UDC 613.6
Petryshchev A.S.
PhD, assistant professor NU «Zaporizhzhia Polytechnic»

SCRUBBING INDUSTRIAL GASES EMISSIONS AS A KEY TO HUMAN SAFETY IN THE ENVIRONMENT AND OCCUPATIONAL HEALTH

The burning of fossil fuels at the facilities of the industrial complex leads to the formation of a significant amount of harmful gaseous combustion products. One such product is sulfur dioxide SO2. The presence of sulfur dioxide in the atmosphere can lead to the formation of acid rain as a result of the interaction of SO2 with moist air. Such rains have a negative impact on the surrounding ecological environment [1]. The entry of smoky air containing sulfur dioxide into the human respiratory tract has a negative effect on the cardiovascular system [2]. That is, from the point of view of the safety of human existence in the environment and healthy working conditions at industrial enterprises, the content of sulfur dioxide in the surrounding air must be constantly monitored. In connection with strict regulations regarding the content of sulfur dioxide in the air, there is a need to reduce the amount of SO2 in industrial emissions.

From the point of view of resource saving and efficiency in general, the regenerative method of flue gas desulfurization has a number of advantages over other methods due to the highly efficient desulfurization process, processing and return to the technological process of the spent sorbent, which leads to a reduction in the volume of generated waste. Along with this, it should be taken into account that the presence of other gases in the flue gases, in addition to SO2, such as carbon monoxide, oxygen, nitrogen oxide, water vapor, as well as the temperature of the reaction zone creates a significant impact on the regenerative capacity of the sorbent and sorbing characteristics [3]. The above determines the need for clear control and the ability to regulate the physico-chemical parameters of the desulfurization process with the search for and compliance with the appropriate temperature regimes and the content of impurities.

In the key to the development of flue gas cleaning, the authors of the paper [4] achieved certain results using mathematical modeling to improve the efficiency of sulfur cleaning. Thus, a multifactorial mathematical model of the dependence of the degree of sulfur removal on the technological parameters of the flue gas filtration process was built. The obtained results open up the opportunity to optimize the technological indicators with further regulation of the desulfurization process to increase its efficiency.

The existing problems in the improvement and rationalization of technological indicators of flue gas desulfurization of industrial enterprises follow from the above. At the same time, the question of finding practical ways to achieve more effective ways of removing SO2 from gaseous production products is acute.

Therefore, today, the problem of improving the technological parameters of flue gas purification from sulfur at industrial enterprises with the determination of practically implemented ways of increasing the efficiency of desulfurization is relevant. The results in solving the given problem can allow to increase the ecological safety of the environment together with the level of safety of human existence in the environment and occupational hygiene.

REFERENCES

1. Milotić, M., Đurić, S., Čepić, Z., Adamović, D., Obrovski, B., Đorđić, D., Stošić, M. (2022). Experimental Investigation of SO2 Removal from Flue Gases by Cleaning with Solution of Lime Suspension and Formic Acid Processes, 10(3), 537.

2. Ma, L., Duan, X., Wu, J., Li, J., Peng, L., Wang, L., Xiao, L. (2022). Simultaneous desulfurization and denitrification of flue gas enabled by hydrojet cyclone. Journal of Cleaner Production, 337, 1, 134205.

3. Muhammad Adli Hanif, Naimah Ibrahim, Aishah Abdul Jalil. (2020). Sulfur dioxide removal: An overview of regenerative flue gas desulfurization and factors affecting desulfurization capacity and sorbent regeneration. Environmental Science and Pollution Research, 27, 27515–27540.

4. Петрищев А., Семірягін С., Смірнов О., Смірнов Ю., Цимбал Б. (2023). Запобігання професійних ризиків шкідливого впливу діоксиду сірки на здоров'я працівників та розвиток екологічної безпеки при очищенні промислових газів. Social Development and Security, 13, 2, 161–170.