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PURIFICATION OF FLUE GAS BY MEANS OF MEMBRANES

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One of main sources of industrial emissions is the combustion technology. In addition to solid waste, a number of compounds produced by the combustion leave the system in the gaseous state. At present, there are various methods for the purification of waste gases that allow flue gases released to the atmosphere to fully comply with emission standards. However, these technologies are now often reaching the maximum limits for their separation capabilities, and it is clear that with the more stringent emission limits imposed by the European Commission effective from 2021, they will not be able to meet them. The aim of this work is to test our new patented method of water condensing membrane for flue gas purification [1,2]. Moreover, our objective is also to compare our unique separation method with polymeric membranes being nowadays developed primarily for carbon capture (CC). Nevertheless, these membranes and whole CC technology have also solve the problem of the other pollutants like SO_2, NO_x and HX. We would like to find out whether the new separation method could be as efficient as the current polymeric membranes represented by the results of several academic investigations and pilot tests performed by membrane producers. It seems that it would be very advantageous and reasonable to develop the process combining efficient SO_2, NOx, HX removal and water recovery but not necessarily with CO_2 removal as CC will be possible only on sites where it could be further processed. Thus, there could be also a demand for the efficient technology without CC to be combined with current flue gas purification systems especially on smaller scales.

A unique lab-scale apparatus testing the purification of flue gas has been built. Using tested flat sheet membrane Toray, the purification of feed gas to levels required by the legislative of the European Commission since 2021, has been achieved. Various separation conditions (pressure above and below the membrane, temperature of separation, flux of feed and sweeping gas) were tested and optimal parameters were found. Our results proved high separation potential of "water condensing membrane" for separation of SO_2, and CO_2 from flue gas.

References

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