

## ADSORPTIVE PURIFICATION OF ETHER-ALDEHYDE FRACTION BY NATURAL ADSORBENTS

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Ester-aldehyde fraction (EAF) is a mixture of ethanol with concentration of 94 ... 98% and 2% ... 6 of main impurities (ethers, aldehydes, diacetyl, methanol, nitrates and sulfates).

Existing methods of purifying EAF through using acceleration column, with which a distillation unit is equipped, or through the use of activated carbon, treated prior with hydrogen peroxide or nitric acid, require significant energy input, additional equipment, expensive active carbon, activated by chemical reagents, which are poisonous.

The authors proposed an effective method of processing EAF by using cheap local adsorbents: palygorskite and hydromica, which have high adsorptive properties, could be re-generated and recycled, and deposits of which are developed in Ukraine.

For research the authors took palygorskite and hydromica with fraction of 1 ... 2 mm, subjected them to thermo-activation at  $t = 100^{\circ} \text{C}$  for 60 min. Cooled sorbents were put into adsorber, and EAF was passed through layer of minerals. The purified solution was analyzed by chromatograph. For comparison, EAF solution, not processed by sorbents, was used.

As shown by the obtained results, palygorskite absorbs diethyl ether, methyl acetate, reducing their initial contents twofold and threefold respectively. Palygorskite also effectively absorbs ethyl acetate, acetaldehyde, acetone and acetic acid.

Hydromica adsorbs acetaldehyde, reducing its initial concentration threefold.

Larger adsorptive capacity of palygorskite, when compared to hydromica, can be explained by various structural composition of the studied minerals. For instance, the edges of palygorskite crystals, which are charged with homogeneous OH-groups, will actively form hydrogen connections with negatively charged large molecules. Significant part of the palygorskite surface contains zeolite-like channels, available for adsorption of small molecules.

Hydromica is characterized by having only external adsorptive surface, and its porosity is caused by cracks between contacting particles. Since hydromica effectively adsorbs acetaldehyde, and palygorskite adsorbs also other impurities, it could be recommended to use combined sorbents with different ratios of palygorskite and hydromica to purify EAF.

It was established that to purify 1000 decaliters of EAF it is sufficient to use 400 ... 420 kg of palygorskite or hydromica. Low cost of the studied sorbents, their developed deposits in Ukraine, high adsorptive capacity prove the economic feasibility of their use for purifying EAF.

**KEY WORDS:** natural adsorbents, palygorskite, hydromica, ether-aldehyde fraction