Research on the dissociation of yucca to the organic solubility of wastewater

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Abstract. With the development of society, the pollution of wastewater has become extremely serious, and the amount of wastewater is also gradually increasing. The water quality discharge does not meet the standards, which has a serious impact on the water quality of our country, it also has a very important impact on people’s daily water use. Yucca has a wide variety of plants, and the main components of its extract are steroidal saponins, free radical saponins and carbohydrate complexes. It has a special physiological structure, macromolecules and sequence molecules are directly adsorbed, and it has a strong adsorption capacity for harmful gases, which can improve the odours and is widely used, But it is less used in wastewater treatment, this project uses yucca extract to conduct preliminary analysis and exploration on the dissociation of organic solubility in wastewater, to improve the solubility and treatment of free ions and organic dissolved matter in water, preliminary results found that adding 200ppm-20% and 500ppm-10% concentration of yucca is the most suitable range for water quality treatment. It will be a bigger breakthrough when used in wastewater treatment, and my country’s water pollution will be in great improvement.

Keywords: wastewater pollution; yucca extract; organic solubility.

1. Introduction

Nowadays, with the development of society, no matter in industry or agriculture, wastewater pollution is extremely serious. In the process of economic development, my country’s factories are gradually increasing. The amount of waste water is also gradually increasing, and the water quality discharge does not meet the standards, which has a serious impact on the water quality of our country, and also has an impact on the people’s daily water use [1-4]. As we all know, water is an indispensable substance in our daily lives, but nowadays, the ubiquitous waste water ponds can't help but make people worry. Rural sewage research shows that the rural sewage processing and treatment status, backward rural equipment infrastructure, poor water pollution control and other issues. Rural domestic sewage is directly dumped out of farmland and ditches through daily washing and household use, which has a serious impact on water quality [5-7]. In order to comply with the current environmental protection concept of green and sustainable development, there is an urgent need for a process to treat and prevent wastewater. Yucca, also known as soft-leaf yucca, can be found in many places in our country. It is an evergreen shrub for many years and has a wide variety of plants in the genus Yucca. The main components of the extract are steroidal saponins, free radical saponins and carbohydrate complexes. It has a special physiological structure, macromolecules and sequence molecules are directly adsorbed, and it has a strong adsorption capacity for harmful gases, which can improve the smell. At the same time, it can reduce animal ammonia emissions and improve the breeding environment of livestock and poultry. Yucca saponins are a natural detergent or surfactant, which can change the morphology of the
epithelial cell membrane of the digestive tract and reduce the surface tension of the cell membrane. It can combine with cholesterol on the cell membrane to form an irreversible complex and excrete from the body, thereby enhancing the body’s immunity and improve animal performance. It also has the functions of regulating the intestinal microenvironment and promoting cell nutrition. It has been widely studied and used in animal production. Studies have also shown that it has a certain promoting effect on improving the water quality of aquaculture water bodies [8-12]. Combining with the current background of “five water co-treatment” and conforming to the needs of social development, this project explores the initial evaluation and exploration of the dissociation of yucca extract in the organic solubility of wastewater and the extent of the impact of different concentrations of yucca on water quality improvement. It further illustrates the problem of yucca improving the dissociation of the organic solubility of wastewater. Due to the problem of wastewater treatment in the plant area, the research team used natural yucca extract to treat the water quality to improve the treatment of free ions and organic dissolved matter in the water, especially to achieve the reusable water quality and the environmental problems of the plant water treatment at the first phase research discussion.

2. Experiment process
In this study, the conductivity of the yucca extracts in a series of percentages and concentrations of the plant solution changes at different times. The experimental process is shown in Figure 1.

![Figure 1 Experimental flowchart](image)

This research shows the experimental flow chart of this project as shown in Figure 1. The waste water comes from the waste water that the project members personally visit the physical factory and personally treat the waste water, and then bring it into the laboratory for the yucca treatment experiment. After filtering, the waste water is tested to 50ppm, 100ppm, 200ppm and 500ppm yucca were studied. Experimental process steps:

1) Conductivity instrument——DDS-11A conductivity mete, put its electrode in deionized water first.
2) The conductivity instrument measures and records the conductivity of the standard water and filtered wastewater without yucca.
3) Dilute the 10000ppm yucca extract into 50ppm, 100ppm, 200ppm, and 500ppm yucca extracts. Take 10ml of it and put it into four clean beakers, and use a conductivity instrument to measure
the conductivity of the yucca extract at this concentration.
4) Take out 100ml of factory liquid wastewater in a beaker and filter it into another beaker with a funnel. Pour 80ml of the filtered plant solution into four clean beakers, labeled as A.B.C.D.
5) Pour 1ml of yucca extract of different concentrations into a beaker A.B.C.D and stir with a glass rod. Measure and record the conductivity immediately. Re-measure and record with conductivity after standing for 5min and 10min.
6) Follow the fifth test to take the yucca extract and take 1ml into the beaker A.B.C.D. Stir with a glass rod, measure and record. Re-measure and record with conductivity after standing for 5min and 10min
7) Follow the sixth test to take the yucca extract and take 2ml into the beaker A.B.C.D and stir with a glass rod. Immediately use conductivity to measure and record. After standing for 5 min and 10 min, the conductivity is measured and recorded again.

3. **Study the flow chart of water improvement**
The water improvement process in this experiment is shown in Figure 2. The Figure 2 and 3 illustrate the process of improving the water body. After the wastewater is removed from the factory, it is pre-treated. The experiment is preliminary filtration. After the filter residue is filtered, it will be further studied, and then then use different concentrations of yucca to drip the wastewater and improve water saturation of organic phenadoxones and water. This process will be returned to the factory for use as raw materials for industrial production and the next industrial production, such as shown in Figure 4.

![Figure 2](image1)

**Figure. 2** Take samples for analysis

![Figure 3](image2)

**Figure. 3** Sample preparations for analysis
4. Initial results and discussion

In this project, standard water, filtered wastewater without yucca added and conductivity of 50ppm, 100ppm, 200ppm, 500ppm are measured, as shown in Table 1.

Table. 1 Original conductivity of stock solution and filler

| Solvent                   | Standard water Conductivity (ms/cm) | Filtered wastewater without yucca | 50ppm yucca Conductivity | 100ppm yucca Conductivity | 200ppm yucca Conductivity | 500ppm yucca Conductivity |
|---------------------------|------------------------------------|----------------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
| Wastewater                | 0.172                              | 7.990                            | 0.041                    | 0.073                     | 0.148                     | 0.374                     |

Test the conductivity of standard water and filtered wastewater without yucca as a standard and comparison, and then measure the conductivity of 50 ppm, 100 ppm, 200 ppm, and 500 ppm respectively. The table 2 shows that the greater the concentration of yucca extract, the higher the conductivity of the solution. The difference in conductivity caused by adding different concentrations of different doses of yucca additives to wastewater is shown in Table 2.

Table. 2 Different additions and changes in water

| Yucca addition amount /ppm | Conductivity /ms/cm | 50ppm Conductivity | 100ppm Conductivity | 200ppm Conductivity | 500ppm Conductivity |
|----------------------------|---------------------|--------------------|---------------------|---------------------|---------------------|
| Wastewater + 1mlAdditives (5%) | 5.41                | 4.99               | 4.82                | 4.75                |
| Wastewater + 2mlAdditives (10%) | 5.16                | 4.78               | 4.75                | 4.64                |
| Wastewater + 4mlAdditives (20%) | 4.79                | 4.46               | 4.38                | 4.58                |

Wastewater contains a lot of wood particles, ss, and part of wood organic matter. After filtering, some suspended matter is removed, and the remaining organic matter that is difficult to filter causes the conductivity of the solution to increase. The yucca extract contains a fat-soluble and water-soluble surfactant-yucca saponins, which can effectively remove the organic matter contained in the wastewater and greatly reduce the conductivity of the wastewater. As shown in Figure 5-7.
It can be seen from Table 5-7 that when 4ml of yucca extract (20%) is added, the conductivity of wastewater with 500ppm yucca extract is greater than that of 200ppm silk extract. Therefore, the conductivity of the solution when adding 4ml of 500ppm yucca extract is higher than adding 4ml of 200ppm. The reason for the conductivity of the yucca extract is preliminary hypothesis: the reaction is complete when 500ppm yucca extract is added, and the residual yucca organic matter is greater than the residual organic matter of the solution when 200ppm is added, making the solution conductivity increase.

5. Conclusion
It can be seen from the entire experimental process that we initially explored the influence of different concentrations of yucca on the conductivity of wastewater. According to the experimental data, the addition of yucca can effectively reduce the conductivity of the solution, indicating that yucca can effectively reduce the solubility of the solution, improve the size of the solution molecules in the solution, and can effectively promote the dissociation of the organic solubility of wastewater. And under different concentrations (except 20% concentration), the conductivity of 10min<5min<the conductivity of yucca is added immediately, indicating that a certain period of time can effectively promote the organic dissolution of yucca in wastewater, which can be effective in a certain period of time to improve water quality. At the same time, as the concentration of yucca increases, the conductivity of the solution gradually increases. At a concentration of 500ppm, the conductivity table showed an increase in 10 minutes, indicating that the addition of 200ppm-20% and 500ppm-10% concentration of yucca should be within the most appropriate range for water quality treatment. In summary, this project effectively proves that yucca can effectively treat wastewater, and within a certain time and concentration range, it can achieve the best results. Yucca is easily available and affordable and it will be a bigger breakthrough when used in wastewater treatment. My country’s water pollution will be greatly improved. Our country will be greener and environmentally friendly and become a greener country.
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