

CHAPTER I

INTRODUCTION

The large expansion in the petrochemical industry drove our country toward a new era of economic growth. Thailand has imported the foreign technology at a huge value of foreign exchange especially polymerization catalysis technology. As widely known, the Ziegler-Natta catalysts are the most widely used in the polymerization of propylene. Ziegler-Natta catalyst is a mixture of a metal alkyl of base metal alkyl of groups I to III and a transition metal salt of groups IV to VIII [1,2]. However, without any modifiers, polypropylene obtained had low amount of polypropylene with isotactic structure that was required by plastic industry because of its advantage in physical properties as shown in Table 1.1. Thus, electron donors were applied as catalyst modifier [17,18,24-30,33]. Though electron donors gave high isotactic polymer, it lowered catalyst activity [25,26,29].

This thesis was carried out to study the effect of structure of electron donor in propylene polymerization. Five alkylalkoxysilane compounds at various amount of ethoxy and hydrocarbon groups: tetraethoxysilane, methyltriethoxysilane, dimethyldiethoxysilane, trimethylethoxysilane and phenyltriethoxysilane were used as electron donors in this research.

Table 1.1 Physical Properties of isotactic, syndiotactic, atactic polypropylene [40]

Properties	Isotactic Polypropylene	Syndiotactic Polypropylene	Atactic Polypropylene
Density (g/cm^3)	0.92-0.94	0.89-0.91	0.85-0.90
Solubility in hydrocarbon solvent at 20°C	-	Medium	High
Yield Strength	High	Medium	Low

1.1 THE OBJECTIVES OF THE THESIS

1.1.1. To study techniques and steps of propylene polymerization by supported Ziegler-Natta catalyst.

1.1.2. To determine suitable condition for propylene polymerization by supported Ziegler-Natta catalyst system.

1.1.3. To study the effects of external electron donors on supported Ziegler-Natta catalyst system. The studied effects are the catalyst activity and physical properties of the produced polypropylene .

1.1.4. To characterize polypropylene produced in the experiment.

1.2. THE SCOPE OF THE THESIS

1.2.1 Study the preparation of MgCl_2 supported catalyst and apply to slurry polymerization process.

1.2.2 Determine the suitable condition for propylene polymerization such as Al/Ti ratio, H_2 ratio, pressure, temperature.

1.2.3 Determine the effect of external electron donor on catalyst activity, isospecificity.

1.2.4 Study the properties of polymer obtained from this catalyst.

This thesis consisted of 6 chapters. The objectives and the scope of the thesis were described in Chapter 1. Brief summarization of some other articles and patents covering investigations of olefin polymerization were available in Chapter 2. General consideration of chemistry of Ziegler-Natta catalyst, approached models of active species formation, some effects on catalytic activity, and some aspects of catalytic behavior were mentioned in Chapter 3. The concepts of polymerization, kinetics, mechanisms, and factors that control polymer properties were also included. In Chapter 4 the details about chemicals, equipment, procedures, characterization methods used in this thesis were shown. Result, discussion, conclusion and some recommendations were given in Chapters 5 and 6.