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# Visible Spectroscopy of Methylene Blue on Hectorite, Laponite B, and Barasym in Aqueous Suspension

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**Abstract:** The absorption spectra of methylene blue ion exchanged on hectorite, Laponite B, Barasym, or sepiolite in dilute aqueous suspensions show the presence of the monomer, the protonated monomer, the dimer, and the trimer. Due to conformational differences, the absorption band maximum of the monomer with respect to its maximum in aqueous solution is red shifted when it is adsorbed on the external surface and blue shifted when it is adsorbed on the interlamellar surface. The availability of the interlamellar surface for methylene blue as a function of the type of clay and/or the counterion present thereby can be probed. The results indicate that 0.6– 0.7% of the cation-exchange capacity of Barasym consists of acid sites capable of protonating methylene blue. Counterions of low hydration energy were found to induce a small number of similar sites in hectorite and Laponite B; hence, these sites must be situated on the external surface. Dimers formed on external surfaces show one absorption band. Dimers formed on the interlamellar surface of hectorite yield spectra having two absorption bands. The trimer was formed only at the external surface. With increasing loading of the clays, the spectra of methylene blue showed metachromasy. The metachromatic behavior can be fully explained by dye aggregation, which is the result of its concentration on the surface. No  $\pi$ -electron interaction with the surface oxygens need be invoked.

**Key Words:** Adsorption • Barasym • Hectorite • Laponite • Methylene blue • Sepiolite • Visible spectroscopy

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