

Hydrophobic cavities in organophilized clays for the efficient removal of the hazardous hormone ethynylestradiol.

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Introdução

The elimination of the very hazardous endocrinous disruptor hormone contaminants from water, for example ethynylestradiol (EE), is an important current challenge. Different methods have been tested and proved to be ineffective.^{1,2} Therefore, new and more efficient strategies for the removal of hormones are required. In this work, the clay montmorillonite was modified with the cationic surfactant CTAB (cetyltributylammonium bromide) in order to produce microporous hydrophobic cavities for the efficient removal of EE from water (Figure 1).

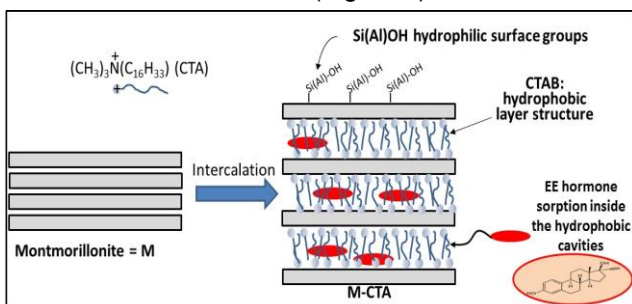


Figure 1. Hydrophobic cavities in the organoclay for the absorption of (EE).

Resultados e Discussão

Different M-CTA samples were prepared varying the CTA contents from 0 to 9, 16 and 34 wt% determined by TG and elemental analyses (Table 1). Analyses of the obtained organoclays by XRD, EDS, BET surface area, IR, contact angle, positron annihilation lifetime spectroscopy suggest that CTA is intercalated in the interlayer space of the clay to form the hydrophobic cavities. SEM images did not show any significant change in texture after intercalation of CTA in the clay (Figure 2).

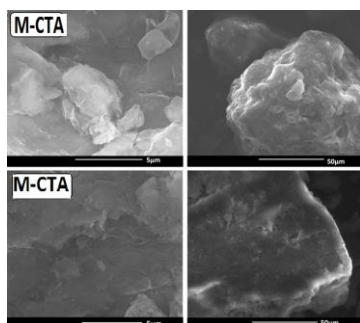


Figure 2. Scanning electron micrography of M-CTA
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Table 1 shows the results obtained from TG/DTG curves, elemental analysis, XRD and adsorption EE

Sample	CTA /wt% ^{a*}	d ₀₀₁ /nm	EE absorption mg g ⁻¹
M0CTA	0	1.50	0.0
M09CTA	9	1.68	2.6
M16CTA	16	1.63	7.5
M34CTA	34	1.73	7.4

^{a*} Determined by TG and CHN

Figure 3, shows the removal of EE using the organoclays. It can be observed that the pure montmorillonite clay did not adsorb any EE. On the other hand, with the intercalation of CTA the EE removal increased up to 36-38% (7.4-7.5 mg_{EE}/g_{clay}).

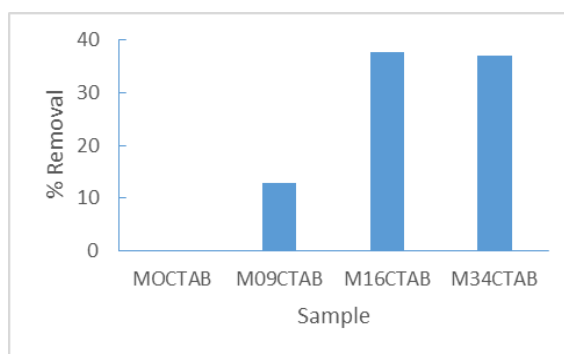


Figure 3. EE removal using M-CTA.

Reuse studies showed that the saturated M-CTA can be recovered by simple extraction with acetonitrile and reused several times.

Conclusões

The intercalation of CTAB in the clay montmorillonite produced hydrophobic cavities efficient for the removal of the hormone EE from water.

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