

**UNIVERSITI TEKNOLOGI MARA**

**FABRICATION OF MOLYBDENUM  
(IV) SULFIDE – ZEOLITIC  
IMIDAZOLE FRAMEWORK-8 ( $\text{MOs}_2$   
– ZIF-8) MEMBRANES SUPPORTED  
ONTO ALUMINA SUBSTRATES FOR  
DYE TREATMENT IN  
WASTEWATER**

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## ABSTRACT

In order for treatment of dye content in wastewater the research was studied using a method of membrane filtration technique. Instead of using conventional technology, membrane can withstand highly reactive solutions at various operating conditions. Composite membrane used with the combination of Molybdenum (IV) Sulfide and Zeolitic Imidazole Framework-8 ( $\text{MoS}_2$  – ZIF-8) was prepared using simple vacuum filtration technique. This membrane prepared undergoes two tests which are membrane test and adsorbent test. The concentration of methylene blue dye inlet and outlet was observed throughout the test. Two parameters observed which are contact time and concentration. Concentration of dye were varied for 10 mg/L, 20 mg/L and 30 mg/L. Compare for all three concentration, 30 mg/L of dye concentration seems produced highest efficiency of dye removal. This can be concluded that the higher the concentration the higher the efficiency of dye removal. Besides, the contact time were observed for every 10 minutes for 1 hour at three different suggested pressure 0.5 bar, 1.0 bar and 1.5 bar. The optimum contact time was observed at lowest pressure 0.5 bar with highest concentration of methylene blue dye solution.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Research Background

Water acts as a main source for a human being and all living things. It is also basic fundamental which purposely to maintain the ecosystem. But nowadays, there a lot of case regarding the water source availability and accessibility which most of the case about the contaminated water supply. Residence area which located nearby the industrial processing company was the most affected area. In order to prevent this problem from widely occurs in the future many strategies has been suggested by the governance of the water sector that follow based on Integrated Water Sources Management where it is the way for the environment and development sustainability (Chan, 2009). In spite of this problem, many of the people lack of safe drinking water supply which unexpectedly threat their health. Constantly discharge of undesired components in water will make all this problem worst. Pollutant which presence in the water also includes release of dye from textile industry which make it physically contaminate (Ghangrekar and Chatterjee, 2018).

Dye is commonly use worldwide as the main components to generate colour. Basically, most industries such as paper and pulp mills, dye manufacturing industries, textile and food companies apply dye as the main composition in order to get complete process production to produce desired products (Püntener *et al.*, 2003). Paint is one of the products produce from dyes and pigments extraction. Generally, pigments are coloured, colourless or fluorescent whether organic or inorganic insoluble in application. While dyes are actually coloured substances which soluble or undergoes adsorption process into the solution during the application. Dyes can be categorized into two types such as natural dyes and synthetic dyes. Synthetic dyes was based on compound from petroleum while natural dyes obtained from natural sources (Gürses *et al.*, 2016).

Dyes produce from industrial waste usually may cause harm to health and also environment. However, there is no any proof yet regarding most of dye present in textile dyeing risk to human health at high level exposure of the workers especially for factory workers. Long-term exposure unexpectedly can be more hazardous to health and this