

UNIVERSITY OF BELGRADE  
TECHNICAL FACULTY IN BOR



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## INVESTIGATION ON THE CO<sub>2</sub> BREAKTHROUGH BEHAVIOUR OF DIFFERENT MATERIALS

Students: Marko Krpić<sup>1,2</sup>, Aleksandar Đorđević<sup>2,3</sup>

Mentor: Boris Rajčić<sup>3</sup>

<sup>1</sup>Trayal Corporation, Kruševac, 37000, Serbia

<sup>2</sup>University of Belgrade, Faculty of Chemistry, Belgrade, 11158, Serbia

<sup>3</sup>Institute of General and Physical Chemistry, Belgrade, 11158, Serbia

### Abstract

The fabrication and manufacturing processes of industrial commodities such as iron, glass, and cement are carbon-intensive, accounting for 23% of global CO<sub>2</sub> emissions. Chemical absorption is one of the most promising technologies for CO<sub>2</sub> capture. The development of adsorption-based technologies for CO<sub>2</sub> capture in the post combustion processes requires finding materials with high capacity of adsorption and low cost of preparation. In recent years, carbon capture and utilization (CCU) has been proposed as a potential technological solution to the problems of greenhouse-gas emissions and the ever-growing energy demand. To combat climate change and ocean acidification as a result of anthropogenic CO<sub>2</sub> emissions, efforts have already been put forth to capture and sequester CO<sub>2</sub> from large point sources, especially power plants. In this work, zeolite 13X was used as potential materials for CO<sub>2</sub> adsorption. The method used for testing was based on the simulation of air flow of a certain composition using a test station, where it is the flow rate and air humidity can be adjusted. The results are presented in graphs together with adsorption capacities. For the applied conditions in this research, satisfactory results were obtained in a high percentage. Obtained results for 13X illustrate its potential as an effective adsorbent for the selective separation of CO<sub>2</sub> from air. Also, this method may be used for the separation of CO<sub>2</sub> from flue gas exhaust or other greenhouse gas emissions, and may have important applications in the pressing areas of sustainability and climate change mitigation.

**Keywords:** Adsorption CO<sub>2</sub>, Zeolite, CCU, Climate change

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