## ENRICHMENT OF GAS MIXTURES WITH METHANE USING PSA TECHNOLOGY

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## Abstract -

**Problem Statement.** Methane is the second most emitted greenhouse gas in terms of total emissions, but the impact of methane on global warming is significantly greater compared to carbon dioxide - the most emitted greenhouse gas. Therefore, reduction of methane emissions is important. Currently, existing technologies offer the capability to capture and extract methane from gaseous mixtures, however often insufficiently. In this work, efforts have been made to improve the enrichment of lean gas streams with methane using Pressure Swing Adsorption (PSA) technology.

**Methods.** The scope of works in presented research included the use of both commercial and original research equipment. The first step was to perform adsorbent selection by determining the porous structure, surface characteristics and sorption analysis. On the basis of the measured data, a way to carry out the PSA process was designed. Then the designed process was verified by conducting a test experiment under laboratory conditions on the original PSA unit constructed by the authors.

**Results.** As a result of the studies, an adsorbent material with potentially relevant properties for its use in the PSA process was found. After running in the laboratory PSA unit the designed PSA process based on the selected adsorbent, it was stated that a satisfactory level of enrichment of the initial lean gas mixture with methane, was achieved.

**Conclusion.** This study demonstrated that it is possible to design a PSA process for methane enrichment of lean gas streams. It is also worth noting that continuing efforts to further improve this process are still needed, as well as more experiments should be undertaken.

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