CHAPTER I

Introduction

The world's demand for textile continues to grow. The annual consumption of textile fiber rose by 2% in 1995 and that rate of growth is expected to continue[1]. Cotton, the purest form of cellulose, is widely available natural fiber used for textiles. Colouring cotton could be achieved using a variety of dye types including reactive dyes, vat dyes, sulphur dyes and azoic dyes. In recent years, reactive dyes show the greatest growth potential, due to their distinct advantage in terms of capability of forming covalent bond with cellulosic fibers, hence giving dyeing with high wash fastness property. The other reasons are brilliant shades, wide shade range and versatile fairly simple application method. Up to now, approximately 21% of the dyes used around the world for dyeing cellulosic fibers are reactive dyes[2].

The formation of covalent bond between the reactive dye and the fiber is as a result of the reaction of ionized hydroxyl groups on the cellulose and the reactive group of the dye in the presence of alkalis. However in practice, hydroxyl ions present in the dyebath due to the alkaline dyeing conditions compete with the cellulose substrate, resulting in a percentage of hydrolysed dyes which can no longer react with the fiber. Thus between 10 and 50% of the initial dye load will be present in the dyebath effluent, giving rise to highly coloured effluent which is difficult to treat due to the water-soluble nature of the hydrolyzed dyes.[3]

Increased awareness of environmental issued in the dyeing industry has been brought about by public concern. There are ,however, certain environmental problems which may arise from the use of reactive dyes and associated chemicals. The problems occur from using high salt concentration (40 – 100 g/l) [3,4], usually sodium chloride or sodium sulfate, to achieve adequate dye substantivity for the fibers. It is well known that when fibers are immersed in water they develop a negative charge on the fiber

surface. Which is the same as that on the anionic dye. Therefore, the fiber repels the dye, hindering or even preventing its close approach. With most water-soluble anionic dyes (such as direct, reactive dyes etc.), the addition of an electrolyte enhances the attractions by masking the negative charges of the fiber, and the dye uptake is therefore increased. However, high electrolyte concentration of both sodium chloride and sodium sulfate in dyebath discharges are undesirable, as increase salinity in rivers upsets the delicate balance of aquatic flora and fauna [1]. Sodium chloride is a commonly used electrolyte, but the alternative sodium sulfate is even more suspect since it attacks concrete pipes and also has been associated with an increase in total acidity of streams, lakes and rivers [1,4]. Since the environmental issue has been increasingly linked to international trade, producers are inevitably forced to search for environmentally friendly processes. To improve an efficiency of dye uptake of cellulosic fibers, one may consider into three main areas; upgrading the dyeing machinery, selecting the dyestuffs having distinct properties such as high degree of fixation and low amount of salt consumption and finally modifying the cellulosic fibers. Focusing on the latter, the modification of cellulose to improve dyeability is another interesting approach in order to dye modified fibers without the requirement of auxiliaries.

The purpose of this thesis is to combine dyeability modification and preparation processes. Therefore, the author is to investigate the coapplication of dyeability modifying agents and hydrogen peroxide bleaching agent to scoured cotton fabric during preparation process in the presence of sodium hydroxide. Firstly, the modifying agent will be synthesized in our laboratory. Characterization of this compound will be carried out using nuclear magnetic resonance technique (NMR) and elemental analysis. Secondly, the obtained modifying agent will be used to modify cotton fabric in the bleaching bath. Then, the modified fabric will be dyed using commercial reactive dyes without the addition of salts. The dyeing properties including colour strength, the degree of dye fixation and color fastness to light will be evaluated

and compared to those obtained from the dyeing of unmodified fabric under salt dyeing condition.