Abstract

UZM-9 zeolite of LTA framework holds significant importance due to its unique structure and properties, making it suitable for various industrial processes such as gas separation, ion exchange, and catalysis. Optimizing the synthesis process is crucial to enhance its performance and applicability. This research aims to contribute to develop efficient and cost-effective methods for its production, furthering its potential in industrial applications.

The main objectives include the optimization of synthesis parameters, isomorphous substitution, and adsorption studies. Optimization involved the addition of seeding crystals, reducing structure-directing agents, and selecting reactant sources. Direct synthesis of Fe and Zr forms of the UZM-9 zeolite by isomorphous substitution was studied. Adsorption studies examined CO_2 on different cation forms, while the texture properties were studied by nitrogen adsorption. Prepared zeolites were further characterised by XRPD, SEM, ICP-MS, and FT-IR.

Results show significantly improved crystallization times, enhanced texture properties, and the effects of using various sources of reactants. Isomorphous substitution of Fe atoms was unsuccessful, while showing promising results for Zr. Various ion-exchanged forms of UZM-9 zeolite were shown to have their adsorption properties affected by the cations present in their pores, while the results also varied with adsorbed gas.

Overall, the study managed to optimise the synthesis, possibly making it economically viable, while thoroughly researching its characteristics and therefore possibilities of its utilization.