ENHANCED COAGULATION OF HUMIC ACID USING POWDERED ACTIVATED CARBON WITH POLYALUMINIUM CHLORIDE

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ABSTRACT

This study aimed to determine the optimization conditions for powdered activated carbon as an enhancer of humic acid coagulation in water with polyaluminium chloride (PAC) as a coagulant. This is because powdered activated carbon helps in a better result to remove of natural organic matter (NOM) with its adsorption qualities. This study focused on the effect of powdered activated carbon dosage to the coagulation of humic acid, the effect of pH to the coagulation of humic acid and effect of volume on the coagulation of humic acid. Appearance colour (Pt CO), true colour (Pt CO) and total suspended solids (mg/L) are taken by using jar test. The optimum dosage of powdered activated carbon for humic acid coagulation is 40 mg and the optimal pH for humic acid coagulation is pH 7 since it shows the highest percentage of humic acid removal, by using 1 mL polyaluminium chloride as a coagulant and 40 mg powdered activated carbon as an enhancer. The optimum volume in this study was 600 mL, by mixing 40 mg of powdered activated carbon with 1 mL of coagulant in test water at pH 7.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Water is usually the most important of all-natural resources. Water supplies and quality are critical to human survival, the ecological environment, and economic and regional. Water quality is also inextricably linked to human health and long-term socioeconomic growth. Pollutants, particularly trace elements, enter the aquatic water systems because of increased anthropogenic activities as most agricultural water use comes from groundwater sources that cause harm to humans. In addition, the strong development of industrial companies, has increased industrial wastewater emissions and because of incomplete disposal, increased emissions to sewage treatments plants (Tong et al., 2021). Therefore, many pollutants such as heavy metals, refractory organic matter, and pathogens coexist in wastewater. While wastewater recovery is a promising solution to increase the pressure on water resources.

In addition, water scarcity worsened by climate change, population growth, and industrialization is accelerating the use of alternative water sources, such as desalination of seawater recovery and reusing wastewater. Water pollutants, especially trace elements, invade aquatic ecosystems and the human body through drinking water routes. Some metals are non-degradable, persistent, and toxic, and the accumulation of these metals in the aquatic environment adversely affects human health and ecosystem safety. Humic acid is one of the essential polymeric organic substances in soil, sediments, and groundwater. Unique carbonyl C=O and aromatic C=C stretches play an essential role in the chemical adsorption of metal ions (Zhao et al., 2021). Humic acid is also the main component of soluble