

Adsorption methyl orange in aquatic solution using local palm stems from Laghouat region

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ARTICLE INFO

Article History :

Received : 14/07/2020

Accepted : 13/12/2020

Key Words:

Adsorption;
Palm stems,
Methyl orange,
Kinetics,
Isotherms.

ABSTRACT/RESUME

Abstract: This study consists of evaluating the biosorption on a local material, palm stems from the Laghouat region. In order to optimize this process, several parameters such as: pH, contact time, initial dye concentration and ionic strength were also studied. Monitoring of the kinetics of direct absorption of methyl orange by palm stems and the isothermal study.

The results of the batch biosorption tests confirmed the ability of this material to adsorb the studied dye with an equilibrium time of 120 min at pH 4. The modeling shows that the biosorption of the elements considered takes place in a monolayer according to the Langmuir isotherm with a maximum adsorption quantity of methyl orange is estimated at 8.67 mg/g under the optimal conditions obtained.

I. Introduction

Water is essential to life, without it there would be no possible life on earth because all living things need water to exist. Water is one of the five essential elements for life and it is essential for the development of all life [1].

The protection of water is a considerable stake for our future; we are all concerned if we wish to continue to live in good condition, for that however we must all be careful not to use this blessing abusively.

The various human activities of the industrial, urban or agricultural type cause the pollution of water because of the discharges of many toxic products [2, 3]. Among these released products are mineral pollutants such as cobalt, copper, nickel, chromium, lead and zinc, which are detected in waste streams from mining operations, tanneries, electronics, electroplating, batteries and petrochemical industries [4,5] and organic pollutants such as synthetic dyes used in the textile industry which are discharged directly into the aquatic environment without any prior treatment [6,7].

Following this great threat to the environment, a lot of work has been done on water pollution control.

And several depollution techniques have been developed, we can cite precipitation [8], membrane filtration [9], ion exchange [10], liquid extraction [11], electrodeposition [12], advanced oxidation processes [13], biological processes [14] and adsorption which is considered to be one of the most widely used treatment techniques [15, 16] to remove certain classes of pollutants from water, in particular those which are not readily biodegradable. The removal of dyes is one of the groups of pollutants that is currently a problem.

In the course of research, several unconventional adsorbents have been investigated as agricultural wastes which can be obtained and used as adsorbents with inexpensive [17].

Dyes such as methyl orange have a reputation for being toxic and persistent in the environment, as the latter is classified among the azo dyes that cause methemoglobinemia, characterized by the impediment of oxygen transport in the blood. Medical studies have also shown that the presence of methyl orange in water causes irritation of the digestive and respiratory systems, as well as irritation of the eyes and skin [18].