CHAPTER I
INTRODUCTION

Organic contaminants of aqueous processes contributes to the major problems for waste-water clean up. Volatile organic compounds, VOC's, are one of the most important contaminants. Most of the VOC's are emitted from small sources like automobile, bottle of fingernail polish remover, spray paints cans, solvents usage, etc. (Never, 1995) Trichloroethylene is one of the most common volatile organic compounds. It is acutely toxic, primarily because of its anesthetic effect on the central nervous system. Exposure to high vapor concentration is likely to cause headache, vertigue, tremors, nausea and vomiting, fatigue, intoxication, unconsciousness, and even death. Conventional treatment processes being based on adsorption for stripping/adsorption create filler of hazardous solid waste which then must be disposal of. Therefore, a demand for an alternative purification technology has been becoming a matter of considerable important nowadays (Eschweiler, 1993). Chemical oxidation is an important hazardous waste water treatment method since it destroys trichloroethylene which is quite resistant to other treatment methods.

Ozone oxidation is one of the most effective chemical oxidation for waste water clean-up because it completely destroys the contaminant without generating the hazardous waste. However, the degradation of toxic compound are not good if the concentration of toxic compound in wastewater is low because this process will obtain the low conversion.

One currently explored that surfactants adsorb onto the solid surface, admicelles, can solve this problem by increasing the interaction between

the contaminants and the ozone gas. Nevertheless, there is an environmental restriction due to high continuous loss of surfactant resulting in the high cost of the surfactant.

The chemical bond of surfactant or surfactant-like molecules to mineral oxide surface (bonded monolayer) may solve this problem. A novel method was proposed for successive constructing organized molecular layers on solid surface using surface active components. One of the most widely use of this active agent is silane coupling agent. Chlorosilane is an appropriate representative to construct the chemical bond onto mineral oxide surface. Thakulsukanant et al. (1997) also studied the stability of octadecyltrichloro-silane chemically bonded onto silica surface. The result showed that the bonded ODS was stable under agitation up to 310 rpm and temperature below 40°C. The pH value has very little effect on ODS debonding.

For the reaction of ozone with TCE, there are numerous researches concentrated on the kinetics of the oxidation but a little of work succeed for oxidation using the catalysts. Therefore, the objectives of this thesis would be developed into 3 parts:

1. To synthesize the admicellar catalyst which is the silica chemically bonded with octadecyltrichlorosilane.
2. To characterize the catalyst by using FTIR and Elemental analyzer.
3. To study the kinetic rate of ozonation especially the rate expression.