# ISOTHERM OF BENZENE VAPOR ADSORPTION ON NaXL ZEOLITE

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ABSTRACT
Adsorbents with high sorption properties were created as a result of hydrothermal addition of amorphous silicon oxide and aluminum oxide in kaolin at a high molecular level. According to this method, NaXL is obtained as a result of interaction of 12.5% NaOH solution, metakaolin with γ-$Al_2O_3$. Adsorption of the obtained adsorbent NaXL in benzene vapor was studied.
Keywords: kaolin, metakaolin, NaXL zeolite, benzene.

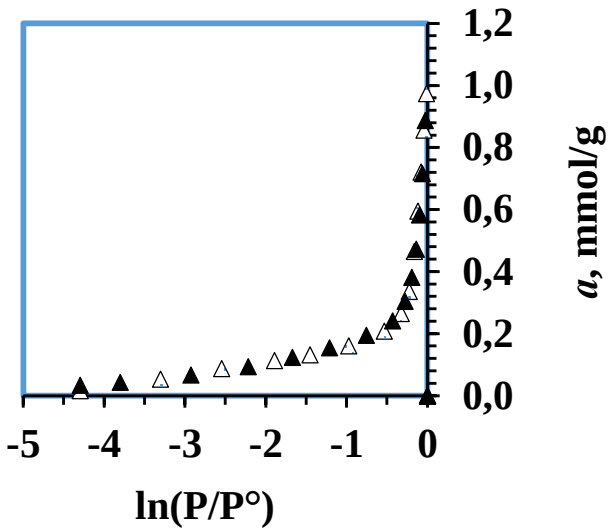
Introduction. Preparation of microporous synthetic zeolites from local raw materials containing silicon and aluminum oxides and studying their adsorption properties is an urgent issue today. The formation of an irregular (amorphous) phase of metakaolin (aluminum disilicate) as a result of endothermic dehydration of kaolin in open air at 550-650°C was recognized by the authors. [1]. The structure of metakaolin is a mixture of amorphous silicon and aluminum oxides. Adsorption of polar and non-polar molecules on synthetic zeolites and clay mineral adsorbents Rakhmatkariev G.U. and others have done a lot of research[2,3].

Research object and methods. The differential heat of adsorption was measured in a DAK 1-1 calorimeter of the Tian-Calve model. The capillary method was used to determine the adsorption isotherm. The adsorption isotherm has an accuracy of 0.1% and a differential heat of up to 1%. Adsorption of benzene vapor was carried out at 303 K on a microporous sorbent obtained from native coal [4].

Results obtained and discussion. Determination of complete thermodynamic properties of microporous sorbent obtained from local coal was carried out by

capillary method in a high vacuum adsorption device. Figure 1 shows the isotherm plot of benzene vapor on a microporous adsorbent obtained from native kaolin. When benzene molecules are adsorbed on zeolite surfaces, p-complexes are formed. For the formation of p-complexes, 0.4 mmol/g of benzene is absorbed on the surfaces of NaXL zeolite. Adsorption of benzene molecules on NaXL zeolite ranges from 0.3 mmol/g to 0.53 mmol/g. The adsorption process in this layer has a complex description and is carried out mainly by the migration of cations. Adsorption of benzene molecules to NaXL zeolite obtained from Angren kaolin and alumina is mainly due to the formation of p-complexes with sodium cations located at the entrance of the pores. NaXL zeolite adsorbs a total of 0.97 mmol/g of benzene.

Summary. When benzene molecules are adsorbed on zeolite surfaces, p-complexes are formed. For the formation of p-complexes, 0.4 mmol/g of benzene is absorbed on the surfaces of NaXL zeolite. Adsorption of benzene molecules on NaXL zeolite ranges from 0.3 mmol/g to 0.53 mmol/g. NaXL zeolite adsorbs a total of 0.97 mmol/g of benzene.




Δ-value of experiment
▲-Points calculated by volume saturation theory of micropores

Figure 1. Benzene vapor adsorption isotherm on NaXL zeolite at 303 K

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