CHAPTER I
INTRODUCTION

With increasing world population, environmental problems are becoming serious and solutions to keep the air and water clean must be found urgently. This relates to the remediation of hazardous wastes, contaminated groundwater, and the control of toxic air contaminants.

One of promising methods that has been developed to deal with these problems is the photocatalytic process. This process is interesting because it does not utilize toxic materials like the conventional processes such as ozonation and chlorination. Besides, this process does not produce any sludge that needs to be further handled and disposed of as in the processes of chemical coagulation or carbon adsorption. The photocatalytic process is also considered as an effective method because of two important advantages: i) the relative high oxidation potential species: hydroxyl radical, perhydroxyl radical, and superoxide radical are generated by the photocatalysis (Hager, 1990 and Matthews, 1990) and ii) photocatalyst can be reused or can be fixed on the media to avoid the separation and catalyst recovery (Reutergardh and Iangphasuk, 1997).

The photocatalytic process starts from absorption of light energy by a molecule of the catalyst that is normally considered as a semiconductor. This photo-energy activates the molecules of the catalyst to produce an electron and positive hole pair that will initiate the redox reaction. In this study, isopropyl alcohol degradation by the photocatalytic process was carried out. Isopropyl alcohol is a common solvent used in many industries especially in the printing industry. Isopropyl alcohol is about twice as toxic as ethyl alcohol but less toxic than methyl alcohol (Fairhall, 1949). Even though the use of isopropyl alcohol in industrial applications does not present a health hazard, the alcohol vapor produces anesthetic effects in high concentrations. Hence, treatment of these wastes before disposing to the environment is necessary.

For photocatalytic processes, appropriate wavelength of the light and catalysts are needed. Most of semiconductor catalysts suitable for photocatalysis are the oxide or sulfide of metals. In this study, the catalyst used is platinized titanium(IV)oxide with a band gap of 3.0 eV that absorbs light in the range of UV (350-380 nm) or shorter wavelength. In this study, the role of platinum deposited on titanium(IV)oxide was investigated in the sense of enhancing the reaction rate. The form of catalyst used is also important and this is mainly depending on the preparation techniques. Microemulsion technique is a promising technique that can produce very fine particles of catalysts which are good for the photocatalytic process because of their optical functionality (Brus, 1984).

There are so many experimental parameters affecting the rate of reaction in photocatalytic oxidation, for example light intensity, initial concentration of reaction substrate, pH, catalyst dosage, dissolved oxygen, and electrolytes. The effects of initial concentration of isopropyl alcohol, catalyst dosage, initial pH, and dissolved oxygen on the photocatalytic degradation of isopropyl alcohol were determined in this study.