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Synthesis of ETS-10 and its modification

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The objective of this study is to synthesize ETS-10 and modify its surface area, pore volume, and pore size. ETS-10 adsorbent, with a Si/Ti ratio of 5.5, was synthesized without seeds using the hydrothermal method[1]. To modify ETS-10, organic templates such as tetrapropylammonium bromide and P123, as well as a specific weight percentage of isopropanol as a solvent, were used. ETS-10(Na, K) was synthesized using hydrothermal methods as previously reported. The final gel composition was $3.5Na_2O{:}1.5K_2O{:}TiO_2{:}5.5\ SiO_2{:}131\ H_2O$ [1]. During the synthesis of ETS-10, sodium silicate and deionized water were mixed, and then sodium hydroxide and potassium chloride were added to the mixture. After achieving a homogeneous mixture, titanium trichloride was added, and the pH level was set to 10-11. The resulting gel was then transferred to a Teflon-lined autoclave and heated at 230°C for 60 hours. Finally, the ETS-10 powder obtained was washed and dried for 24 hours at 110°C. In comparison to the ETS-10 synthesis, the synthesis of ETS10 (10 wt% isopropanol) and ETS-10 (20 wt% isopropanol) involved substituting 10 wt% and 20 wt% of deionized water, respectively, with isopropanol solvent in the first step of the synthesis. The synthesized adsorbents were named ETS10 (10 wt% isopropanol) and ETS-10 (20 wt% isopropanol). The synthesis of organic templates followed the same procedure as the ETS-10 synthesis: after adding sodium hydroxide and potassium chloride, organic templates such as TPABr and P123 were added to the mixture. The resulting mixture was dried and then calcined [2]. XRD, SEM and BET analysis were used to identify the synthesized compounds.

Keywords: Synthesize, Titanosilicat, ETS-10, Hydrothermal method.

References

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