Research on Liquid Film Neutralization of Welding Gas Emissions

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Keywords: absorption; water; gas emissions; liquid neutralization; criterion generalization; carbon monoxide and dioxide; sulfur oxide; film; experimental stand.

Abstract: To reduce the concentration of harmful gas emissions and aerosols in welding processes, it is proposed to use liquid neutralization, in which a film flow of liquid is organized along vertical plates. When gases or contaminated air move between the plates, the liquid film intensively absorbs gaseous and particulate pollutants. Absorption intensity into the film of water carbon monoxide and dioxide, as well as sulfur oxide, was studied at the experimental stand. In the experiments, the gas rate, liquid flow rate, and the concentration of harmful substances in the gas were changed. As a result of the analysis of the results obtained, the optimal gas speeds were identified and the importance of irrigation. In this case, the concentration of carbon monoxide and carbon dioxide can be reduced by 30 – 45 %, and the concentration of sulfur oxide – by 1.5 – 2 times over a contact length of 0.6 – 1.0 m. Generalization of the results obtained in a wide range of changes in gas concentrations, liquid flow rates and the speed of movement of the contaminated gas was obtained in the form of dependencies between the Sherwood, Reynolds and Schmidt numbers, from which it is possible to calculate the mass transfer coefficients at different contact lengths of the water and gas film and the overall characteristics of the neutralizer of harmful gas emissions.