Biogas to biomethane upgrading by water absorption column at low pressure and temperature

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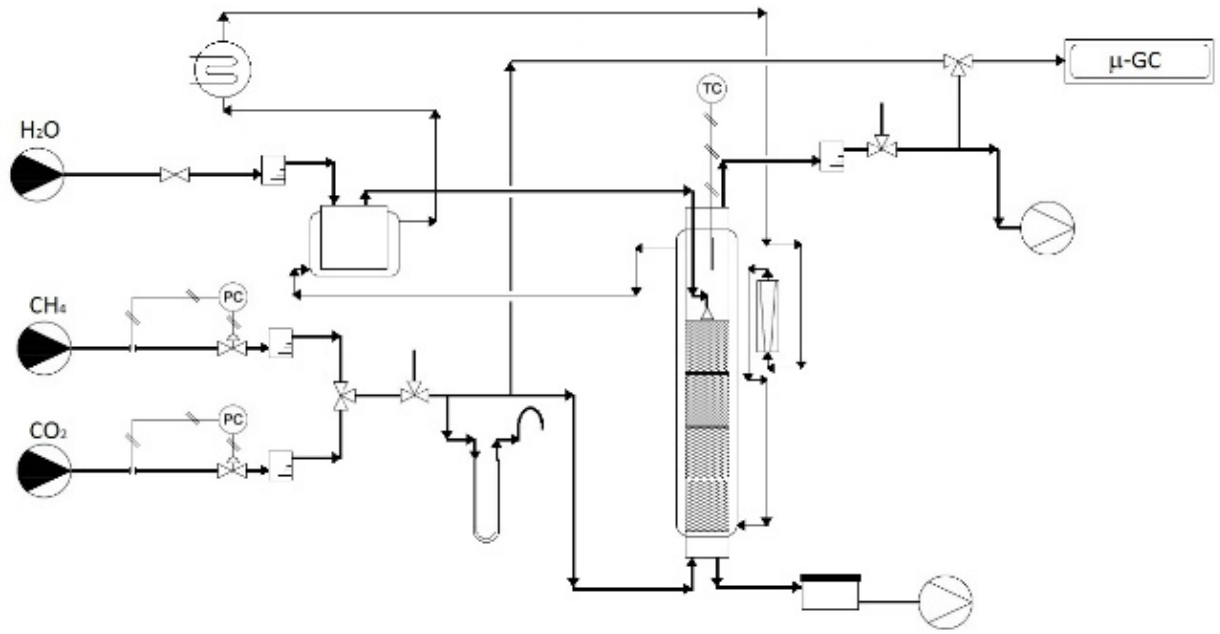

Flowsheet of the experimental apparatus used for the absorption study and main results obtained in term of difference between the carbon dioxide concentration entering and exiting from the column depending on the different experimental conditions. Credit: *Technology*

Compared to other processes the innovation lies in the operating conditions. Instead of enhancing the solubility of carbon dioxide

working with a pressurized system, low absorption temperature is employed. In this configuration, two main advantages can be obtained: there are no duty costs for pressurizing the system and there is no need of cleaning the absorption solvent, since the solubility of carbon dioxide in water at ambient pressure is low and any further treatment of the wastewater can be avoided. The new technology here proposed involves the use of two absorption columns: the first at atmospheric pressure for the removal of the main part of CO_2 and the second one, of reduced dimension, for the final purification of biomethane.

A team of researchers from the Università Degli Studi di Milano and Politecnico di Milano in Italy, have demonstrated the possibility to perform a first important step in the biogas upgrading to biomethane using cost-effective conditions in terms of pressure and temperature by physical absorption column technology. The work was developed both from an experimental and computational point of view. The experimental work was made by the experimental apparatus reported in the figure, while the simulation study was performed by using PRO II SIMSCI simulation software. The report will appear in the *Technology* journal.

"We propose a well-known technology for the separation of CO_2 from biogas mixture, but using different operating conditions relative to the traditional one. Our idea is to perform the absorption of CO_2 in water by using low temperature (in the range 5 - 15C) coupled with atmospheric pressure. This technology involves the use of two absorption columns: the first at atmospheric pressure for the removal of the main part of CO_2 and the second one, of reduced dimension, for the final purification of biomethane. This study demonstrated the feasibility of the first step of this approach, while ongoing research to validate the whole process of the double column configuration is now in process," says Professor Carlo Pirola, Ph.D., of the Universit¨¤ degli Stuidi di Milano and Principal Investigator of this paper.

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