CHAPTER I

INTRODUCTION

1.1 Scientific Retionale [1]

Pigmented inkjet printing is relatively new in the world of inkjet printing. Only since mid-1996 have color pigmented inkjet inks been made commercially available that enable high-resolution process color pigment printing. These initial products were developed primarily for improved light fastness. The main driving force for choosing pigments instead of dyes is the elimination of wet post processing needs for fabric dyeing. Unlike dye, pigment has no reactive group to react with the fiber of fabric, therefore the binder of the ink is the important substance for the adhesion of the ink onto the fiber of the fabric. The various kinds of binder are used for the pigment printing such as latex or emulsion binder, soluble binder with any crosslinking, and radical curing binder. The latex binders were used in this study. The film formation of the ink film occurs by heating that the lattices of the latex coalesce and bind the pigment onto the substrate.

The pigmented inkjet ink needs no bulk thickeners, no impurities and no large particles. The minimum amount of pigment, small pigment particles and the minimum necessary amount of binder are used to allow inkjet to provide the print head reliability required and to give transparent process color on the fabrics. The main problem of inkjet printing on the fabrics is that the very low viscosity of the inkjet ink may give the excess penetration of ink. The most hydrophilic property of the inkjet ink may affect the hydrophilic/hydrophobic property of the fabrics.

1.2 Objectives of the Research Work

1.2.1 To explain effects of the binder systems on the various kinds of the textile fibers.

1.2.2 To explain the properties of printed fabrics by the pigmented inkjet ink in conjunction with the binder systems of ink.

1.3 Scopes of the Research Work

In this research, the focus is to characterize printed fabric of nontreated fabrics: cotton, polyester, cotton/polyester blend, and silk fabrics by aqueous pigmented inkjet system. The nontreated fabrics were used in order to eliminate the effect of pretreatment agent to the ink absorption, the stiffness, and the crockfastness results. The binders used in this study are commercially available and are used in the textile industry as the same binder for pigmented screen inks. The chemical formulations of the pigment dispersions from Fuji Pigment Company and the binders from Shin-Nakamura Co. and Sanyo Chemical Industries are confidential so that their formulations are not thoroughly known theoretically. The next part is the printing on pretreated cotton fabric. The cotton fabric was treated with the aluminum oxide dispersed in poly(vinyl alcohol) solution. The procedures to achieve the objectives as follows:

1.3.1 Preparing the aqueous pigmented inkjet ink with the pigment dispersed by surfactant from Fuji Pigment Company by changing the polymer binders. The binders are the acrylate latex from Shin-Nakamura Co., and the polyurethane latex from Sanyo Chemical Industries.

1.3.2 Printing on nontreatedtreated fabrics by Epson inkjet printer model Stylus 3000

1.3.3 Studying the effect of mechanical stability and water uptake of the polymer binder to the ink ejection

1.3.4 Studying the ink absorption of the various fabrics

1.3.5 Studying the effect of inkjet ink on stiffness of printed fabrics

1.3.6 Studying the effect of different binders of ink on stiffness of fabrics

1.3.7 Studying the effect of different binders on crockfastness of printed fabrics

1.3.8 Studying the effect of crockfastness of printed fabrics

1.3.9 Studying the effect of the aluminum oxide pretreated cotton fabrics on color saturation, and crockfastness

1.4 Contents of the Research Work

This thesis consists of 5 chapters. The first chapter deals with the background, the interest and the scope of this research work. Chapter 2 provides the theory of inkjet printing system, inkjet ink, and textile fibers. Additionally, it includes the literature reviews of previous works that give beneficial information and trend for the work. The experimental in Chapter 3 describes about chemical equipment, apparatus, and procedure in this work. Chapter 4 describes the results and discussion about characteristic of printing, ink properties, stiffness, and crockfastness of printed fabrics. Finally, the summary and suggestion for the future work are in Chapter 5.