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ABSTRACT BOOK

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Novel zeolite`s nanocomposites with a two-tailed cationic surfactant – Arquad ® 2HT-75 with increased stability

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Functionalization of natural zeolites (NZ) with cationic surfactants drastically alters the surface chemistry of zeolite and opens new applications possibilities for water treatment: adsorption of pharmaceuticals, pesticides, dyes, etc. The use of surface modified natural zeolites (SMNZs) could be a reliable approach for water treatment, as they can simultaneously remove cations, anions, and/or non-ionized molecules. The main advantages of the NZs, as starting materials, are their abundance in nature, low-cost and good stability. However, the main drawback is a potential instability of surfactant at the zeolite surface. Literature data showed that a certain amount of surfactant can be removed from the zeolite surface depending on experimental conditions, which could have a negative impact on water quality. To increase SMNZs stability and abate possible negative effects on the environment, it is suggested to use different novel types of surfactants (Reeve et al., 2018 and references therein).

For these reasons, a zeolite-rich tuff IZ CLI (Turkey) with clinoptilolite as the main component (79%) has been modified using two cationic surfactants such as Cetylpyridinium chloride (CPyCl) and Arquad®2HT-75 (ARQ), the latter with two hydrocarbon chains. The bilayer composites (B), CPyCl-B and ARQ-B, were prepared using the method of fast functionalization (de Gennaro et al., 2016). To test the stability of composites, 1 g of CPyCl-B or ARQ-B was washed with 2 l of distilled water. Z-potential (Zetasizer Nano ZS90, Malvern Instruments) was measured for unmodified tuff as well as for composites before and after washing.

Z-potential for IZ CLI has shown a negative value (-37.9 mV). The formation of a bilayer was confirmed by the inversion of Z - potential values which turned to positive for both composites CPyCl-B and ARQ-B (+37.7mV and +36.1mV, respectively). After extensive washing of composites, Z - potential of CPyCl-B has dropped to -7.9 mV indicating a significant loss of surfactant molecules. On the other hand, washing of ARQ-B almost did not affect Z-potential indicating great stability of bilayer at the zeolite surface when a two-tailed surfactant was used. These results could open new possibilities for SMNZs applications in fields where surfactant stability is crucial, such as water treatment, thus promoting further research on the use of different novel cationic surfactants.

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