
DIRECTIONS FOR IMPROVING TECHNOLOGIES FOR CONVERTING COAL INTO SYNTHETIC LIQUID FUELS

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Modern technologies for producing synthetic liquid fuels from coal include pyrolysis, hydrogenation, gasification, followed by synthesis of the final products by the Fischer-Tropsch process or via methanol. In pyrolysis, liquid fuels are obtained as by-products and their yield is usually no more than a few percent. A negative feature of hydrogenation is the formation of a significant amount (up to 40 %) of small, unreactive residue, the efficient use of which poses a significant scientific and technical challenge. The gas produced by coal gasification always contains more carbon monoxide CO than hydrogen, which is due to the need to ensure the heat balance of the process. At the same time, to be used in chemical syntheses, the hydrogen content in the gas should be several times higher than CO.

To ensure the required H₂:CO ratio, part of the carbon contained in the feed coal is oxidised to carbon dioxide in an exothermic process. This improves the ratio in the resulting synthesis gas, but leads to irrational consumption of some carbon, reduces gas yield and ultimately increases the consumption factor of raw materials for the final product and worsens the technical and economic performance of the production. Therefore, obtaining additional hydrogen to improve the composition of synthesis gas is relevant. Until recently, however, the main way to produce hydrogen in industry was through the conversion of natural gas methane, which is unacceptable in today's environment. The production of hydrogen from coke oven gas, where its content is about 60 % (by volume), by short-cycle adsorption is also unpromising, due to the several-fold decrease in coke production in Ukraine and, consequently, the almost complete absence of free coke oven gas resources. Therefore, it is important to introduce other industrial methods of hydrogen production.

Keywords coal, synthetic liquid fuels, gasification, Fischer-Tropsch synthesis, hydrogen.

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