Jar Test

Introduction

Coagulation/flocculation is the process of binding small particles in the water together into larger, heavier clumps which settle out relatively quickly. The larger particles are known as floc. Properly formed floc will settle out of water quickly in the sedimentation basin, removing the majority of the water's turbidity. In many plants, changing water characteristics require the operator to adjust coagulant dosages at intervals to achieve optimal coagulation. Different dosages of coagulants are tested using a jar test, which mimics the conditions found in the treatment plant. Jar testing is a pilot-scale test of the treatment chemicals used in a particular water plant. Jar testing entails adjusting the amount of treatment chemicals and the sequence in which they Are added to samples of raw water held in jars or beakers

Principle:

The first step of the jar test involves adding coagulant to the source water and mixing the water rapidly (as it would be mixed in the flash mix chamber) to completely dissolves the coagulant in the water. Then the water is mixed more slowly for a longer time period, mimicking the flocculation basin conditions and allowing the forming floc particles to cluster together. Finally, the mixer is stopped and the floc is allowed to settle out, as it would in the sedimentation basin.

Purpose

To determine the optimum concentration of coagulant to be added to the source water and thus calculates the best ratio for the removal using alum or any other coagulant.

Chemical compounds coagulase:

There are many chemicals used in the Coagulation/flocculation and the following compounds most widely used are: aluminum sulfate (alum), sodium aluminate, ferric chloride, ferric sulfate, hydrated lime and Sodium Carbonate.

Materials Required:

Apparatus Required:

1-jar testing device (Sedimentation Jar Test): consist o

- Four or six-place gang stirrer
- Four to six beakers 1000 ml

2-Turbidity Meter

3-pH Meter

4- Pipettes10 ml

Chemicals Required:

A solution of alum (dissolving (1 g) of alum used in the treatment in one liter of distilled water)

Procedure:

Can work experience to find a relationship with many variables and so:

1-When you change the period of mixing.

2- When you change the period of sedimentation.

3- When comparing different materials coagulation.

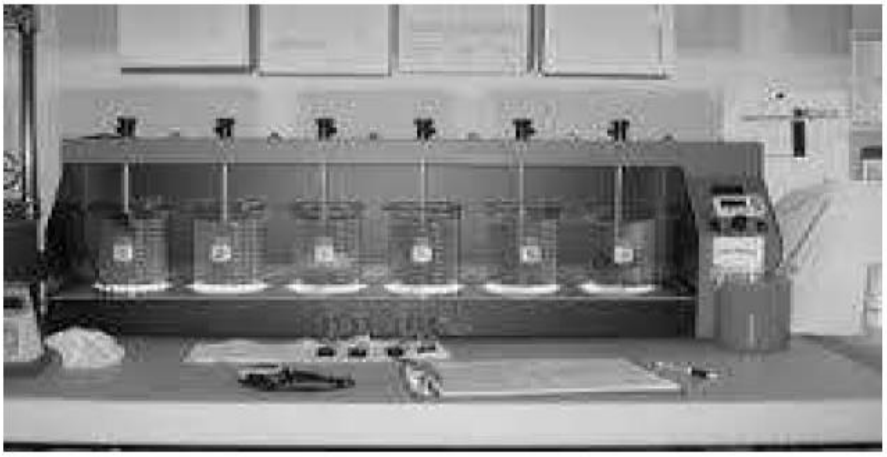
Testing of Sample:

1-measured turbidity and pH value of the raw water sample

2- Placed one liter sample of raw water in each Baker with the addition of coagulase material doses by Pipette in different concentrations.

3- Start mixing solutions for (1-2) minutes on the maximum speed (flash mix), then reduce the speed to slow speed (slow mix) and continue to mixing on solutions for the slow speed (15-20 minutes)

4- At the end of the mixing period, turn off the stirrer, let the flocs settle (at least 20 minutes) ,Carefully take (50) ml of sample from each beaker of sample by Pipette and measured turbidity and pH in each of the samples.



Calculation:

1-regulates the table as follows and placed the results of the required Relations

No Beaker	1	2	3	4	5	6
Dosage						
Turbidity						
pH						

2- Percentage removal = (turbidity1- turbidity2)/ turbidity1 *100

3- Plotted the following relationships:

- The relationship between the dose of alum and final turbidity.
- The relationship between the dose of alum and Percentage removal.