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Group composition analysis of the Shubarkol deposit coal-tar resin fraction

N T Smagulova[1,2,4], Zh K Kairbekov[1,2], A C Maloletnev[3], A Zh Kairbekov[2], D Zhanabaev[2] and A Kanatkyzy[1]

[1]Al-Farabi Kazakh National University, Almaty, Kazakhstan
[2]Scientific Research Institute for New Chemical Technologies and Materials, Almaty, Kazakhstan
[3]Moscow State Mining Institute (NITU MISiS), Moscow, Russian Federation

E-mail: nazym2011@inbox.ru

Abstract. Coke-chemical resin is used for the production of sulfur-free naphthalene, benzene, and tetralin. In this study, physico-chemical characteristics of the coke-chemical resin and the tar fraction were examined using gas chromatography and mass spectrometry. Three fractions of initial resin were analyzed with boiling point up to 180, 180-230, and 230-280°C. The results showed that the chemical composition of distillate fractions of resin consists of alkyl derivatives and aromatic hydrocarbons with the number of aromatic rings of 1-4.

1. Introduction

Coke-chemical resin, consisting mainly of condensed aromatic hydrocarbons and other high-molecular compounds, also refers to hard-processed raw materials. In the industry, the resin is subjected to dehydration and distillation to separate the fractions, to obtain benzene, naphthalene, phenols, pyridine bases and other chemical products by the methods of alkaline, acid-type extraction, crystallization and hydro-treating. Each stage of chemical product exudation comes with the use of re-distillation, high heat and reagent consumption, las well as the loss of valuable products, such as naphthalene [1-5]. A number of valuable chemical products, such as 2, 6-dimethylnaphthalene, are not currently produced due to the low content and high cost of exudation. At present, due to strengthening of requirements for the quality of raw materials for organic synthesis and increased demand of benzene and naphthalene, experimental work was carried out to improve the processes of hydro-treatment from coke-chemical raw materials [6-9].

2. Experimental

The material composition of the resin fractions and the hydrogenates obtained from it were determined by gas chromatography mass spectrometry using a Chromatek-Cristal 5000 gas chromatograph with a mass-selective detector of model 5973 with ionization by electron impact (70 eV) under the following conditions: fused silica capillary column HP-5MS 25 mx 25 mm, the thickness of the phase film is 0.25 μm); injector temperature 280°C, interface 290°C; the initial and final temperature of the thermostat is 35 and 280°C respectively; column heating oven at an initial temperature is 1 min; the temperature of the column heating oven changed at a rate of 10°/min; carrier gas - helium; the volume of the introduced sample is 0.2 μl. Samples were introduced into a chromatograph in a 1:40 split ratio mode. The registration of the mass spectrum of the components of the raw materials and the products obtained was