

**Universiti Teknologi MARA**

**Batik Wastewater Treatment Using Synthetic and  
Natural-based Coagulant**

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## ABSTRACT

Batik industries generate varieties of wastewater from cleaning, processing and dyeing processes. Disposal of the batik wastewater with pH ranges from 4 to 13 could affect an environmental problem due to the high content of dissolved solid and toxic compounds as well as coloured bodies. Nowadays, polymers application is a common industrial practice in wastewater treatment. A coagulant, namely KN1 was developed from a local plant, and employed in a newly treatment system called ALL-IN-ONE CONCEPT (AOC). The AOC wastewater treatment plant was designed to use KN1 in order to meet the requirements of Environmental Quality Act (EQA). The pilot plant is able to chemically and physically treat the batik wastewater in the same reaction tank, hence minimizing the area occupied and modification of the existing batik making apparatus. The treatment started with the coagulation and flocculation process, followed by sedimentation of solid particles finally filtration using specially designed activated carbon column. The most suitable pH for KN1 and hydrochloric acid (HCl) for the coagulation and flocculation process ranges from 1 to 2.5 with 8 x 4 mm non-washing granular activated carbon (GAC). The results show that the average chemical oxygen demand (COD) and biochemical oxygen demand (BOD) reduction were 91 per cent and 72 per cent respectively. The average removal of total solids (TS), total suspended solids (TSS) and volatile suspended solids (TSS) was 99.8 per cent. The turbidity was reduced from 447 NTU to colourless after 50 hours of treatment. Heavy metal constituents show a reduction up to 80 per cent as well as oil and grease constituent. Despite the biodegradable properties, KN1 also shows the non-selectivity in treating batik wastewater compared to other coagulant such as Polyaluminium Chloride (PAC) and Polydadmac (PDMC).

# CHAPTER ONE

## INTRODUCTION

### 1.1 Batik

Malaysian batik is a well-known craft, which has aesthetic sensibilities and a rich textile tradition. It is a symbol of an appreciation as well as impression for old folks. The Malaysian batik textile is one of the most decorative textiles in South East Asia, unique in its designs and colours. Malaysian batik is commonly attire in Malaysia and is worn by both men and women. The Malays, Chinese, Indians and the Natives equally favour it.

The origin of batik can be traced back to Java and it has been known to exist in Indonesia since the 20<sup>th</sup> centuries. The word batik shows an impression of using molten wax by tjanting process called “*cecek*” or “*tritik*”. Batik was introduced in Malaysia in 1913 as a starter in developing small-scale industries. Batik in Malaysia portrays a beautiful Malaysian culture through the motives and patterns applied onto a piece of cloth (Wan Ahmad and Salleh, 1991).

Batik is a piece of woven cloth decorated with designs which employs wax as a technique of preventing the dye from penetrating into the waxed area of the cloth during the dyeing process (Anney, 1987). This technique provides an unlimited range of design possibilities and artistic freedom since the source of patterns depends on actual drawings. *Batik Cap* (Block print batik) and *Batik Tulis* (Hand drawn/ printed batik) are two processes that represent the art of batik making. Except for the technique of using wax as the resist substance, these two processes are quite different from one another. A high level of skill and artistic sense is required to produce a yardage of high quality batik fabric.

Block printed batik is produced using an aluminium or brass block pattern. The pattern is transferred onto the fabric via a certain medium that will stop or resist the dye action. This process is also known as resist style or discharge style. The resist elements are eliminated after the dyeing process. The female