CHAPTER I

Introduction

Cotton fabrics have many excellent properties for clothings such as comfortability, moisture absorbency and good ventilation. One of the distinct disadvantage of wearing cotton fabric is that fabric tends to crease, especially after washing. Therefore, ironing is required before use. Nowadays, wrinkle resistant properties can be imparted to the cotton fabric. These can be achieved by the introduction of chemical bond between adjacent cellulosic polymer chains. Theoretically, cellulose can be chemically crosslinked by any polyfunctional reagent capable of reacting with hydroxyl groups of cellulose. The chemistry and technology of crosslinking has been fully licensed. The early work was done with formaldehyde which gives a methylene ether link. The most important aldehydes used as crosslinking agents are the derivatives of N-hydroxymethyl(methylol). These compounds react with cellulose on heating under slightly acid conditions.

Further development of crosslinking agent is concentrated on the formaldehyde-free compounds. The formaldehyde free compounds have been intensively under investigation in order to find less toxic chemicals. The most promisimg compound is based on polycarboxylic acid which first reported by Welch. Welch published work showing that polycarboxylic acids with weak base catalysts provided the same durable press performance as conventional methylol derivatives. Most subsequent researches have centered on 1,2,3,4-Butanetetracarboxylic acid (BTCA). Welch has also proposed that the cellulose crosslinking reaction with BTCA involves the formation of a cyclic acid anhydride which then reacts with the cellulose hydroxyl to form an ester linkage. With the tetrafunctionality of BTCA, this reaction can occur more than once so that a crosslink between cellulose molecules is formed.

It is this crosslink that imparts the properties of durable press, wrinkle recovery and shrinkage control to the cotton cellulose.

The idea of simultaneous dyeing and finishing is quite attractive in terms of cost savings. Normally, easy-care finishing is carried out after dyeing process. The reason is that dyeing of reactive dyes requires basic pH value whilst the easy-care finishes undergo the reaction with cellulose under acidic conditions and in the absence of moisture. However, many attempts to combine two processes into single-step process have been made in order to reduce the production costs. In previous researches, simultaneous dyeing and finishing process concerned the use of N-methylol compounds as well as polycarboxylic compounds as a crosslinking agent and commercial reactive dyes without any modification. The results showed that good color yield could be achieved when reactive dyes containing nucleophilic groups such as amino and hydroxyl groups were used. It was believed that nucleophilic group which attached to aromatic ring of chromophore could undergo reaction with crosslinking agent, leading to high dye fixation. However, the nature of any groups attaching to aromatic ring is found to be quite chemically stable. The efficiency of these groups may be limited to some levels. Another problem encountering the use of these dyes is shade change as a result of crosslinking reaction.

In this research, we investigated the single-step dyeing and finishing process of cotton fabrics using modified reactive dyes and polycarboxylic acid as a crosslinking agent. The modified reactive dye could be obtained from the reaction between commercial reactive dye with ethanolamine. The result of the reaction was the modified reactive dye which contain a hydroxyalkyl group. The hydroxyalkyl group has hydroxyl group attaching an aliphatic residue. The hydroxyalkyl group was designed as nucleophilic reactive group of dye and was believed to exhibit higher reactivity than hydroxyl group which attacks directly to chromophores. Another

problem of simultaneous dyeing and finishing is the precipitating of commercial reactive dye in acidic condition caused the presence of crosslinking agents. In the case of modified dye used in this study, this problem could be reduced because a hydroxyalkyl residue could enhance dye solubility in acidic pH.