



**Faculty of Engineering**  
**Department of Environmental Engineering**

**"Utilization OF Agricultural Waste for Treating Waste  
Water from Food Industries"**

**A THESIS**

Submitted to the Faculty of Engineering, Helwan University  
In Partial Fulfillment of the Requirements of  
The Degree of Doctor of Philosophy of  
**Environmental Engineering**

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2021

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## ABSTRACT

Increase in environmental awareness at few last decades raises the interest of applying natural coagulants as an alternative to chemical ones.

In developing countries and in Egypt in particular, industrial water treatment is usually neglected. One of the reasons causes facilities avoiding treating industrial effluent is the high cost of chemicals used in treatment process. Beside high cost, chemicals used in water treatment plants are environmentally suspicious with issues related to disposal.

Coagulation and disinfection abilities of pomegranate peels aqueous extract were assessed in current work. Jar test procedures and desk well diffusion method was used in these purposes. Parameters affecting coagulation process were evaluated and optimized. Total suspended solid removal efficiency was the parameter used in evaluating treatment process effectiveness. Tests were performed using standard methods.

The results of this work revealed that pomegranate peels aqueous ex has great potentials as natural coagulant in cheese industry effluent treatment. Furthermore, sludge produced from treatment process using pomegranate peels extract was compared to that produced of using aluminum sulfate. Studying rheological properties of flocs using a Brookfield rheometer showed that the use of peels as coagulant produced sludge with less attendance for pipe blocking and slightly more compact than Aluminum sulfates sludge.

pH value of treated water using the bio coagulant remained largely unaffected after treatment contrary to that of Alum treated water.

Coagulation mechanism in both bio coagulant and alum was studied. Results revealed that in case of bio coagulant bridging and adsorption mechanism is the weighted hypothesis to explain the process. In case of alum, charge neutralization is the most likely mechanism. Bacterial inactivation was also notable, applying pomegranate peels extract on E-coli, Staphylococcus aureus and total coliform leads to formation of satisfied inhibition zone at lower concentrations compared to Alum solution.

*Keywords: Extraction, Polyphenolic compounds, Pomegranate peels, Cheese processing waste water, Natural coagulants.*