

Popularnonaukowe streszczenie English version

Clay minerals are substances of very small grain size – at the level of 0.00X mm. Due to their specific layered structure, clay minerals can easily be modified using various techniques. For instance, some modification methods lead to the formation of microporous materials of large specific surface area (about 200-400 m²/g), which can be the sorbents of gases or ions, or can be the catalysts.

The following project aims to apply methods modifying the structure of montmorillonites, which will enable us to produce a sorbent capturing CO₂ and so-called bleaching earths capable of capturing various hazardous chemical compounds.

The first method is based upon so-called pillaring of montmorillonite. In this method, pillars are introduced among the montmorillonite layers, where they bonds adjacent sheets but also generate micropores between the pillars. Such modification enables the sorption of e.g., CO₂ on montmorillonite.

The second method applies a new technique of chemical activation of montmorillonite, in which mineral is dried in order to remove hydration water and then is intercalated with a proper volume of relevant solution of salt or acid. Dry montmorillonite very quickly absorbs such solutions and this process is accompanied by cation exchange in the interlayer spaces. Hence, we obtain a dry product of reaction, which can be a final output or can be subjected to further modification techniques.

The described above research was undertaken because: (i) CO₂ sorbents are still sought in order to reduce the emission of so-called greenhouse gases by investigating sorption mechanisms on various substances and (ii) the known methods of chemical activation of bentonites are still modified. The presented research project is a very promising example of such attempts.