

# USING OF SURFACTANT MODIFIED Fe-PILLARED BENTONITE FOR THE REMOVAL OF PENTACHLOROPHENOL FROM AQUEOUS STREAM

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## ABSTRACT

The first part of this work considers the preparing of the adsorbent type Montm-FeOH-CTAC After purification of two types Algerian bentonites (Maghnia and Mostaghanem) and preparation of cationic polyhydroxy ferric solution, we have optimized following parameters : CTAC/Montm.-FeOH= 7 mmol.g<sup>-1</sup> and pH=3.4, in order to obtain the adsorbent with maximum uptake of PCP. The study of the different experimental equilibrium isotherms showed clearly the high efficiency of these new adsorbents toward PCP, with significant quantities adsorbed especially onto Maghnia samples in acidic environment. Using two mathematical models Langmuir and Freundlich was found to be the Freundlich the best fitted. A comparative study of PCP adsorption onto the two modified clays and an activated carbon in the same conditions has been done.

Keywords: Adsorption, chlorinated phenols, organic pollutants, pillared clays.

## INTRODUCTION

Phenolic derivatives are classified as priority hazardous pollutants in wastewater streams. They are principally issued from industries or formed by the degradation of phenoxy-herbicides, various organophosphoric pesticides and humic acids.

The chlorophenols and particularly pentachlorophenol (PCP) are formed during chlorination of water containing phenolic compounds. In spite of their moderate toxicity, their presence in drinking water even at 0,1 ug.dm<sup>-3</sup> confer to water a very disagreeable taste.

Adsorption on activated carbon is one of the processes commonly used for purification of drinking water and for advanced cleaning of effluents from biological treatment plants.

However, many researchers have studied the feasibility of using low cost substances, such as a variety of clay minerals, and industrial products [1-5].

Modified clays such Al-pillared and a cationic surfactant modified Al-pillared montmorillonite tested for removing chlorophenolic derivatives have shown a high affinity toward these compounds [2-4].

The purpose of this work is to study further the adsorption capacity of surfactant modified montmorillonite but pillared initially with iron polycation of form Fe<sub>x</sub>(OH) toward pentachlorophenol (PCP), one

of very dangerous organic micropolluting compounds.

## . EXPERIMENTAL PROCEDURES .

### Starting materials

#### Clay samples

The raw bentonites from deposits of Maghnia and Mostaghanem in the west of Algeria were supplied by ENOF (Entreprise nationale des substances utiles et des produits non Ferreux). Their chemical compositions and physical properties have been given in earlier work [1].

The <2µm fraction of each sample was obtained by the method described in our previous work [1]. These products are designated hereafter as Na-Montm.

#### Fe-hydroxy polycation solution

Iron pillaring agent was prepared as follows. A stock solution of ferric nitrate was prepared by dissolving an appropriate amount of Fe(NO<sub>3</sub>)<sub>3</sub>.9H<sub>2</sub>O (99% Merck) in distilled water at room temperature. A 0.1M NaOH solution was slowly added drop by drop (0.6 cm<sup>3</sup> min<sup>-1</sup>) to 0.43 M Fe(NO<sub>3</sub>)<sub>3</sub> solution with vigorous stirring (using an agitator with glass rod) to obtain a final solution with an OH/Fe ratio equal to 2.0 and a final concentration of 0.2M Fe<sup>3+</sup>.