CHAPTER I

INTRODUCTION

Tributyltin (TBT) is the active biocidal component found in a number of popular antifouling hull coatings. It has been accepted that TBT is highly toxic to a wide range of marine biota and possibly recognized as the highest toxic substance introduced deliberately to the ocean (Foale, 1993). The rate of TBT released from antifoulant paint is strongly affect the natural environment. The release depends on the type of paint and the amount of TBT in the paint *per se*. Because TBT-based paints have been shown to be effective and long-lived, their use is consistently increasing in some areas. Nonetheless, their adverse effects on marine species have resulted in strict controls of TBT use in various countries such as France, USA, UK, and others (Hasan&Juma, 1992). TBT has been found to be extremely toxic to various aquatic organisms, particularly the larval and juvenile stages of oysters and fish. Nevertheless, information of TBT toxicity to human is extremely limited.

Nowadays, the potential toxicity of TBT effects on the growth and reproductive success of invertebrates, notably molluscs has been reported. Studies of oysters and dogwhelks have provided evidence of their reduction in number in TBT-contaminated areas. For other species, effects on wild population are largely undocumented or required substantiation (Bryan&Langston, 1992). Many estuarine areas serve as an important nursing and feeding grounds for fish and other organisms are TBT-contaminated. Although TBT and other organotin compounds are not yet widely used in Thailand , farmers in Samutprakarn province used them to kill molluscs in their shrimp grow-out ponds. It was suggested that these substances might retard the growing efficiency of the shrimps. Recently, fish (including *Lates calcalifer*) collected from two markets in Bangkok, Thailand were found to contain TBT residues in the muscle tissue at the concentration between 1.3-13 ng/g (Kannan *et al.*,1995).

Thailand has exported aquatic animals with increase annually in quantity and value. If the aquaculture industries were to maintained their production because of the effects of residual organotin compounds in water, this may cause a significant economic disaster to Thailand (Visoottiviseth, 1993). Studies of TBT residues in aquatic animals from polluted areas, residues in water, cause-effect relationships under field and laboratory conditions are needed in Thailand and other developing countries as aquatic pollution from rapid industrialization may result in detrimental effects on fishery resources.

Sea bass (*Lates calcalifer*) is the fish that extensively use to determine the toxicity of aquatic pollutants. It is easy to culture, widely abundant, commercially and ecologically importance, adequate background information, and represent of the ecosystem that may receive the environmental impact. These make sea bass suitable using as a test organism for this study. The static renewal test-type was used to study the effects of TBT under laboratory conditions in short and long-term period.

Objectives

1. To determine acute toxicity of tributyltin oxide (TBTO) on *L. calcalifer* during 96-hour test.
2. To determine sublethal toxicity of tributyltin oxide (TBTO) on oxygen consumption and growth of *L. calcalifer* during 8-week test.

Anticipated benefits

1. To provide data of acute and sublethal TBT toxicities on *L. calcalifer*.
2. The acute and sublethal toxicity levels can be used as the fundamental datum in evaluating water quality criteria for TBT contaminated areas in Thailand.

Scope of the study

The scope of this study is mainly to determine the effects of short and long-term tributyltin oxide (TBTO) exposure on *L. calcalifer* during 96-hour and 8-week testing periods. The water quality parameters (pH, temperature, dissolved oxygen, salinity, and conductivity) were measured every day and every three days in acute and sublethal toxicity studies, respectively. Moreover, hardness and alkalinity of the reservoir water used in the experiments were also determined periodically. The static renewal test-type was employed for both the acute and sublethal studies. The chemical tested was tributyltin oxide(TBTO). Juvenile sea bass (*L. calcalifer*) aged 45-60 days was used to test against the potential toxic level of TBTO. The experiments were conducted at the Department of Marine Science, Chulalongkorn University.