SIIC050

THE EFFECT OF pH AND DOSAGE COAGULANTS TO OPTIMISE PERFORMANCE OF SELECTED NATURAL AND CHEMICAL COAGULANTS IN WASTEWATER: A COMPARATIVE STUDIES

Nurul Huda Binti Noor Muhammad[1], Ainnie Rahayu Binti Abdullah[2] and Dr. Norain Binti Isa[3]
[1,3]Faculty of Chemical Engineering, Universiti Teknologi MARA Pulau Pinang, 13500 Permatang Pauh, Pulau Pinang Malaysia
[2] Faculty of Applied Science, Universiti Teknologi MARA Pulau Pinang, 13500 Permatang Pauh, Pulau Pinang Malaysia

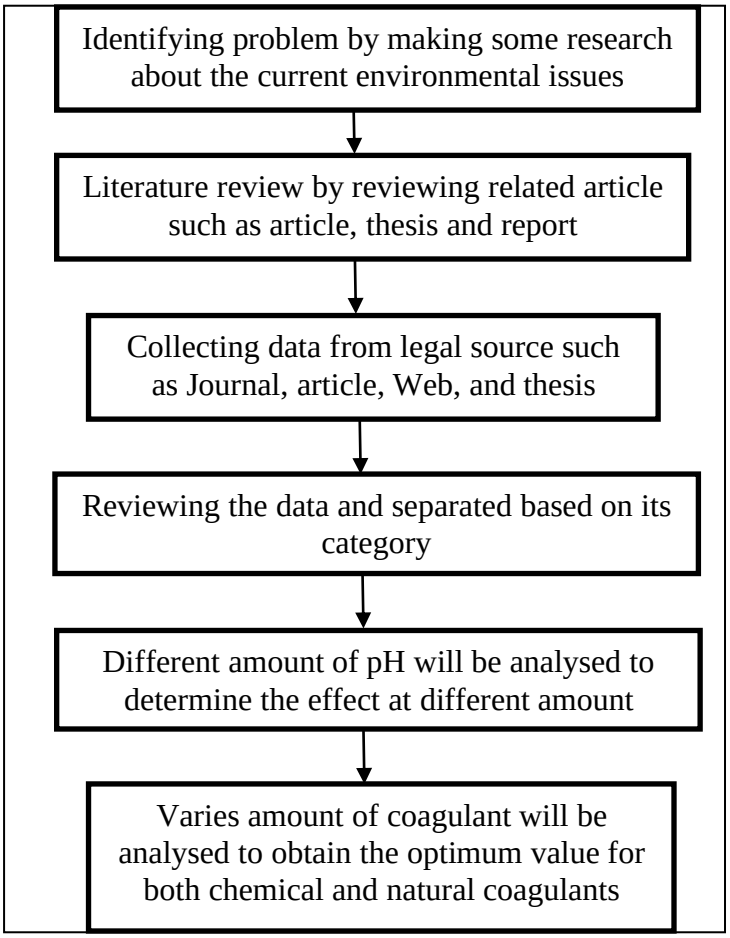
**Corresponding author: [2]ainnie153@ uitm.edu.my*

Abstract:
Developing countries and third world countries are facing potable water supply problems because of inadequate financial resources. The cost of the water treatment process might be higher due to the unsuitable parameter used during the coagulation, flocculation and sedimentation process. Therefore, this study was conducted to determine the effect of the pH and coagulant dosage of turbidity in wastewater and to determine the optimum pH and dosage of the selected natural and chemical coagulants. Methodology of this comparative study includes identifying problem, literature reviewing, collecting data, reviewing data, analyzing parameter and discussion. As a finding for the natural coagulants, the best pH was at 7-7-5 since the better result of colloidal particle occur at neutral condition. Among seven natural coagulant, Orange Peels has a better result among the other six coagulants. It is because the colloidal particle can be further stabilized and lead to floc growth at neutral condition. Polyaluminium Chloride (PAC) shows the better result for the chemical coagulant since its pH at 7, dosage coagulant required at 19 mg/L with removal efficiency at 90.5%. Higher dosage in chemical coagulant can result higher in sludge volume. Thus, PAC shows the better performance for the chemical coagulant since it optimum condition shows the better ones compared to other chemical coagulants.
***Keywords*:**
pH, dosage coagulant, coagulant performance, wastewater

Objectives:

- To determine the effect of pH and coagulant dosage of turbidity in wastewater
- To determine the optimum pH and coagulant dosage of the selected natural and chemical coagulant

Methodology:



Results:

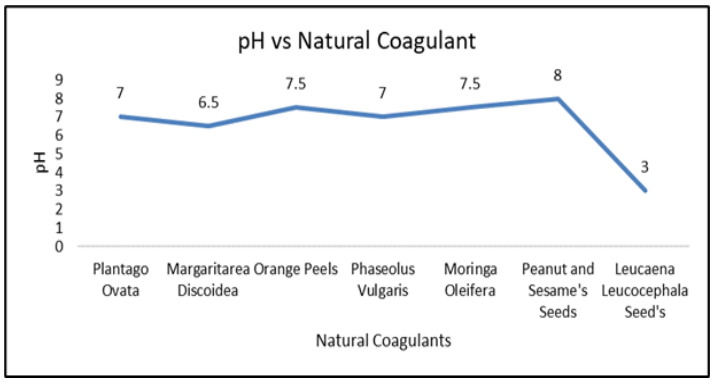


Figure 1: Graph pH vs Natural Coagulant

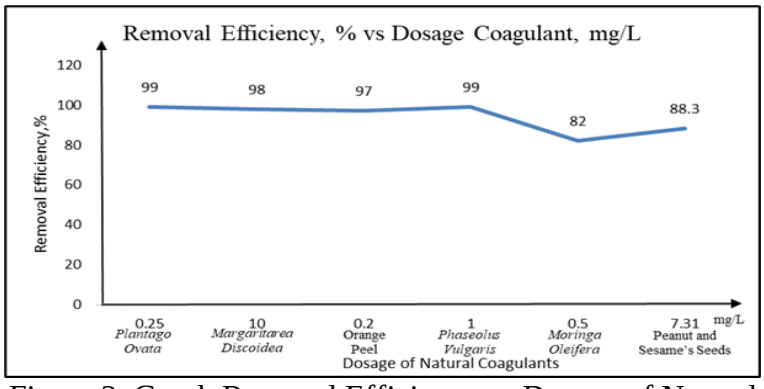


Figure 2: Graph Removal Efficiency vs Dosage of Natural Coagulant

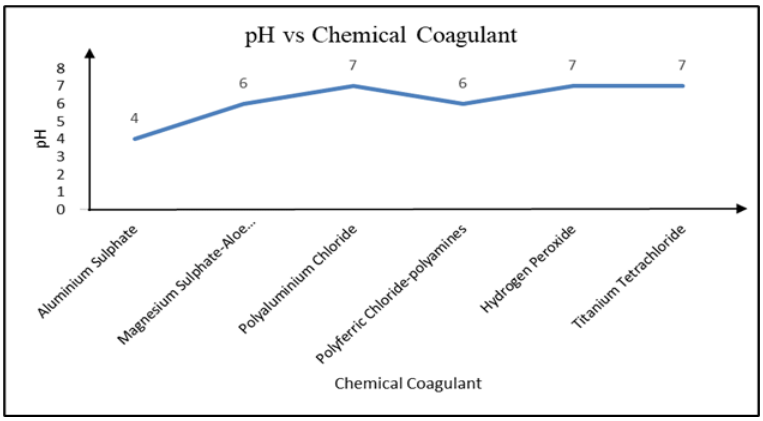


Figure 3: Graph pH vs Chemical Coagulant

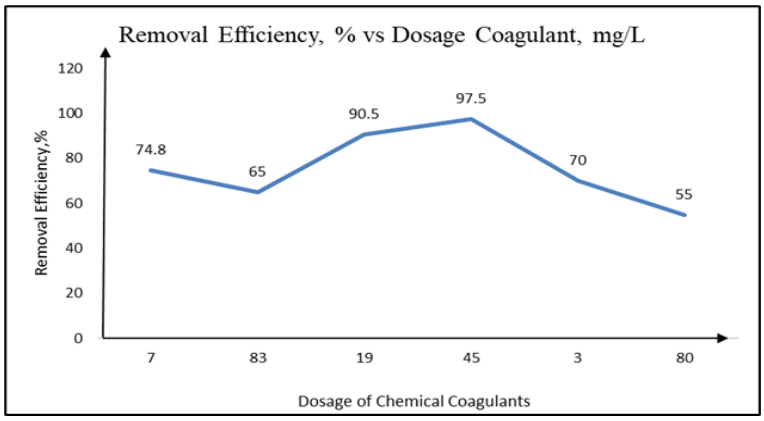


Figure 4: Graph Removal Efficiency vs Dosage of Chemical Coagulant

Conclusion:

As a conclusion, this study focused on the effect of pH and dosage coagulants to optimize the performance of the selected natural and chemical coagulant in wastewater. The selected natural coagulants are *Plantago Ovata*, *Margaritarea Discoidea*, Orange Peels, *Phaseolus Vulgaris*, *Moringa Oleifera*, Peanut and Sesame's Seed and *Leucaena Leucocephala*'s Seeds. After reviewing these coagulants, it was found that most of the natural coagulant has optimum condition at pH 7-7.5. Other than that, the pH was at 3, 6.5 and 8 for *Leucaena Leucocephala*'s Seeds, *Margaritarea Discoidea* and Peanut and Sesame's Seeds respectively. These natural coagulants showed their high removal efficiency at these pH condition. However, the turbidity in the wastewater still can occur at pH condition in range 4-8.For the chemical coagulant, most of the pH value shows their best performance at pH 7. Proven by the pH of Polyaluminium Chloride, Hydrogen Peroxide and Titanium Tetrachloride. An optimum pH can affect the performance of the coagulant during the coagulation, flocculation and sedimentation process. Through this study, it found that an optimum pH for chemical and natural coagulant was in range 7-7.5 because the neutral charge of the mechanism can play more significant effect of the turbidity removal. In addition, the amount of H+ and OH- also affect the process since it occurred in aqueous phase. Neutral pH also can deliver to further stabilize and lead to floc growth. Dosage coagulant also can affect the performance of the coagulant in wastewater. An excess of dosage coagulant can increase the volume of the sludge especially for the chemical coagulant. Lower in dosage coagulant also can affect the better result of the removal turbidity. An optimum dosage with lower amount with higher in efficiency is recommended since it can save the cost of the process. For the natural coagulant, Orange Peel shows the best coagulant since the removal efficiency at 97% by using the amount of coagulant at 0.2 mg/L. Meanwhile, for the chemical coagulant, the best coagulant is polyaluminium chloride since its removal efficiency at 90.5% and the amount of dosage used at 19 mg/L. Orange Peels and Polyaluminium Chloride shows the best performance in treating dairy wastewater and municipal wastewater respectively. Based on the effectiveness, chemical coagulant can become the best coagulant since natural coagulant required higher dosage and less effectiveness compared to chemical coagulant. However, natural coagulant may become the most preferable since is safer to use and less cost required.