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Porous Carbons Obtained from Lignite, Anthracite and Graphite in a Bed of Slag and Catalyst Particles

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This paper describes the influence of solid fuel nature and conditions of thermal treatment in a flow reactor with a fluidized and fixed bed of slag and catalyst particles on the porosity of obtained carbon products. Lignite, anthracite and natural graphite were used as starting raw materials. Optimal conditions of thermal treatment providing the formation of porous carbons were selected for the each type of a raw material: pyrolysis with high rate of heating (flash pyrolysis) for lignite, the same combined with steam activation for anthracite and chemical modification and flash pyrolysis for natural graphite.

Keywords: porous carbon, lignite, anthracite, graphite, flash pyrolysis, activation, fluidized and fixed beds, slag and catalyst particles.

Introduction

It is known the pyrolysis of carbon-containing materials results in an evaporation of some fragments of organic matter with the obtaining of porous carbon products. Carbons with the developed porosity are usually produced from raw materials with a significant content of volatile matter at the conditions of high rate heating (flash pyrolysis) [1-6].

Different methods were applied for the technological realization of flash pyrolysis processes. Among them are the processes based on the high rate heating of powdery raw material in a flow of a gaseous carrier.

In order to increase the efficiency of a mass transfer between solid material and gaseous carrier the special technical decisions are used. Some of them supply the fuel particles moving by curvilinear trajectory, for example in cyclone reactors [5, 7]. As it was shown early, the new possibilities for increasing an efficiency of lignite pyrolysis process gives the technology based on the thermal treatment of lignite particles moving through the heating fluidized bed of more big particles of catalytically active material [1, 8, 9].

The conventional approach in production of porous carbons is the activation of carbon raw material by gaseous reagents: water steam, carbon dioxide and oxygen [10-11]. In this case

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