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ANALYSIS OF THE DESIGN SOLUTIONS FOR SULFUR SCRUBBERS IN COKE OVEN GAS TREATMENT PROCESSES

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This article presents a retrospective and comparative analysis of the use of various types of internal devices (packing and trays) in sulfur scrubbers at coke chemical plants. It examines the experience of developing and implementing domestic technological solutions, as well as the use of modern structured fillers from global manufacturers. Industrial performance indicators for disc-type scrubbers are presented, and issues related to their operation are outlined. The paper presents the results of the modernization of the coke oven gas desulfurization unit, carried out in 2025, aimed at improving the efficiency of absorption and solution regeneration processes. The main focus is on the reconstruction of sulfur scrubber No. 3, in which the damaged packing layers were dismantled, as they caused increased hydraulic resistance and uneven distribution of the gas-liquid flow. As a replacement, metal Raschig rings with an increased diameter of 52–57 mm, manufactured in-house, were used, which allowed for the rapid restoration of the unit's operational capability and ensured acceptable hydrodynamic characteristics. After the scrubber was commissioned at a capacity of 100,000 m³/h, a stable hydraulic resistance of no more than 130 mm water column was established, which corresponds to the design values. Additionally, layer-by-layer irrigation control was implemented, which increased the operational flexibility of the absorption system. The compressor units in the regeneration line were also replaced, which eliminated the steam-gas mixture flow capacity limitation, restored effective cooling, and stabilized the vacuum system. As a result of these measures, deep purification of coke oven gas from hydrogen sulfide to a level below 0.5 g/m³ was achieved, and sulfuric acid production was increased, confirming the effectiveness of the implemented technical solutions.

Keywords: coke-chemical production, coke oven gas, desulfurization, absorber, fixed packing, large-aperture plates, hydraulic resistance.

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