CHAPTER 1 INTRODUCTION

1.1 Background

The cat is a small domesticated carnivorous mammal. It is valued by humans for its friendship and its ability to hunt household pests. Cats have been associated with humans for at least 10,000 years ago. Because of their close relationship with humans, cats are now found almost everywhere on earth [1, 2].

A litter box is one of the necessary devices for cat owners. Other names of the litter box are sand box, litter tray, litter pan, and cat box. It is a device which supports feces and urine of cat, like a human's restroom. Not only does the litter box hold excrement and urine of cat, it also eliminates their odor. Generally, a cat excretes urine about 100 ml/day which contains about 5-7.5 g of urea amount[3, 4].

Cat litter is material in the cat's litter box which is prepared to absorb urine, other excrements and eliminate odor. Previously, cat litter has been made from natural materials such as clay, wood chips, sawdust, sand, peanut shells, rice hulls, pelletized grass, shredded paper and grain fibers. The problems of these materials are low absorbency and lack of odor elimination. Currently, there are four kinds of the most popular raw materials for cat litter which are clay minerals, silica gel, bentonite clay, and bio-degradable materials.

Thailand is an agricultural country so most people in Thailand are agriculturists. Fertilizer is necessary for increasing the quantity and quality of agricultural products. Consequently, Thailand agriculture needs several million tons of fertilizer per year.

In the fertilizer industry, the raw material is phosphoric acid which comes from the reaction of sulfuric acid and phosphate rock. Furthermore, phosphoric acid production generates phosphogypsum as a by-product with about 1.46 grams per 1 gram of phosphate rock. Therefore, the quantity of increased phosphogypsum of each year is several million tons which affects the problem of phosphogypsum treatment. Formerly, excessive phosphogypsum was dropped on water sources or nearby land which caused considerable environment problems.

There are two ways to deal with excessive phosphogypsum, which are land reclamation and value addition. The value addition of phosphogypsum is the best way. There are

many methods to increase the phosphogypsum value such as using it as a chemical raw material, in agriculture applications, in construction material production, in artistic work, and in medicine and dentistry.

In the production of construction materials, phosphogypsum is converted to plaster. The plaster is divided into two types, namely α-hemihydrate calciumsulphate and β-hemihydrate calciumsulphate. β-hemihydrate calciumsulphate or β-plaster is produced from a dry calcinations process. In this process, phosphogypsum is heated at 120-180 °C. Because β-plaster production is not complicated, its production cost is low. Therefore, β-plaster production from phosphogypsum is a good choice to reduce excessive phosphogypsum. Since there is much impurity in phosphogypsum, plaster from phosphogypsum has lower quality than plaster from mineral gypsum. Impurity in phosphogypsum affects strength characteristic and setting time of plaster. Normally, purification of phosphogypsum is roughly divided in to two types, namely physical method and chemical method.

This research presents the study of cat-litter production from phosphogypsum for use as cat's excrement disposal. The main raw material of cat-litter is phosphogypsum in terms of β-plaster and other raw materials which are fiber material such as multi-purpose towel, coir and peanut shell. Other materials are added into plaster in order to increase mechanical properties and adsorption ability. After cat-litter is produced, it will be compared with other commercial cat-litters by testing properties of cat-litter such as density, abrasion resistance, and water adsorption.

1.2 Objective

The objective is to study and compare properties of cat-litter which were produced from β-plaster with paper pulp or with coconut coir. Those properties are density, abrasion resistance and water adsorption

1.3 Scopes of work

1. Study cat-litter production
2. Prepare β-plaster from phosphogypsum by the method of dry calcinations
3. Use extruder to produce cat-litter pellets from β-plaster
4. Use paper pulp and coconut coir as added materials
5. Test 3 physical properties of the obtained cat-litter which are:
   - density
   - abrasion resistance
   - water adsorption

1.4. Expected Results

1. To add value to waste phosphogypsum
2. To manage phosphogypsum which is a by-product from fertilizer industry