Review on Turbidity of Water Removal by Using Natural Coagulant's

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Abstract-coagulation of water conduct uses chemical as well as natural processes to prepare water for our use or to arrival it to the environment. Through coagulation, water treatment plants can remove the contaminants in water and further treat it to be usable again. Treated water is also less dangerous when returned to the environment. Coagulation and flocculation ensues in sequential steps intended to overcome the forces steadying the suspended particles, allowing particle accident and growth of floc. Flocculation requires watchful attention to the mixing speed and amount of mix energy.If step one is unfinished, the next stages will be unsuccessful.

I. INTRODUCTION

Chemical coagulant is very common treatment process used mainly in water treatment performs. Use of a natural coagulant is testified to have many advantages above chemical coagulant e.g. Alum Use of chemical coagulant has makes of pH and alkalinity.However, natural coagulant has been stated to be free of these constraints. Turbidity removal can be achieved by natural coagulant. Growing population, enlarged economic activity and industrial development has not only created a increased in demand of fresh water but also caused in simple excess of this natural resource. Water resources all over a world are in danger not only by over corruption and poor supervision but also by ecological deprivation.

(A) Coagulation

All the waters, surface contains both dissolved and a suspended particles. Coagulation and flocculationare the processes used to separate the suspended items portion from the water. The suspended particles differ considerably in source,conformation charge,size of particles,shape and density. Correct submission of coagulation and flocculation processes and selection of the coagulants depends upon understanding the collaboration between these factors. The small particles are kept in suspension by the action of physical forces on the particles themselves. One of the forces playing a principal role in stabilization results from the surface charge present on the particles. Most solids are in the water possess a negative charge and,since they have the same type of surface charge, repel each other when they are come closer. Therefore, they will remain in suspension slightly than clump together and settle down out of the water.

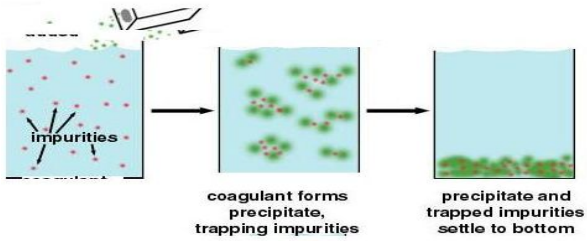
(B) Purpose

The primary purpose of coagulation and flocculation process is the removal of the turbidity from the water. Turbidity is a cloudy presence of water caused by small particles suspended there in. Turbidity is an aesthetic problem in water. Water with a high turbidity can be very difficult or difficult to properly disinfect. As a result, the maximum acceptable level of turbidity in water is 0.5 NTU, while the recommended level is near 0.1 NTU. (NTU, or TU, stands for nephelometric turbidity units, the measurement of the turbidity of water. In addition to removing turbidity from the water, coagulation and flocculation is helpful in other ways. The process eliminates many bacteria which are suspended in the water and can be used to take out color from the water. Turbidity and color is much more common in surface water than in a groundwater. As surface water flows over the ground to streams and then through rivers, the water picks up a large quantity of particles. As the result, while aeration is more usually required for ground water, treatment containing coagulation and flocculation is characteristic of surface water.

II.PROCEDURE

1.flash mix
2. Coagulation and
3. flocculation

Three Actual Processes :
As I mentioned above, the chemistry of coagulation and



flocculation involves of three processes - flash mix, coagulation and flocculation. Each of these processes are briefly explained below.

Fig (a). Three Actual Processes

1) In the flash mixer: coagulant chemicals are added to the water and the water is mixed rapidly and violently. The purpose of this step is to uniformly distribute the chemicals through the water. Flash mixing typically takes a minute or less time. If the water is mixed in thirty seconds, then the chemicals will not be properly mixed into the water. However, if the water is mixed for more than sixty seconds, then the mixer edges will shear the newly forming floc back into small elements.

2) After flash mixing, coagulation occurs. Throughout coagulation, the coagulant chemicals nullify the electrical charges of the fine elements in the water, allowing the particles to come closer collected and form large clumps.

3) The final step is flocculation. During flocculation, a process of moderate mixing brings the fine particles formed by coagulation into exchange with each other. Flocculation typically lasts for about thirty to forty-five minutes. The flocculation basin often has a number of partitions with decreasing mixing speeds as the water advances through the basin. This grouped chamber allows increasingly large floc to form without being broken separately by the mixing blade

(A) Floculation

Following are the first step of coagulation, a second process called flocculation occurs. Flocculation, a gentle mixing stage, growths the particle size from submicroscopic microfloc to visible suspended particles. The microflocs are carried into contact with each other through the process of gentle mixing. Collisions of the microfloc particles reason them to bond to produce larger, visible flocs called pinflocs. The floc size stays to build through additional collisions and interaction with inorganic polymers formed by the coagulant or with organic polymers added. Macroflocs are molded. Great molecular weight polymers, called coagulant aids, may be added during this step to help bridge, bind, and strengthen the floc, add weight, and increase settle down rate. Once the floc has reached it optimum size and strength, the water is ready for the sedimentation method. Design contact times for flocculation range from 15 or 20 minutes to an hour or extra.

III.COAGULANT SELECTION

The choice of coagulant chemical hang on the nature of the suspended solid to be removed, the raw water situations, the facility design, and the charge of the amount of chemical necessary to produce the preferred result. Final selection of the coagulants should be made following thorough the jar testing and plant scale estimation.Respects must be given to essential effluent quality, effect upon downstream action process performance, cost, method and cost of sludge handling and removal, and net overall cost at the dose required for operative treatment.

IV.MATERIALS

Few materials were used in this study such as water, natural coagulants (Dolichos lablab), and Cicer arietinum (dal)) and clay ingredients. The detail explanations of those coagulants are as given below. There are three natural coagulants used in this present study. They are namely seeds of Dolichos lablab (beans), and Cicer arietinum (dal) and Moringa Oilefera. The descriptions of these coagulants are given below:

1) **Cicer Aeritenium**
2) Moringa Oiefera
3) Dolichos Lablab

(A) Stock Solution Of Natural Coagulants

The seed powder was kept approximate size less than 75μm to complete solubilization of active constituents in the seed. A completely matuared seeds of cicer aritinum were used in the reading. After sun dry, external shells were detached and seed kernels were attained. Using grinder,fine powder was attained from seed kernel. Distilled water was added to the powder to make 1% suspension of it. The suspension was forcefully shaken for 45 minutes using a magnetic stirrer to help water extraction of the coagulant proteins and this was then passed over filter paper (Whatsman no. 42). The filtrate portions were used for required dose of natural coagulants. Fresh solutions were ready daily and kept refrigerated to prevent any elderly effects such as change in pH, viscosity, and coagulation activity. Solutions were shaken vigorously previously use.

V.OPERATION

Jar test is the most widely used experimental methods for coagulation-flocculation. A focculator jar test apparatus was used in the experiments to coagulate sample of synthetic turbid water using some coagulants.It was carried out as a batch test, accommodating a series of two beakers together with two spindle steel paddles. Before operating the jar test, the sample was mixed homogenously. Coagulants of varying concentrations were added in the beakers. The whole procedures in the jar test were conducted in different rotating speed. After the desired amount of coagulants was added to the suspensions, the beakers were agitated at various mixing time and speed, which consist of rapid mixing (200–250 rotation per minute, rpm) for 1–3 minutes and slow mixing (30–40 rpm) for 12–15 minutes. After the agitation being stopped, the suspensions were allowed to settle for 20–60 minutes. Finally, a sample was withdrawn using a pipette from the middle of supernatant for physicochemical which represent the final concentration. All tests were performed at an ambient temperature. Fordifferent turbid ranges—higher (100) NTU, medium (40) NTU, and lower (10) NTU. In the experiment, the study was conducted by varying a few experimental parameters, which were coagulant dosage and mixing time in order to study their effect in flocculation and obtain the optimum condition for each parameter.

Fig : Jar Test Operation

VI.PREPARATION OF COAGULANTS POWDER

Moring oleifera seed pods are allowed to mature and dry naturally to a brown color on the tree. The seeds were removed from the pods, kept for sun dry, and external shells were removed. Mature seeds showing no signs of discoloration, softening, or extreme desiccation were used. The seed kernels were ground to fine powder using a kitchen

blender to make it of approximate size of 600 μm to achieve solubilization of active ingredients in the seed. Powder of Cicer arietinum (commercial name bashion) was bought from local market of Dhaka city. The grains of powder were maintained approximate size less than 600 μm to achieve solubilization of active ingredients in the seed. Mature seeds of Dolichos lablab were used in the study. After sun dry, external shells were removed and seed kernel were obtained. Using grinder,fine powder achieved from seed kernel. Distilled water was added to the powder to make 1%suspension of it. The suspension was vigorously shaken for 45 minutes using a magnetic stirrer to promote water extraction of the coagulant proteins, and this was then passed through filter paper (Whatman no. 42, 125mmdia.). The filtrate portions were used for required dose of natural coagulants. Fresh solutions were prepared daily and kept refrigerated to prevent any ageing effects (such as changein pH, viscosity, and coagulation activity). Solutions were shaken vigorously before use.

VII.RESULTS

Table No : 1 Turbidity Analysis by using Cicer Aeritenium Seed Powder

Sr No.	Volume of sample in (ML)	Coagulant dose in (Mg/L)	Turbidity of water before addition of coagulants (NTU)	Turbidity of water after addition of coagulants (NTU)
1	1000	50	39	13.2
2	1000	100	41.5	11
3	1000	150	42	5.8
4	1000	200	41.1	10.6
5	1000	Sample	38	12.3

Table 2 : Percentage Turbidity Removed With Optimum Dosage 150 Mg/L(Cecer Aritenium Powder)

Sr No.	PH	Turbidity removed in %
1	2	18
2	4	42
3	6	45
4	8	76
5	10	68
6	12	63

VIII.CONCLUSION

It was concluded that the maximum removal of turbidity for the sample was achieved as 78%. So, it was suggested that, we can use locally available natural coagulant(tamarind seed powder) to treat the low turbid waste water which is cost effective and environment friendly.

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