

SUPPORTING INFORMATION

INFLUENCE OF THE PREPARATION METHOD ON THE PHYSICO-CHEMICAL AND SORPTION PROPERTIES OF MONTMORILLONITE

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Summary

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Methylene blue absorption spectra

The MB concentration in the supernatant were analyzed with a UV-Vis spectrophotometer (SHIMADZU UV-2600/2700).

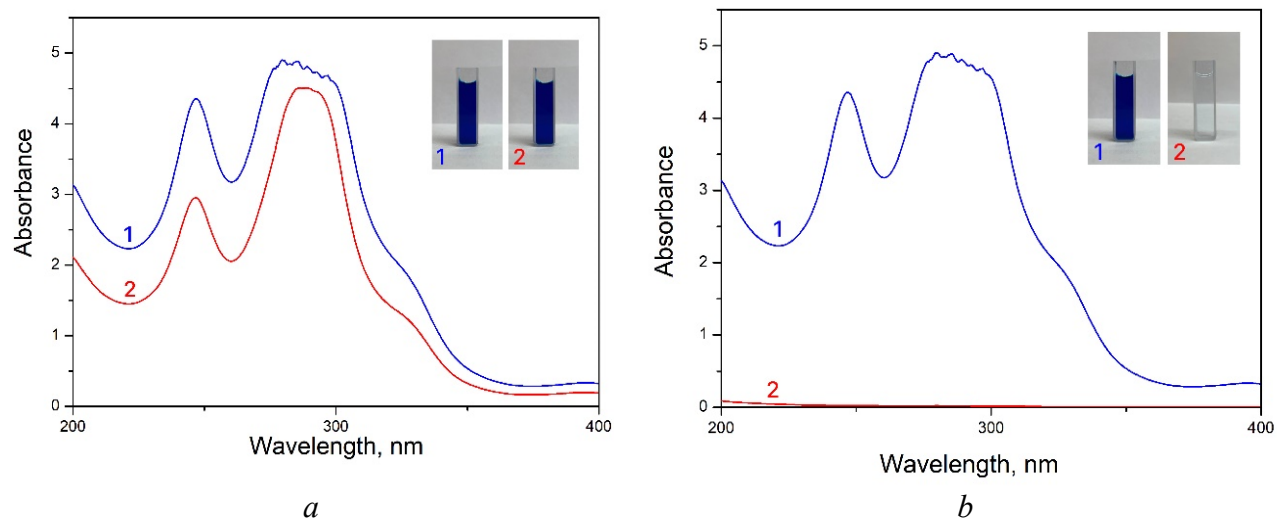


Figure S1. Absorption spectra and photographs of 200 mg/mL of MB. Curves 1 - before and 2 - after addition of montmorillonite samples *a*) Al0-gel (24 h); *b*) Al0.5-gel (2 h).

Photographs and spectra confirm the high sorption efficiency of montmorillonite Al0.5.

Kinetics of methylene blue adsorption

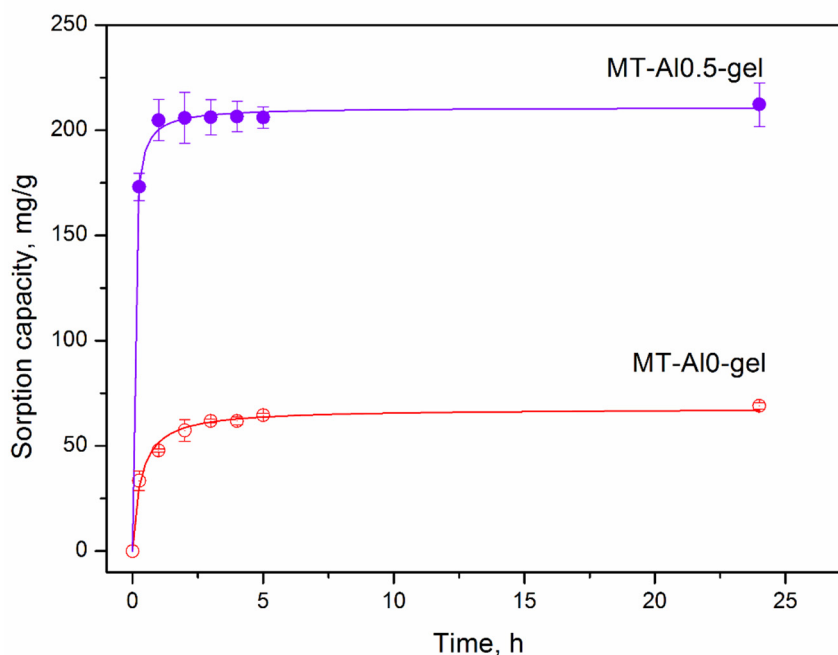


Figure S2. Kinetic curves of MB adsorption by the montmorillonite samples.

Pseudo-first-order (PFO) and pseudo-second-order (PSO) adsorption models [49–51] were used to process the kinetic data. Based on the results of graphic processing of the experimental data, it was established that the sorption kinetics for the MT-Al0-gel and MT-Al0.5-gel samples is well described by a pseudo-second order equation: the theoretically calculated values of the sorption capacity q_{calc} are close to those found experimentally, and the high approximation coefficient is 0.99. The pseudo second order (PSO) kinetic model is usually associated with the situation where the rate of the direct adsorption/desorption process is rate limiting. The data obtained allow us to conclude that the sorption equilibrium in the dye-MT system is established quite quickly: for MT-Al0-gel in 3 h, and for MT-Al0.5-gel in 2 h.

Within the framework of kinetic models, the rate constants of the process were also calculated (Table S1). The samples show high values of pseudo-second order rate constants, the highest for MT-Al0.5-gel, which is consistent with the short time of equilibrium in the system.

Table S1. Parameters of kinetic models of sorption of methylene blue on montmorillonites

Samples morphology	q_{exp} , mg/g	PFO model			PSO model		
		q_{calc}	k_1	R^2	q_{calc}	k_2	R^2
MT-Al0-gel	69±1	62±2	2.2±0.5	0.94	67±1	(7±1)·10 ⁻³	0.99
MT-Al0.5-gel	212±10	207±1	7.4±0.3	0.98	210±1	(90±8)·10 ⁻³	0.99

q_{exp} и q_{calc} — experimental and calculated value of sorption capacity (mg/g), k_1 — the PFO reaction rate constant, min⁻¹, k_2 — the PSO rate constant (g/(mg·min)).

References

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