

INTERACTION OF BROWN COAL WITH ISOPROPANOL IN A MICROWAVE FIELD

Satpaeva Zh.B.^{1,2}, Fazylov S.D.¹, Tateyeva A.B.², Karipova G.Zh.²,
Arinova A.E.^{1,2}, Issayeva A.Zh.²

¹*Institute of Organic Synthesis and Chemistry of Coal, Karaganda, Kazakhstan*

²*Academician Ye.A. Buketov Karaganda State University,*

Karaganda, Kazakhstan

satpaeva_zh@mail.ru

Modified coal is a potential source of high-quality crude mountain wax. We investigated the effect of microwave treatment on the interaction of brown coal of the isopropyl alcohol in the presence of *p*-toluensulfonate (0.01 mole) as catalyst. Conditions of alkylation treatment: the reaction time in the microwave field was limited in all cases to 1 hour; the weight of the coal was 5 g; amount of the catalyst was 0.01 mole, and the amount of alcohol was 50 ml. Microwave exposure was carried out on the device brand LG-MS2022G (2.45 GHz). After alkylation, the solid residue was subjected to extraction treatment with a benzene carrier and a mixture of 2-propanol-benzene (1:1). The extractive bitumen's obtained were fractionated with sulfuric ether into waxes and ethers. The group composition of waxes was investigated by alkaline hydrolysis with 5% alcohol solution of potassium hydroxide, separating the saponification products in a similar way. Chromato-mass-spectrometric (CMS) analysis of alkylated products was carried on an Agilent Technologies 7890A.

It is established that the most optimal conditions for the process are: irradiation power of 150-300W, catalyst amount of 0.01 mole. As the data of CMS analysis, under these conditions the tar content on the resulting bitumen is reduced to a minimum (from 1.38% in the initial to 0.33% in the modified bitumen).

The use of microwave irradiation increase the bituminous product an average of 1.5-2 times than traditional technology. An increase microwave irradiation power above 500 W leads to an increase in resinous substances in the recovered bitumen.

According to CMS benzene extract of wax substances contains oxygen-containing hydrocarbons (esters) (26.2%), aromatic hydrocarbons (33.9%) and alkanes (29.4%). The heptan extract contains mainly paraffinnic hydrocarbons (53.1%), and hexane extracts it is found oxygen-containing (51.0%) and paraffinnic (45.8%) hydrocarbons.