IR-SPECTROSCOPY STUDY OF OXYGEN-CONTAINING ORGANIC (E-2) OBTAINED ON THE BASIS OF EPICHLOROHYDRIN AND ALCOHOLS

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Abstract. *Fusel oil is a valuable component for a number of industries. Isoamyl alcohol $(CH_3)_2CHCH_2CH_2OH$ is the main component of fusel oil. At the same time, oxygenates containing oxygen, despite some disadvantages, are currently considered the most promising anti-detonation additive for gasoline. The use of such additives in this case will depend on the balance of environmental impact characteristics of the additives and production costs.*

Keywords: *oxygen, fusel oil, additive, gasoline, non-oil raw materials, epichlorohydrin, oxygenates, octane number*

As a rule, the amount of oxygen-containing anti-knock agents in gasoline fuel is several percent, and they are described as additives that increase the octane number. An important advantage of oxygen is that it can be partially or completely produced from non-oil raw materials. In other words, the use of oxygenates in fuel helps to preserve traditional energy sources and use alternatives [1-6].

The structure of organic esters based on epichlorohydrin and methanol, which increase the octane number, was studied using IR-spectral data.

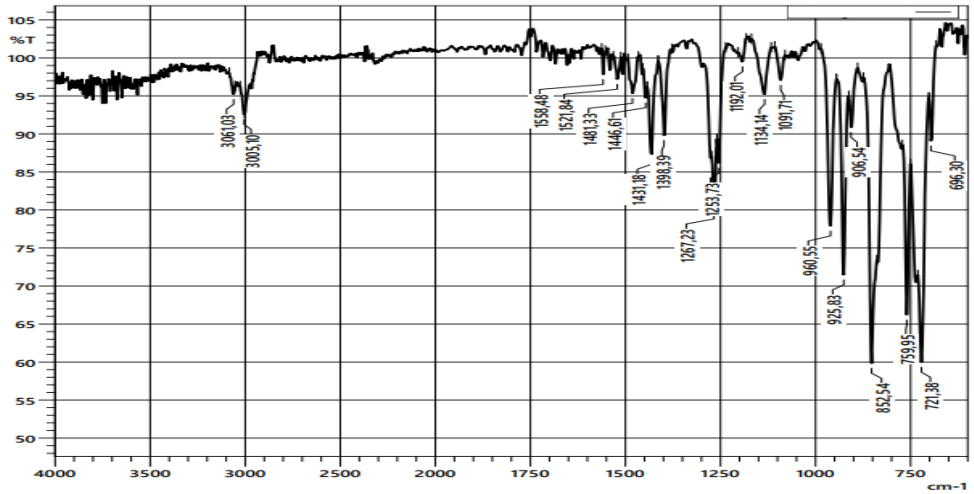
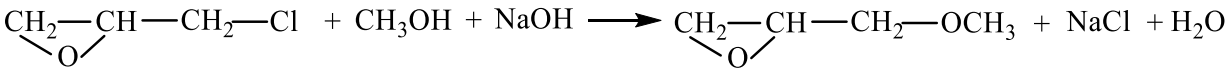


Fig 1. IR-spectroscopy of epichlorohydrin, which is considered as a starting material in the production of additives that increase the octane number.

When the epichlorohydrin molecule was studied in an IR-spectrometer, valence vibrations of C-C_l groups were observed in the 1446-1481 cm^{-1} range. And in the 721-759 cm^{-1} region, we can see the valence vibrations of the C-C group. The most characteristic absorption band for epichlorohydrin is the epoxy group. In the region of 3005-3061 cm^{-1}, symmetric valence vibrations of the epoxy group occurred, and in the region of 852-960 cm^{-1}, asymmetric valence vibrations occurred.

Epichlorohydrin and methanol-based epoxide group ethers are presented under IR-spectroscopy analysis.

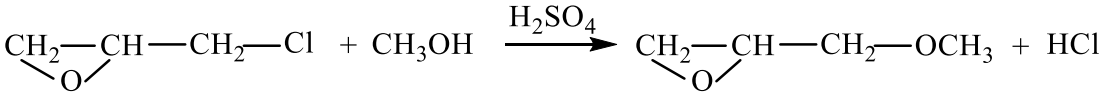
(Under alkaline conditions) Reaction of epichlorohydrin and methanol (E-1).



In the 2943 cm^{-1} region of the IR spectrum, symmetric valence vibrations of the epoxy group, and asymmetric valence vibrations in the 844-966 cm^{-1} region, were invisible. We can see CH_3O- ether group's valence in the 2831 cm^{-1} area and deformational vibrations in the 1429-1473 cm^{-1} area. Symmetric 2885 cm^{-1} and asymmetric 1869 cm^{-1} valence vibrations of the CH_2 group are observed in the corresponding fields.

Epichlorohydrin and methanol-based epoxide group ethers are presented under IR-spectroscopy analysis.

(Catalyst H_2SO_4 under acidic conditions) Reaction of epichlorohydrin and methanol (E-2):



In the 2943 cm^{-1} region of the IR spectrum, symmetric valence vibrations of the epoxy group, and asymmetric valence vibrations in the 846-966 cm^{-1} region, were invisible. We can see the CH_3O- ether group's valence in the 2831 cm^{-1} area and deformational vibrations in the 1456-1473 cm^{-1} area. Symmetric 2885 cm^{-1} and asymmetric 1869 cm^{-1} valence vibrations of the CH_2 group are observed in the respective fields.

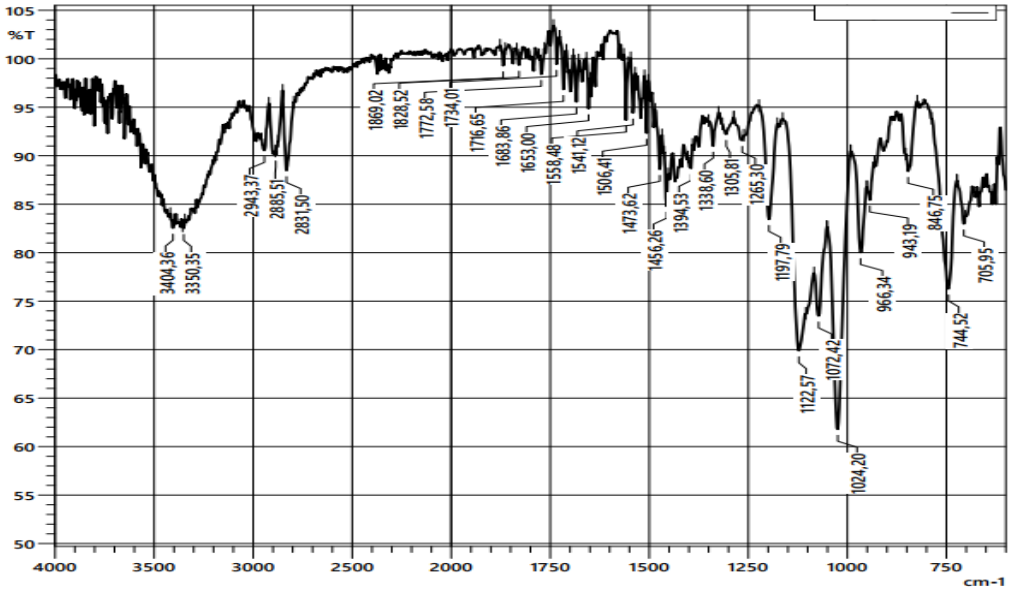


Fig 2. IR-spectroscopy of ethers with epoxide group obtained on the basis of epichlorohydrin and methanol (acidic medium).

The efficiency of E-1 and E-2 esters obtained by these two methods (reaction yield -82%) is higher in E-2, but the economic efficiency (reaction yield -75%) is higher in E-1. The physico-mechanical properties of the proposed E-1 and E-2 ethers were studied and reaction equations were presented.

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