**Komitet za termodinamiku**
**i fazne dijagrame Srbije**

***u saradnji sa:***

**Fakultetom tehničkih nauka u Kosovskoj Mitrovici,**
**Tehničkim fakultetom u Boru i**
**Associated Phase Diagram and Thermodynamics Committee**
**(Poland, Czech Republic, Hungary, Bulgaria, Slovenia, Serbia, Montenegro, Romania, Croatia, Bosnia and Herzegovina)**

# Deseti simpozijum o TERMODINAMICI I FAZNIM DIJAGRAMIMA

**sa međunarodnim učešćem**

*Zbornik izvoda radova*

TPD Symposium X 2021

**Kosovska Mitrovica,**
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# Deseti simpozijum o termodinamici i faznim dijagramima

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# Thermal and XRD analyses in characterization of bentonite modified with different amounts of surfactant

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**Abstract**

Organobentonites are usually synthesized by intercalating various long chain organic cations (surfactants) into the interlayer space of bentonite by ion exchange with naturally occurring exchangeable cations. Presence of surfactants in the interlamellar space of bentonite changes its surface properties from hydrophilic to hydrophobic [1].

In this study, results on characterization of organobentonites obtained by treatment of Ca/Na bentonite with different amounts of surfactant – octadecyldimethylbenzyl ammonium chloride – ODMBA (10, 20, 30, 50 and 100 % of cation exchange capacity of Ca/Na bentonite) are presented. Organobentonites are denoted as OB-10, OB-20, OB-30, OB-50 and OB-100 [2]. Characterization of organobentonites were done by XRD [2] and thermal (DTA/TG) analyses. DTA curves as well as the data for mass loss from TG curves of Ca/Na bentonite and organobentonites are presented in the graphical abstract. DTA/TG analysis can be used to differentiate peaks associated with weight loss and those associated with phase transition and is widely used in the study of thermal reactions of the natural clay minerals (e.g. Ca/Na bentonite). These reactions include dehydration, dehydroxylation as well as transformation of the clay to a meta-phase and recrystallization of the meta-phase into a crystalline phase. The first two reactions are endothermic whereas the recrystallization of the meta-phase is exothermic [3]. In the DTA curves of the organobentonites, additional intensive exothermic peaks at temperatures >300°C were observed representing oxidation of the organic matter present in the interlayer space of clay. The relative intensity of these exothermic peaks increase with increasing amounts of ODMBA in organobentonite. From mass loss, it can be seen that when organic cations are present in the interllamelar space of clay, mass loss in the first temperature region is lower confirming that treatment of Ca/Na bentonite with ODMBA ions increase hydrophobicity of the clay surface.

**Acknowledgement**

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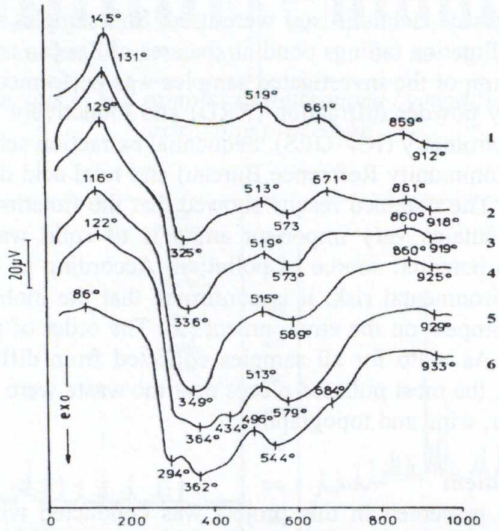
**References**

1. S. Sahnoun, M. Boutahala, C. Tiar, A. Kahoul, C. R. Chimie 21 (2018) 391-398
2. A. Daković, M. Tomašević-Čanović, V. Dondur, D. Stojšić, G. Rottinghaus, Zeolites and mesoporous materials at the down of the 21st century, in: A. Galarneau, F. Di Renzo, F. Fajula, J. Vedrina (Eds.), Proceedings of the 13th International Conference, Montpellier, France, 8–13 July 2001. Stud. Surf. Sci. Catal. 135 (2001) 5276-5283.
3. S. Yariv, Appl. Clay Sci. 24 (2004) 225-236.

**Graphical abstract:**




*DTA curves: 1) Ca/Na bentonite; 2) OB-10; 3) OB-20; 4) OB-30; 5) OB-50 and 6) OB-100*

*Mass loss for investigated samples in different temperature regions*

| | Mass loss, % | | | |
|---|---|---|---|---|
| | 20°C-200°C | 200°C-460° | 460°-800°C | 20°C-1000°C |
| Ca/Na-Mont | 11.40 | 1.50 | 4.72 | 17.72 |
| OB-10 | 9.82 | 3.33 | 6.82 | 19.89 |
| OB-20 | 8.74 | 4.05 | 8.02 | 20.98 |
| OB-30 | 6.69 | 6.42 | 10.49 | 24.18 |
| OB-50 | 4.03 | 9.52 | 14.65 | 28.50 |
| OB-100 | 2.25 | 18.39 | 16.65 | 37.53 |