

Purification of wastewater by activated carbon prepared from dates stones of Southern Algeria

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Abstract:

The El-Oued region (Southern Algeria) confronted various problems of pollution, including discharges of wastewater containing pollutants into the surrounding environment without any treatment. This issue is a matter of increasing concern owing to the effects that pollutants can cause both on environment and health. Effluents polluted by organic material from several sites in the city of El-Oued are highly loaded with non-biodegradable organic compounds, and hence required a significant effort to find economical methods to reduce this pollution.

The aim of this study is the preparation and characterization of an activated carbon from lignocellulosic natural residue of waste "dates stones" from the south of Algeria (El-Oued). After the preparation of the raw material for production, we studied the characterizations of carbon (Iodine number, Methylene blue number, Morphology analysis, IR spectroscopy analysis and Cation-exchange capacity) at the beginning on the other hand we observed the effectiveness of the carbon in the filter of wastewater, we measured the terms: chemical oxygen demand (COD), biochemical oxygen demand after 5 days (BOD₅), total nitrogen (TN), total phosphorus (TP), Total Suspended Solids (TSS), turbidity, conductivity, pH and temperature.

Keywords: Purification, activated carbon, dates stones, wastewater, carbonization

1. INTRODUCTION

The valuation of various wastes and agricultural by-products has achieved more or less effective activated carbon in various applications, and various precursors were used: apricot kernels of agricultural waste biomass coconut waste, by-products of cereals, olive pits, kernels jujube.

The objective of this work is to develop a by-product of the date palm, whose heritage in Algeria exceeds 18 million date palms with 800 varieties and an annual output that exceeds 780000 tonnes.

Once drivers by-products of the date palm are different uses:

- The tree trunk, used in traditional cabinet, firewood and building structures.
- Dry palms, used as fences, wind breezes, in making baskets, hats, etc.
- Dates schemes as traditional brushes, and as fuel.
- The Liffe is used in cleaning, particularly in that of the washer, for the manufacture of ropes, for the manufacture of sandal soles.
- The refuse of dates are used in livestock feed.
- The date stones are also used in livestock feed and when they burn to ashes are used for eyelash extension and hair, for treatment of certain diseases such as sore teeth.

Our choice fell on the date stones which every year a huge amount is discarded and receives not recovery.

In our work the active carbon that will be prepared from the date stones, will be used in wastewater treatment.

Several studies have been made in this area has used a charcoal prepared from the date stones in the removal of cadmium, for the removal of volatile organic compounds.

In the first stage of this work, we will prepare the charcoal from the seeds of dates of the El-Oued region and its characterization.

In a second step, we will use the activated carbon prepared in removing organic pollutants in wastewater from the same region and determining the best conditions for adsorption.

2. CONCLUSION

This work allowed us to value date stones, a waste of date palm in charcoal. The activated carbon that we have obtained has excellent textural properties (high porosity and large surface area): surface area 125.86 m²/g, pore size 0.0039 cm³/g, pore width 16.25 microns, external surface area 33.37 m²/g, methylene blue index 13.6 g, iodine number 735.2 mg/g, amount of functional groups 1.4 x 10⁻² mol/g.

The best conditions for the removal of organic pollutants are: a contact time of 5 minutes and an agitation rate between 200 and 300 rpm and a pH is less than 5 or greater than 8.

The removal of organic pollutants in wastewater from El Oued region prepared by the charcoal has led to very significant abatement rate: 86.9% for COD, 87.55% for BOD₅.

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