



ADSORBENT EFFECT OF THE SNAIL SHELLS *HELIX ASPERSA*.

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Introduction & Objectives:

Snail shell is usually neglected and abundant agricultural waste. As a result of the chemical composition of the shell, it can be used in wastewater treatment either as a coagulant or as an adsorbent. It has been found efficient, especially in the removal of heavy metals like lead, based on its adsorption capacity, available surface area, distribution ratio and percentage sorption. The activation of these low cost precursors are done physically or chemically using various kinds of activating agents, depending on the end use of the adsorbent. Moreover, the chemical activation has some important advantages to that of the physical activation such as lower carbonization temperature and shorter time of activation.

The aim of this work is to study the adsorbent effect of the snail shells *Helix aspersa*.

Methodology (Material and methods):

For this purpose, a quantities of these biomaterials are collected at the level of Belaiba region at south east of the wilaya of M'sila (Algeria). The snail was identified in collaboration with professor Nouerddine SOLTANI, Badji Mokhtar University, Annaba, Algeria. For adsorption experiments the snail shells were washed for remove all impurities from the substrate and were dried in an oven at 90°C for 24 hours. Grinding took place in two consecutive stages. The first was to reduce the fibre to grains less than 4 mm in size. After sieving, we obtain mesh sizes of 90um. Three samples were prepared : Raw biomass (CE), Biomass chemically activated with 5% of nitric acid then carbonized at 500°C for 03h (AN) and Biomass activated thermally at 500°C then chemically with 25% CaCl₂ (CC).

The physicochemical characterization was done by the determination of the zero-point pH (pH_{PZC}) and for get an idea of the thermal stability of samples thermogravimetric analysis (TGA) was carried out. The infrared spectroscopy (IRTF) for determining functional groups or the acido-basicity of materials [1]. Iodine number and methylene blue index were calculated for the characterization of the porosity of adsorbents. Adsorbent mass effect and comparison between the three samples using malachite green dye as model.

Results and Discussion:

The pH_{PZC} values for the different samples are very similar and have a number around 8 which signifies a basic medium. The thermogravimetric analyzes did not give much information because of the low temperature range (< 800°C) while the analysis by infrared spectroscopy shows similar functional groups of calcium carbonate [2].





The values of the iodine number and the methylene blue index show the great porosity of these shells, in particular, the AN sample which reaches (985 ± 1) for the iodine number and $(299, 5 \pm 0.05)$ for the methylene blue index [3].

Malachite green has been used as a dye model. We found good results, especially, for the AN sample.

Conclusion: This study shows the importance of the chemical activation, especially by acids, for the porosity capacity of snail shells *Helix aspersa*. As consequence, these biomaterials can be used to build a cheap filter systems for treatment of waste water from dye industry.

Keywords: Snail shells, adsorption, dyes, Malachite green.

References

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