

COMPARISON OF FEW NATURAL AND SYNTHETIC COAGULANTS FOR THEIR COST EFFECTIVENESS AND TREATMENT EFFICIENCY

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Clear appearance is one of the characteristic features of safe drinking water. Removal of colour and turbidity gives clear appearance to water. Production of clear drinking water from most raw water sources involves use of coagulant to remove turbidity. There are a number of substances that are available for treating turbidity, while some effective natural flocculating agent, providing a low-cost household solution to the critical need for potable water in rural riparian communities. The objective of this study was to determine the optimum conditions of efficient turbidity removal of three conventional coagulants, Ferric chloride (FeCl_3), Poly Aluminium chloride (PACL) and Aluminiumsulphate (ALUM, $\text{Al}_2(\text{SO}_4)_3 \cdot x\text{H}_2\text{O}$) and three natural vegetable coagulants, Moringa (*M. oleifera*) seeds, Nirmali (*S. potatorum*) seeds and Cow Peas; and also to compare the cost effectiveness and treatment efficiency of natural coagulants. The influence of pH and coagulant dosages on the coagulation process was studied where the conditions were optimized corresponding to the best removal of turbidity. To obtain the optimum dose of the coagulant, jar tests were conducted over the various coagulant sample ranges. To investigate the optimum pH for coagulation process, the above procedure was repeated over the range 5 to 7 pH values of the raw water. The optimum pH for PACL, Alum, FeCl_3 , Moringa, Nirmali and Cowpea were 6.0, 6.5, 6.5, 5.5, 5.5 and 6.5 respectively and the optimum coagulant dosages of PACL, Alum, FeCl_3 , Moringa, Nirmali and Cowpea were 20 ml (0.2 g), 40 ml (0.8 g), 40 ml (0.4 g), 80 ml (1.6 g), 80 ml (0.8 g) and 40 g respectively for 500 ml raw water. Of the materials tested, alum showed the highest turbidity removal efficiency. Higher dosages did not significantly increase turbidity removal and were not economical.

Keywords: Coagulation flocculation, optimum coagulant dosage, optimum pH, conventional and natural coagulants