Removal of Turbidty from Turbid Water by Bio-cogulant Prepared from Walnut Shell

Mohammad Siddique[1], Suhail Ahmed Soomro[2], Shaheen Aziz[2], Abdul Sattar Jatoi[2], Abdullah Mengal[3], Hidayatullah Mahar[4]

[1]Department of Chemical Engineering, Balochistan University of Information Technology, Engineering & Management Sciences, Pakistan, [2]Department of Chemical Engineering, Mehran University of Engineering and Technology, Jamshoro, Pakistan, [3]Department of Mechanical Engineering, Balochistan University of Engineering and Technology, Khuzdar, Pakistan, [4]Department of Chemical Engineering, National Fertilizer Corporation Institute of Engineering and Technology, Multan, Pakistan

Abstract

Problem facing by people regarding drinking water is one of major issue and to be rectified. Walnut (Juglans regia) is one of the most important fruit in Pakistan. Pakistan is ranked 24th in production of walnuts in the world, about 2128 tons per annum were generated as a waste This high quantity of walnut shell should be used for some useful work. Apart from this Water contains impurities of dissolved and suspended solids, Calcium bicarbonate, magnesium bi carbonate, magnesium sulfate, calcium sulfate, wastewater discharge, chemical contamination that may be organic or inorganic, fast population growth, use of energy generation of waste from industrial and domestic wastes, corrosion of water pipe lines and industrial waste. Water contains humid and folic acid which gives them a yellowish tinge on this behalf study was made to investigate the low cost bio-coagulant prepared from walnut shell. By utilizing 30mg/l of coagulant dose give a maximum turbidity removal up to 83% and for utilizing 50 µm mesh size turbidity removal up to 82%. Walnut had potential to remove turbidity from water by utilizing different mesh size and pH ranges.

Key words: bio-coagulant; walnut shell; mesh size; pH; turbidity

Corresponding author's email: *siddiqnasar786@gmail.com*

INTRODUCTION

Water is undoubtedly the most vital parameter among the natural resources. Turbidity imparts a enormous problem in waste water treatment (Madhavi and Rajkumar, 2013). Contamination of water with unwanted particles is a challenging problem for maintaining the quality and hygiene of water. Banana peels, the fruit waste were used to prepare environment benign bio-adsorbent for the adsorption of impurities from aqueous solution (Singhal et al., 2014). Now a day due to rapid industrialization even in rural areas, water become contaminated. Presently there are no appropriate low cost methods available for removal of water contaminants from drinking water. There are a variety of purification methods of drinking water which are very costly and those methods cannot serve a common man effectively. These natural coagulants, when used for treatment of waters with low-to-medium turbidity range (50–500 NTU), are comparable to their chemical counterparts in terms of treatment efficiency (Vijayaraghavan et al., 2011). Developing countries and third world countries are facing potable water supply problems because of inadequate financial resources. The cost of water treatment is increasing and the quality of river water is not stable due to suspended and colloidal particle load caused by land development and high storm runoff during the rainy seasons especially in a country like Malaysia. During the rainy seasons the turbidity level increases and the need for water treatment chemicals increase as well, which leads to high cost of treatment which the water treatment companies cannot sustain. As a result, the drinking water that reaches the consumer is not properly treated (Ali et al., 2009). Natural coagulants have been used for domestic household for centuries in traditional water treatment in tropical rural areas. Some reports describe natural coagulants from Nirmali seed and maize (Kumar et al., 2002)mesquite bean and Cactus latifaria (Diaz et al., 1999), and Maringa Oleifera seeds(Ndabigengesere and Narasiah 1998). The main advantages of using natural plant-based coagulants as water treatment material are apparent; they are cost-effective, unlikely to produce treated water with extreme pH and highly biodegradable. Naturally occurring coagulants are usually presumed safe for human health (Yin, 2010)

In this work bio-coagulant were developed from walnut shell to observe the potential for turbidity removal.

MATERIALS AND METHODS

Walnut shells were collected from local market of Quetta city. Kaolin powders were used to prepared turbid water for treatment.

Figure 1: Walnut shell

Preparation of coagulant from walnut shell

Walnut shell were washed with distil water and then dried at room temp 24c and then grinded for decreasing size of Walnut shell, sieving were done to make required mesh size for developing bio-coagulant. In fig 01 it is clear from figure methodology for carryout experimental setup.

Preparation of Turbid Water

Turbid water was made by using kaolin powder from 10-20g/l of water. Then checked by using turbidity meter in order to find the suitability of coagulant.

Treatment of Turbid Water with Bio-coagulant Prepared from Walnut Shell

Bio-coagulant was used to treat the turbid water using different dosage prepared from walnut shell. Walnut is one of the economical sources for treatment of turbid water.

RESULTS AND DISCUSSION

Effect of Mesh Size on Removal of Turbidity and pH

Experiments were carried out using different mesh size of walnut bio-coagulant for removal of turbidity from turbid water. In fig 2, 3&4 mesh size 30 40 50 were used to investigate the effect of mesh size on removal of turbidity. The maximum removal of turbidity at 50µm using 25mg/l about 82%, at 40µm and 30µm about.

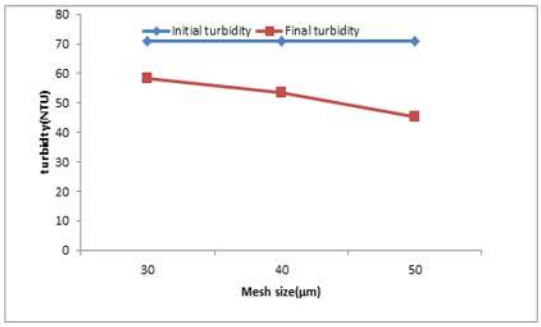

Figure 2: Effect of mesh size of coagulant on turbidity removal

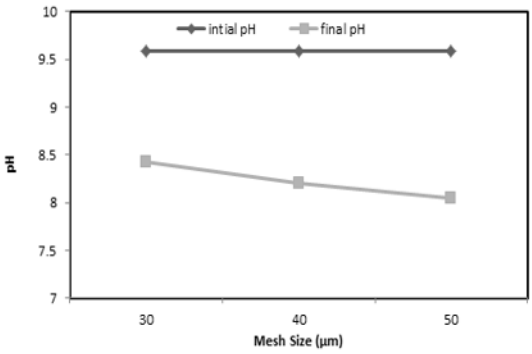

Figure 3: Effect of mesh size of coagulant on pH

Effect of Bio-coagulant Dosage on Turbidity from Water

Different dose of bio-coagulant were used to investigate the optimize condition for effective removal of turbidity from turbid water. From 15 -40mg/l were used, the maximum turbidity removed at 35mg/l. as shown in fig 04 the minimum turbidity removed at 25mg/l.

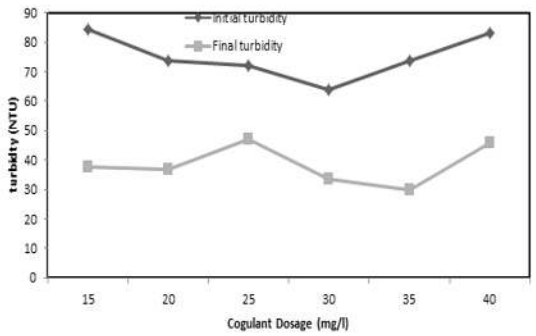

Figure 4: Effect of coagulant dosage on turbidity removal

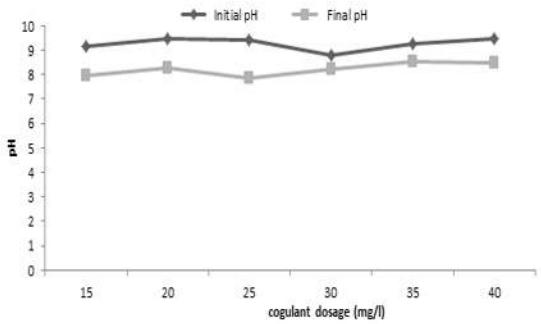

Figure 5: Effect of coagulant dose on pH

In fig 05 effect of various coagulant dosages were studied on pH, when coagulant dose were increased from 15-40 mg/l pH removed maximum at 25mg/l.

CONCLUSION

Study was made to observe the potential of walnut shell for bio treatment of turbid water using different mesh size of bio-coagulant. From 30-50 µm mesh size were used to conduct different turbid water ranges the maximum turbidly removed by using 30. µm mesh size. Various coagulant dose were used to obtained optimize condition, the maximum turbidity removed at 35 mg/l about 83%. By increasing dose of bio-coagulant turbidity will effectively change up to 83%.

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