

**CONCEPTUAL PRINCIPLES OF AVOIDING THE OCCUPATIONAL
RISK OF WORKERS AND DAMAGE TO THE ENVIRONMENT AND
HEALTH OF THE POPULATION DURING CLEANING UP OF
INDUSTRIAL EMISSIONS TO THE ATMOSPHERE**

The authors of the work [1] noted the global demand for energy, in particular for electricity, is constantly growing. Fossil fuels are currently the main source of energy in the world. Combustion of fossil fuels, especially in thermal power plants, produces products such as sulfur and nitrogen oxides, unburned hydrocarbons, fly ash and soot. Some are toxic, such as sulfur oxides, nitrogen oxides, hydrocarbons, carbon monoxide and fly ash. Sulfur dioxide is the most significant sulfur oxide produced during combustion and released into the atmosphere. Mixing with moisture in the air, combustion products create acid rain, which negatively affects the ecosystem. Due to the ever-increasing emissions of gases into the atmosphere and increasing strictness of air pollution regulations, worldwide efforts are being made to reduce sulfur dioxide emissions [1].

The authors of the work [2] noted that sulfur dioxide is one of the main air pollutants from the flue gases of non-ferrous metal smelting. Sulfur dioxide causes many environmental problems, such as photochemical smog and urban particulate pollution, and also affects human health. Flue gas pollution has attracted more and more attention in recent years, and there are many related studies on sulfur dioxide removal technology. A number of technologies have been applied to control sulfur dioxide emissions, such as wet flue gas desulfurization, circulating fluidized bed, and sludge desulfurization. Improving the removal efficiency and achieving joint control of many medium and low concentration pollutants have become the focus of recent research [2].

The authors of the work [3] noted that flue gas desulfurization, which uses calcium carbonate, can effectively remove sulfur dioxide emitted into the atmosphere from power plants, and the removal efficiency and reliability of this process have been greatly improved, and its cost has been greatly reduced. The process of removing sulfur dioxide from flue gas can be divided into two types of scrubbers such as dry scrubber and wet scrubber. A dry scrubber is a desulphurization plant in which an absorbent is injected into the combustion chamber at high power to absorb sulfur oxides. This scrubber can operate with low equipment cost and low energy consumption, but has low desulfurization efficiency due to its lower response rate than the wet scrubber. On the other hand, the wet scrubber is the most commonly used sulfur dioxide removal process. The wet scrubber is relatively easy to adapt to conventional plants already in operation,

and operating costs are driven by the low cost of limestone. The traditional sulfur dioxide removal process uses a wet scrubber that requires a constant supply of new adsorbents to maintain continuous operation [3].

The authors of the work [4] noted that the most common method of sulfur removal is flue gas desulfurization. The regenerative method of flue gas desulfurization has advantages over other methods due to the high efficiency of desulfurization, regeneration of the sorbent and reduction of the volume of waste processing. In addition to sulfur dioxide, the presence of other components in the flue gas, such as oxygen, carbon dioxide, nitrogen oxides, and water vapor, as well as the reaction temperature, critically affect the sorption capacity and regeneration of the sorbent. For optimum sulfur dioxide removal efficiency, other parameters such as pH, inlet sulfur dioxide concentration and additives must be adjusted accordingly [4].

From the above, it follows the relevance of further development of optimization of technological parameters of desulfurization of outgoing flue gases at industrial enterprises.

The application of mathematical modelling with the use of production indicators opens up the possibility to predict with a certain probability the values of the target factors from changes in the parameters of the technological process and allows to determine the most profitable parameters.

Achieving a reduction in flue gas pollution with sulfur dioxide will contribute to the prevention of occupational risks and the reduction of harmful effects on the health of workers, as well as increasing the level of environmental safety.

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