CHAPTER I
INTRODUCTION

Wastewater containing toxic organic chemicals can potentially be hazardous to human health and also to the ecosystem. This wastewater is being discharged into the environment as a result of industrial, agricultural, and domestic activities. Various treatment technologies such as photodegradation, coagulation flocculation, chemical oxidation, biological process, adsorption, etc. are available for the removal of organic compounds from the wastewater. Among various treatment technologies, adsorption technology is currently used widely for the removal of organic compounds from the wastewater. Recently, the removal of organic contaminants using surfactant-modified solid adsorbents has drawn much attention.

Surfactants adsorbed onto the solid surfaces to form micelle-like structure (hemimicelle or admicelle) exhibit hydrophobic environment, so that organic molecules can be incorporated into the surfactant adsorbed layers. This phenomenon is called adsolubilization or surface solubilization (Scamehorn and Harwell, 1988). The adsolubilization has been widely used in many applications such as paints, pharmaceuticals, admicellar polymerization, and admicellar catalysis. In addition, the adsolubilization is also used in wastewater treatment to concentrate and remove organic chemicals. Many research studied the adsolubilization of organic molecules into surfactant adsorbed layers on solid oxide surfaces using cationic, anionic, nonionic surfactant, and also mixed surfactant systems.

In this study, we use polymeric surfactants, polyethylene oxide/polypropylene oxide (PEO/PPO) triblock copolymers, adsorb onto the solid surfaces. Their chemistry is very versatile as the ratio number of ethylene oxide units by number of propylene oxide units, also known as the hydrophilic-lipophilic balance (HLB) can be changed easily. EO/PO triblock copolymers are an important class of surfactant and find widespread industrial application in detergency, dispersion stabilization, foaming, formulation of cosmetic and inks, and pharmaceutical, etc. Many research studied the adsorption of EO/PO triblock copolymer (Shar *et al.*, 1998; 1999) and adsolubilization into EO/PO triblock copolymer adsorbed layer on solid surfaces (Tsurumi *et al.*, 2006). In addition, EO/PO triblock

copolymer can be expected to be environmentally acceptable surfactant with low toxicity.

The purpose of this work was to investigate the adsorption of EO/PO triblock copolymers onto hydrophobic silica and also studied the adsolubilization of various organic compounds into the adsorbed layer of EO/PO triblock copolymers on hydrophobic silica. Many types of EO/PO triblock copolymer, with different HLB values, were used in order to study the influence of HLB values to the adsorption and adsolubilization. In addition, various aromatic organic compounds with different polarity and number of aromatic rings were used to study the influence of the structure of the organic molecule on adsolubilization.