UNIVERSITI TEKNOLOGI MARA

DIRECT PLANT-SURFACTANT BASED IMPREGNATED ACTIVATED CARBON FOR ADSORPTION OF REACTIVE DYE

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ABSTRACT

In textile industry, there is major problem concerning colour effluent in ‘excess with serious consequences to human health and environment. In this work, surfactant impregnated activated carbon has been chosen as the adsorbent in the adsorption process. The aim of this study is to characterized of critical micelle concentration (CMC) of plant-based surfactant and activated carbon and to investigate the direct impregnation plant-based surfactant on activated carbon. The suspension was prepared by using direct impregnated plant based surfactant method. The best reacting condition was found to be at 125 mg/L surfactant loading with 88.56% of RB4 removal efficiency. Moreover, the ideal temperature for process was found to be at 40°C with highest percentage of removal at rate 52.84% and pH value was at pH 7 with 98.41% removal.

Keywords: surfactant, reactive dye, impregnation, activated carbon, adsorption

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INTRODUCTION

1.1 RESEARCH BACKGROUND

Water pollution often be a major topic of media in many countries around the world, especially developing countries. There are several sources that contributed to water pollution in most developing countries which are sewage treatment, manufacturing, agro-based industries, animal farms, agricultural activities and surface runoffs. According to Wang and Yang (2016), country faced problem an increase in health risk consequent from water pollution. Moreover, there are millions of people suffered from water pollution; about 190 million people suffered from illness and 60,000 people death because of diseases and certain sickness which related to water pollution every year. Generally, the largest polluters in the world is from textile industry which is estimated almost 20% of global industrial water pollution comes from the treatment and dyeing of textiles ("Water Pollution", 2012). It is because textile dyeing industry consumed high amount of water, thus generates enormous amount of coloured effluent which contain high COD and inorganic loads, making it one of the main sources of water pollution worldwide (Yang, Li, Shi, Long, & Li, 2015). In addition, Hemachandra and Pathiratne (2016) stated that textile effluent also consists of other mixture of chemicals such as dyes and heavy metals depending on the raw materials used and the product produced. The aquatic life and photosynthetic activity in aquatic habitats might be affected with the presence of aromatics, chlorides, metals and other toxic compounds in the effluent dye (Gajera, Bambharolia, Hirpara, Patel, & Golakiya, 2015). In textile and dyeing industry wastewater, dye pollutants represent one of the major environmental problems. According to Rosa, Fileti, Tambourgi, and Santana (2015), during the textile dyeing process, approximately 10-60% of reactive dyes are lost which lead to the high amount of coloured effluent produced.

Currently, dyes are important and widely used in industry such as leather tanning, manufacturing, paper, cosmetics, pharmaceutical industries and food processing (Nabil, El-Mallah, & Mahmoud, 2014). Dye or also known as pigment are molecules for colour-giving that contains chromophores and auxochromes; the function of auxochromes is to intensify the colour of the dye (Su, Low, Teng, & Wong, 2016).