International Journal of Intelligent Information and Management Science
ISSN: 2307-0692, Volume 6, Issue 4, August, 2017

Study on the Application of Coagulation and Sedimentation Process in Biochemical Pharmaceutical

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Abstract: As the biochemistry in the process of pharmaceutical production will produce waste water and cause high degree of pollution, so this paper studies the applications of coagulation and sedimentation process in wastewater treatment in biochemical pharmaceutical. In this paper, three kinds of inorganic macromolecule coagulants were put into the prepared wastewater, and the removal rate of COD was observed. Then the best effect of polyaluminum sulfate (PAS) was selected. COD removal rate and turbidity removal rate were analyzed by different concentrations, and the effect of pH value on the electrical properties of colloidal particles in wastewater was studied. The process can effectively reduce the process load, and help to improve water quality.

Keywords: Coagulation sedimentation process; Biochemical pharmaceutical; Application

1. Introduction

Biochemical pharmaceutical is an indispensable research process in the medical profession, but it will produce waste water inevitably. In order to reduce the pollution load, ease the pollution emissions and achieve the improvement of river water quality, this is the only way to sustainable development [1]. While reducing the pollution emissions, we should actively carry out the application research of wastewater treatment technology, which can greatly reduce the waste water emissions, and effectively improve the use of water resources, thereby reducing environmental pollution [2]. So this paper studies the applications of coagulation and sedimentation process in wastewater treatment in biochemical pharmaceutical. In this paper, three kinds of inorganic macromolecule coagulants were put into the prepared wastewater, and the removal rate of COD was observed. Then the best effect of polyaluminum sulfate (PAS) was selected. COD removal rate and turbidity removal rate were analyzed by different concentrations, and the effect of pH value on the electrical properties of colloidal particles in wastewater was studied. The process can effectively improve the water quality, providing a basis for further investigation of the process.

2. Application of Coagulation and Sedimentation Process in Wastewater Treatment in Biochemical Pharmaceutical

In the process of biochemical pharmaceutical, it will produce waste water inevitably. Wastewater composition is complex, and the organic pollutants have a wide range, which occupy a large proportion, including toxic and hazardous substances, antibiotics, refractory substances and so on, in addition, the content of suspended solids with the color and smell is relatively high, which is easy to produce foam, it belongs to the chemical pharmaceutical wastewater which is difficult to deal with [3].

2.1. Selection of coagulants for wastewater treatment

There are three kinds of inorganic macromolecule coagulants for wastewater treatment, namely, polymerized aluminum sulfate (PAS) with large molecular structure and strong adsorption capacity; polyaluminium chloride (PAC) with high molecular weight and high charge; polyferric sulfate (PFS) with strong hygroscopicity. Take 3 cups of waste water with a capacity of 200ml, put the inorganic polymer coagulant into the waste water, and set the concentration from 30mg/L to 70mg/L, set the precipitation time as 25 minutes, select the supernatant liquid as the measured sample, chemical oxygen demand COD as the test index, the precipitation effect is shown in Figure 1.

From Figure 1, it can be seen: These three coagulants can make the liquid produce a more obvious precipitation effect, according to the test indicators of chemical oxygen demand COD, it can be seen that before the coagulant concentration achieve 30mg/L, the removal rate of the chemical oxygen demand COD is mostly maintained at about 10%, there is no significant difference, but the effect of polymerized aluminum sulfate (PAS) is superior to the other two coagulants; When the coagulant concentration increases to 40mg/L, the COD removal rate of

polyaluminium chloride and polyferric sulfate show a positive proportionally rising, but they are still smaller than the COD removal rate of polymerized aluminum sulfate. With the increase of concentration, the removal rate of polymerized aluminum sulfate is still higher than the other two coagulants, the polyferric sulfate (PFS) has the worst removal effect.

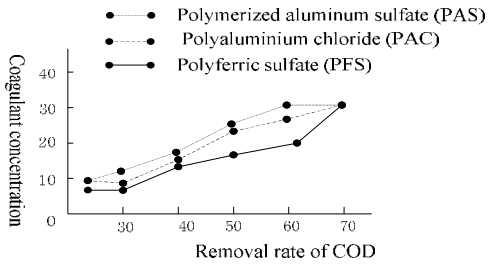

Figure 1. The use effect of three coagulants

As the aqueous solution of polyferric sulfate is reddish brown transparent solution, so the increase of the concentration of the solution has a great impact on the transparency of the solution, while the solution which are put into other two coagulants show relatively clear state. Considering the effect of these three coagulants, the most effective polyaluminum sulfate (PAS) was selected as the coagulant to treat the wastewater produced during the biochemical pharmaceutical process.

2.2. Effect of coagulant dosage on wastewater treatment

Polymerized aluminum sulfate (PAS) is set to a certain concentration of the solution, without changing the PH value of the original solution, use the same speed and time to stir the solution, increasing the input amount of coagulant, the COD removal rate and turbidity removal rate will as a reference index [4]. The removal rate of COD in raw water is about 20%. With the increase of polyacylanate coagulant, the maximum COD removal rate can reach about 48% when the concentration is 40mg/L, but when the amount of coagulant is too much, it will reduce COD removal rate. The turbidity removal rate increases with the increase of coagulant dosage, and the turbidity removal rate is the highest when the coagulant concentration is 80mg/L, which is about 40%. The reason for this phenomenon can be interpreted as:

When the polymerized aluminum sulfate (PAS) is put into the raw water, the precipitation produced by hydrolysis can absorb debris with negative charge immediately; the complex compound produced by hydrolysis has positive charge, which can neutralize with the debris with the negative charge. Compressing the double layer and reducing the point can promote the rapid aggregation and precipitation of suspended solids and colloids, so that the effect of removing turbidity become good. When the amount of polymerized aluminum sulfate (PAS) increases to a certain concentration, due to adsorption and neutralization, a large number of polymerized hydroxyl complex ions are polluted to produce colloid with positive charge and disperse it into the solution, greatly reducing the precipitation effect, which mainly shows that the COD removal rate and turbidity removal rate remain basically unchanged, and there is even a decreasing trend in the process of increasing coagulant.

The coagulation and sedimentation process is mainly to remove the suspended solids and colloidal substances of the pharmaceutical wastewater. When the amount of the polymerized aluminum sulfate (PAS) is too large, the COD removal rate will decrease, and the reason is that the polluted particles have a positively charged colloid and disperse into raw water.

2.3. Selection of coagulants for wastewater treatment

Adjust the concentration of polymerized aluminum sulfate (PAS) to 50 mg/L, and do not the other conditions, make the pH value become variety and analyze the effect of it on the wastewater treatment. The PH value directly affects the electrical properties of the colloidal particles in the wastewater. According to the basic principle of the chemical colloid, only make the PH value in the wastewater fluctuate within a certain range, the electrical energy of the colloidal particles can promote the colloid eventually destabilized and precipitated.

Adjust the pH value of the solution containing polymerized aluminum sulfate (PAS) coagulant to 5.0, at which time the products of hydrolysis are: Al (OH) 2+ and Al (OH) 2+, these two products are effective in neutralizing the negative charge colloids produced in the solution to improve the effect of coagulation sedimentation; if the initial PH value between 6.0 and 8.0, then there will produce a hydrolysis with a positive charge, and the other substances in water can be fully adsorbed; if the PH value is larger than 8.0, then the hydrolysis product will has negative charge, then the solution of pollutants is not easy to stabilize, greatly reducing the COD removal rate. Therefore, when PH = 7.0, the COD removal rate of using coagulant will be the best.

3 . Conclusions

The use of coagulation sedimentation process in biochemical pharmaceutical has the best result in wastewater treatment, different coagulants, input, PH value of will have different degrees of impact on COD removal rate. Select 40mg/L polymerized aluminum sulfate (PAS) as the coagulant, and adjust the pH value in the solution to 7.0, at this time, it has the best result for the wastewater treatment in the biochemical process. The process of

coagulation and sedimentation can effectively improve the biochemical properties of wastewater, and the process can also effectively reduce the biotoxicity of biopharmaceutical wastewater. The coagulation and sedimentation process for biochemical chemical wastewater treatment can meet the standard requirement of water reuse, which can improve the deep water quality and provide reference for the pollutants produced in the process of biopharmaceutical.

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