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# TREATMENT OF SUSPENSION MATTER USING PAPAYA SEEDS AS A BIOFLOCCULANT

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## ABSTRACT

*Liquid effluent treatment becomes a necessity because of the big need of water; different physic-chemical treatments were developed but their low cost and great negative impact on environment encourage scientists to search bio-products using environmentally processes. A new approach based on epuration ability by using plants can be used now. In this context we suggest effluent treatment on the basis of a new bio-flocculating extracts of plant waste. Effluent treatment by plant waste can be an economic and innovative solution to waste recovery. In this study we have tested the flocculating ability of the papaya seeds as a new bio-flocculating plant waste extracts, the work involves the evaluation of pH, dosage of flocculant, and time on the suspension matter flocculation. Experimental result of turbidity before and after treatment shows that our extract has significant effect on removing and eliminating the suspension matter.*

**KEY WORDS:** *Flocculation, Suspension matter, papaya seeds, Turbidity.*

## 1. INTRODUCTION

Suspension matter in water is a major problem concern in global pollution management. They affect the appreciation of water due to clarity, photosynthesis, and poor oxygen environment rendering water unsuitable for aquatic animals. Coagulation flocculation is one of the suitable processes thanks to its facility and rapidity.

Nowadays, Flocculants have been generally used in tap water production, wastewater treatment (Zhang et al., 1999; Salehizadeh and Shojaosadati, 2001). Despite the efficiency of these chemical flocculants, their use has resulted various health and environmental problems as: the incidence of Alzheimer's disease (Christopher et al., 2006), in addition the no biodegradability in nature. The choice of adopting bio-flocculation method using bio-flocculants depends on the possibility of using different plants or waste to synthesize substances with different compositions.

In this paper we evaluated the flocculation power of kaolin suspension as a representative colloidal material using papaya seed as a bio-flocculant, and studied the effect of several parameters influencing the flocculation process; the experimental results were very encouraging.

## 2. MATERIAL AND METHODS:

The waste of the plant were collected during the month March washed several times , dried in oven at 75 ° C (24h), and then ground .The ground material is mixed with distilled water heated to reflux (1h) and then filtered. The treatment of the Kaolin suspension matter solutions of 100ppm were made by a physic-chemical process: coagulation flocculation using the Jar –test system (Fig.1).

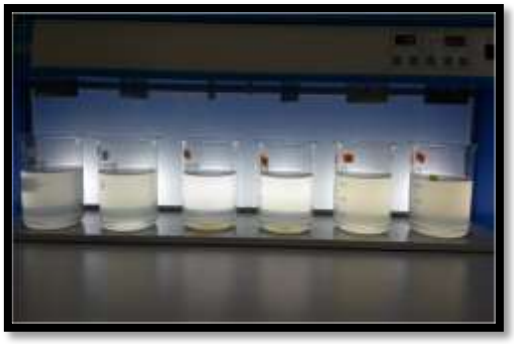

**Figure 1: Jar test system for suspension matter elimination**

The pH is adjusted with a multi- parameter C Consort 3040 using NaOH and HCl (0.1N) at 120RPM, after pH adjustment: the flocculation step by adding different doses of biofloculant at 40RPM, the last step is decantation in 60min, and then the supernatant was analyzed by a brand HANNA turbidity.

## 3. Results and discussions:

### 3.1. Effect of pH:

One of the most parameters influencing the flocculation process is the solution pH. The flocculation tests were performed using papaya seeds extract as a bio-flocculant (Fig.2) at different pH, the turbidity of the supernatant samples of each beaker was measured after 30min of decantation. The Fig.2 demonstrated that the turbidity decrease with the increase of pH, and the adequate pH solution for Kaolin flocculation is 10, this could be as a result of increasing electrostatic attraction between clay and flocculant charges.

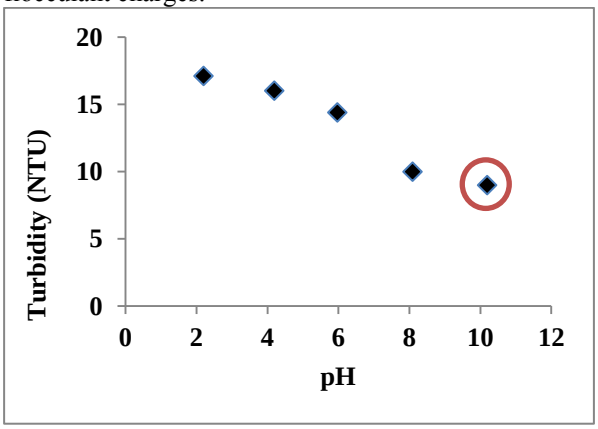


**Figure 2: Evolution of turbidity as a function pH solution (V=500mL, Dose= 1mL of the flocculant, time=60min)**

In case of high pH superior to 10, both kaolinite and our bio-flocculant are negatively charged and therefore the electrostatic repulsion exists, which indicates a lower flocculation capacity (Laylor et al., 2002).

### 3.2. Effect of flocculant dose

Determination of the suitable dose of flocculant is one of the most important steps in flocculation process, so different doses of our bio-flocculant were added to a beaker containing 500mL of Kaolin suspension matter, the Fig.3 shows the turbidity evolution as a function of flocculant dose

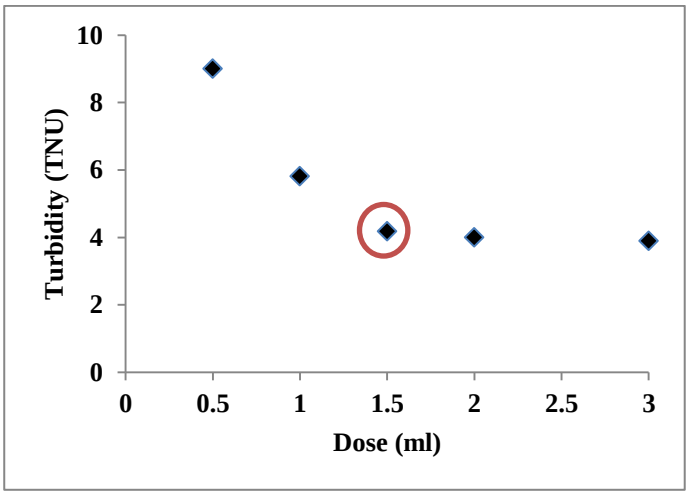


**Figure 3: Effect of the flocculant dose Kaolin flocculation (pH=10, V=500mL, time=60min)**

It's shown that the increasing of the flocculant dose decrease the turbidity, and jut a dose of 1.5ml was sufficient to eliminate the totally of Kaolin and obtained after decantation a low turbidity of 5TNU

### 3.3. Effect of flocculation time:

Flocculation time is essential parameter for the wastewater treatment, in this study the flocculation time was varied from 5 to 60 min (Fig.4)

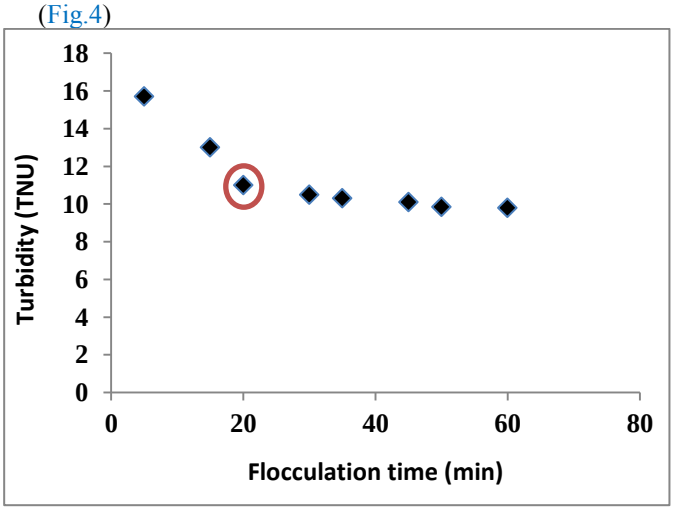


**Figure 4: Effect of flocculation time on Kaolin flocculation (pH=10, V=500mL, Dose=1.5mL of the flocculant**).

The Fig.4 shows that increasing time between 5 to 20min decreases the turbidity from 16 to 9 NTU, after there is any significant change in the elimination of the suspension matter.

## 4. CONCLUSION

At the end of this work, we used the papaya seeds as a natural flocculant for the treatment of Kaolin synthetic wastewater. According to the results obtained during this study, we can draw the following conclusions:

- The flocculation using a bio product is very efficient to treat the suspension matter.
- The optimal flocculating conditions are pH=10, flocculant dose 3mL/L, and the flocculation time 20min.

Furthermore, the characterization of the bio-flocculant is necessary to explain the encouraging results.

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