



CHAPTER I

Introduction

Some heavy metals, namely, copper (Cu), iron (Fe), manganese (Mn), and zinc (Zn) are known as micronutrients as well as toxicants depending on their concentrations in the environment. Generally, Zn is found associated with Cd in ores, rocks and soils because of their geochemical analog properties. The extent may represent potential hazards to plants and/or animals, i.e., both Zn and Ni are considered to be responsible either singly or more likely in combination for phytotoxic effect on crops. Comparing a relative toxicity, Ni is eight times as toxic to plants as the same weight of Zn (Jones and Jarvis, 1981). However, Zn in suitable quantity is essential for plant growth. Cadmium which is not micronutrient can accumulate in food chain. McKenney and Vriesacker (1985) found that Cd contaminated in soils are an effective and specific inhibitor for biological reduction of nitrite (NO_2^-) to nitric oxide (NO). In Thailand, it seems that heavy metals are widely distributed in our environment because of population and industrial growths. Their concentrations are increased by several means, i.e., industrial using and discharge, domestic waste, agricultural practices, and aerial emissions from mobile and stationary sources (Ratanaphaithun, 1983; Plailamoon, 1984). In addition, they are normally accumulated in soils. This is the major route of entry into living tissues of plants, animals and man (Jones and Jarvis, 1981). They are presented in both fixed and available forms. This study is emphasized on soil adsorption and desorption of heavy metals that can reverse into soil solutions. Several factors, for example, cation exchange materials, type and concentration of metals, pH and so on, are influence the two studied reactions.

1.1 The Objectives of the Study

The objectives of this study are as follows;

1. To determine the selective adsorption of each heavy metals, namely, Cd, Ni, and Zn, by 4 Thai soil series (0 - 30 cm. depth).
2. To compare the maximum adsorption capability of each heavy metals by top soils.
3. To study the adsorption and desorption capability of top soils which are treated by varying pH of heavy metal solutions.

1.2 Scope of the Study

Three heavy metals and four Thai soil series are used in this study. The experiments of adsorption and desorption of heavy metals by soils, were carried out in laboratory under the conditions that can be described as follows.

1. According to toxic effect and/or micronutrient supply, three heavy metals are chosen, i.e., Cd, Ni, and Zn. Adsorption performance of these metals are varied with concentration and pH of heavy metals solutions. Desorption performance are varied with pH of solutions only.

2. According to cation exchange materials, top soils of 4 Thai soil series were chosen, i.e., Ban Mi (Bm), Kamphaeng Saen (Ks), Pak Chong (Pc) and Narathiwat (Nw) series. Nw series is organic soil while the others are mineral soil.

1.3 Benefit of the Study

This study may provide available results for some applications as the following.

1. To know the capability of each soil series on selective and maximum adsorption of those metals.

2. To predict the probable performances of Cd, Ni, and Zn when applied to the same soil series,

3. To predict the field dosage which are required to achieve waste disposal or micronutrient supply.