REMOVAL OF MICROPLASTICS IN COAGULATION-FLOCCULATION USING POLYGLUTAMIC ACID

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ABSTRACT

For the past decades, the studies on microplastics have rose dramatically since their adverse impacts and ubiquity on human health and environment has become the major concern. This study will provide the reader with the optimum parameter of polyglutamic acid as coagulant to remove microplastic from aqueous. The polyglutamic acid is safe for both humans and the environment because it is non-toxic, biodegradable, and biocompatible. It has been used as a coagulant agent in the environmental field due to its unique properties. Besides that, the data obtained from experiment will be supported with DLVO Theory to answer both objectives, which is to determine the optimum parameter of polyglutamic acid as coagulant to remove microplastic from aqueous and predict the critical coagulation condition for microplastic removal based on DLVO Theory. There are two important parts in this study, which is the experimental procedure and mathematical modelling of polyethylene. During experimental procedure, the jar test has been done to determine of optimum dosage of coagulant, and the optimum pH value in optimum dosage of coagulant. The usage of polyglutamic acid as coagulant was tested in this study. On the other hand, polyethylene is chosen among all types of microplastic as the contaminant. According to Baiwen et al., polyethylene is chosen since it is the main constituent of microplastic found on the surface water and it is easy to float in water [1]. Meanwhile, the second parts of this study are involving the mathematical modelling of polyethylene using MATLAB simulation to predict the critical coagulation concentration. The result obtained from the mathematical modelling will be used to support the experimental data. From results of the studies that were carried out, it is possible to draw the conclusion that the presence of coagulant aids may in fact be able to successfully enhance removal performance. In conclusion, the optimum parameter of the polyglutamic acid as coagulant is at 8 ppm and pH 1. However, the pH must be raised back to neutral to avoid any damage towards the living cells. Moreover, the critical coagulation concentration can be predicted using DLVO theory and the result obtained from the polyethylene modelling using DLVO theory matched the experimental results, which is at 8 ppm dosage of PGA in pH 1. Thus, it can be concluded that both objectives of this study were successfully achieved.