

Application of Natural Zeolites: Understanding the Properties at a Molecular Scale

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Natural zeolites are usually found as zeolite-rich rocks (zeolitites) which contain at least 50 wt% of zeolite phase. Italian zeolitites may contain phillipsite or chabazite with an overall content of zeolite phase as large as 70 wt%. Especially for agronomical and agricultural purposes, an important property is the adsorption and/or release of the ammonium ion. In this frame, the aim of this study is to present the structures of NH₄ exchanged chabazite and phillipsite and to explain the different behaviour of the two zeolites in agronomy and agriculture applications. It is shown that the knowledge of the local environment of NH₄⁺ in the cavities of these zeolite species is extremely important. In chabazite, the ammonium ion with a monodentate local structural environment may be easily released or desorbed. NH₄-phillipsite [1] shows instead that the ammonium ion is in a tridentate local environment and it is consequently more difficult to be released or desorbed in solution. As a matter of fact, the zeolitite with NH₄-exchanged chabazite gave very encouraging results in agronomy applications. On the contrary, the zeolitite with NH₄-exchanged phillipsite gave very poor results for the same application [2].

[1] Gualtieri A.F., *Acta Cryst.*, 2000, **B56**, 584. [2] Mazzocchi R., Casalicchio G., Giorgioni M.E., Loschi B., Passaglia E., Savelli C., *Colture Protette*, 1996, **11**, 91.

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