Czech
Journal of Multidisciplinary Innovations
Volume 34, October 2024. ISSN (E): 2788-0389
Website: www.peerianjournal.com Email: editor@peerianjournal.com

Wastewater Treatment Of Sericulture Enterprises With Inorganic Coagulants

A.G.Askarova, S.I.Nazarov, H.K.Razzokov
E-mail: Gulchiroyasqarova16@gmail.com, s.i.nazarov@buxdu.uz
Bukhara State University, 200117, M.Ikbol str., 11, Bukhara, Uzbekistan

Abstract: This article describes the effect of the coagulant dose on the specific electrical conductivity, the amount of dry residues and suspended particles during wastewater treatment of sericulture enterprises to the level of process water. At the same time, when treating wastewater from a silk fiber manufacturing enterprise with the proposed coagulants, the efficiency of purification from suspended particles was 95.79%, discoloration was 91%, and dry residue was 81.25%, and the optimal dose of coagulants was calculated based on experimental tests.

Key words: coagulant, wastewater, total hardness, dry residue, specific electrical conductivity, degree of discoloration, suspended particles, mechanical cleaning.

Introduction

Wastewater treatment in sericulture is an important aspect that ensures the sustainable development of the industry, minimizing the negative impact on the environment. Sericulture, one of the oldest types of agriculture, involves the cultivation of silkworms and the use of water to process the cocoon. These actions create wastewater containing organic and inorganic pollutants such as food waste, plant extracts and potentially toxic substances.

With the increase in silk production and increased environmental requirements, the issue of wastewater treatment is becoming more relevant. Improper use of such waters can lead to pollution of reservoirs, deterioration of soil quality and negative consequences for human and animal health.

The main characteristics of the waste water of the silk production enterprise:

- organic pollutants (residues of organic substances such as proteins, fats and oils);
- dyes (used in the silk dyeing process);
- Chemicals (alkalis and acids used in finishing and dyeing processes);

Methods of wastewater treatment of sericulture enterprises include:

- mechanical cleaning (mechanical filtration to remove large particles);
- chemical cleaning (using coagulants and flocculants to precipitate small particles);

2. Materials and methods

2.1 Determination of the total hardness of water

The total hardness of the water is determined by the method of Complexometry. This method is based on the reaction of metal cations with complexones to form complex compounds and is characterized by high speed and accuracy. Aminopolycarboxylic acid derivatives are used for this purpose. For example, ethylenediaminetetraacetic acid (EDTA) is a complexone, a weak tetrabasic acid poorly soluble in water. Therefore, its double sodium salt is used-Complexon or, in other words, Trilon B. 100 ml of the test water is poured into the flask. 5 ml of buffer solution (a mixture with ammonia) and 5-7 drops of indicator (blue eriochrome) are dripped onto it. Then it is

Czech
Journal of Multidisciplinary Innovations
Volume 34, October 2024. ISSN (E): 2788-0389
Website: www.peerianjournal.com Email: editor@peerianjournal.com

immediately titrated, constantly mixing with a solution of trilon B. Titration continues from red-violet to blue-violet, that is, to the point of equivalence.

2.2 Determination of dry residue in water

Dry residue is one of the most important criteria for water quality, which determines the degree of mineralization of water. The type of water can be determined by its ion-salt composition. The main ions determining the amount of residue are carbonates, chlorides, sulfates, bicarbonates, nitrates, sodium, potassium, magnesium, and calcium.

The dry residue in water can be characterized by the presence of non-volatile dissolved solids in it. Residues can be mineral and organic with a boiling point above 105-110 ° C. The gravimetric calculation method determines the nature and presence of the dry residue. To determine the type of dry residue, the test sample must be filtered to separate it from organic impurities.

Initially, the container in which the test sample evaporates in a water bath must be dried with a constant weight. Then 200-500 cm3 of filtered water is poured into porcelain dishes. After evaporation of the last sample of water, the glass with the contents is dried in a constant mass thermostat at a temperature of 110 ° C.

The amount of dry residue (m), mg / dm3, is calculated using the formula:

$$m = \frac{a - b}{V}$$

here a-is the value of the mass of the dry residual vessel, mg;

b- is the value of the mass of the empty vessel, mg;

V- is the amount of water obtained for the test, cm3.

3. Results and discussion

Wastewater with the above-mentioned properties contains various pollutants such as organic substances, dyes, chemicals and other impurities formed during the silk production process. For effective treatment of such wastewater, combined methods can be used that take into account the specifics of pollutants. The results of wastewater treatment with combined coagulants obtained on the basis of the organic and inorganic substances proposed by us are presented in Table 1.

Table 1.

Efficiency of wastewater treatment by the combined method

Indicators	Before cleaning	After cleaning	Cleaning according to the production regulations	Cleaning efficiency, %
pH	9,6	7,1	7,3	-
Suspended particles, mg/l	380	16	17	95,79
Discoloration efficiency, %	-	91	93	91
Dry residue, mg/l	400	75	76	81,25

Czech
Journal of Multidisciplinary Innovations
Volume 34, October 2024. ISSN (E): 2788-0389
Website: www.peerianjournal.com Email: editor@peerianjournal.com

The data presented in this table indicate that the efficiency of purification during wastewater treatment of the enterprise with highly effective coagulants with suspended particles is 95.79%, the degree of discoloration is 91%, and the dry residue is 81.25%, which meets the requirements established by the production rules.

Table 2.

Indicators of wastewater samples from sericulture enterprises

Sample analysis	Transparency	comparative electrical conductivity χ mKCm/cm	TDS mg/l	SAL	Overall stiffness
Steal water	Transparent	30.99	15.75	0.02	7
Er osti suvi	Transparent	4700	2100	2.5	16.5
Untreated wastewater of the enterprise	Transparent	5574	3200	3.64	20.2
Wastewater treatment of the enterprise	Transparent	1273	1589	1.04	8.1

Table 2 shows a decrease in total stiffness from 20.2 to 8.1 (60%) and specific electrical conductivity from 5574 to 1273 (77.2%) as a result of the use of composite coagulants.

Turbidity is an important indicator of water quality, as it can affect the appearance, taste, effectiveness of drinking and purification. Rainwater has an unpleasant taste and can make it difficult to view objects underwater. In addition, turbidity can make it difficult to detoxify water, which increases the risk of infection with pathogens.

The spectrophotometric method. This method uses a spectrophotometer to measure the absorption of light by suspended particles in water.

Turbidity of water is a physical property that measures the scattering of light by suspended particles in water. The particles responsible for turbidity may be of natural origin, such as clay, silt, organic matter, or anthropogenic origin, such as domestic and industrial wastewater.

Table 3.

The effect of the coagulant dose on the level of wastewater treatment of sericulture enterprises

Coagulant dosage (mg/l)	Turbidity	Turbidity after cleaning	Cleaning efficiency, %
30	48,46	4,46	90,8

Czech
Journal of Multidisciplinary Innovations
Volume 34, October 2024. ISSN (E): 2788-0389
Website: www.peerianjournal.com Email: editor@peerianjournal.com

35	48,46	3,74	92,3
40	48,46	3,54	92,7
45	48,46	3,25	93,3
50	48,46	2,13	95,6
55	48,46	2,13	95,6
60	48,46	2,03	95,8

This table shows that turbidity increased from 90.8% to 95.6% with an increase in the coagulant dose from 30 mg/l to 50 mg/l and practically did not change at later stages.

The proposed composite coagulants helped to purify the wastewater of the enterprise from organic substances, dyes, chemicals and other impurities formed during the production of silk.

Conclusion

Wastewater treatment in sericulture is an important task that requires an integrated approach and the active introduction of modern technologies to ensure a sustainable future for the industry. The introduction of effective cleaning technologies is important in terms of increasing environmental requirements and the need to conserve natural resources.

References

1. Muravev A. G. Rukovodstvo po opredeleniyu pokazateley kachestva vodы polevыmi metodami. Krismas, 2004. 146 s.
2. GOST 18164-72. Voda pitevaya. Metod opredeleniya soderjaniya suxogo ostatka. Kontrol kachestva vodы. M.: Standartinform, 2010. 25 s.
3. Amonova M.M, Ravshanov K.A. Polymeric composition for purification of wastewater from various impurities in textile industry // Journal of chemistry and chemical technology. Moscow. - 2019. - № 10. Vol. 62. - № 10. – P. 147 - 153.
4. Zavodovskiy A. G., Zavodovskaya O. V. Opredelenie suxogo ostatka jidkosti metodom pezokvarsevogo mikrovzveshivaniya // Novie informatsionnыe texnologii i menedjment kachestva: Mejdunar. forum, 28 marta–4 aprelya 2009 g. Yegipet, Sharm-el-Sheyx, 2009. S. 172–174.