC)PPh₃ shows the most significant reaction with CT in organic solvent, followed by Cu(PDTC)CN with very limited reactivity, and finally Cu(PDTC)Cl with no reaction. Water-based kinetics were done in phosphate buffer with Cu(PDTC)Cl, Cu(PDTC)CN, and Cu(PDTC)PPh₃. Cu(PDTC)Cl showed the most significant loss in CT in air and under inert gas. In addition variable temperature kinetics assays were performed to elucidate activation energies for the reaction.