This is to certify that the

thesis entitled

Abiotic Transformation of Halogenated Aliphatic Compounds by Iron Powder

presented by

Chien-Ping Hung

has been accepted towards fulfillment of the requirements for

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Craig S. Criddle

Major professor

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ABIOTIC TRANSFORMATION OF HALOGENATED ALIPHATIC COMPOUNDS BY IRON POWDER

BY

Chien-Ping Hung

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ABSTRACT

ABIOTIC TRANSFORMATION OF HALOGENATED ALIPHATIC COMPOUNDS BY IRON POWDER

BY

Chien-Ping Hung

This research is a preliminary study of the dehalogenation of halogenated aliphatic compounds in the presence of iron powder. The haloaliphatics evaluated in this study include carbon tetrachloride (CT), 1,1,1,-trichloroethane (TCA), trichloroethylene (TCE) and tetrachloroethylene (PCE). Variables evaluated include temperature, pH, haloaliphatics concentration and buffer type. Pseudo-first-order kinetics were used to quantify the reaction kinetics of CT and TCE; zero order kinetics were used for TCA.

In the iron-mediated reactions, phosphate appears to play a central role in promoting dechlorination. The order of reactivity was: CT> 1,1,1,-TCA> TCE> PCE. The reaction rate was temperature and pH dependent. Highest rates occurred at high temperature and low pH.

This thesis is dedicated to my family, whom I love.

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