TECHNOLOGICAL SOLUTIONS FOR CO2 REDUCTION IN BIOGAS

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Biogas is a rapidly growing alternative to natural gas. This gas mixture is produced during anaerobic digestion of organic materials, this makes biogas production an attractive choice in lowering the accumulation of organic waste in landfills. The composition of biogas depends on digestion process specifics and chosen raw materials. Even in ideal circumstances, methane – the active component, is not the only material present in the mixture. Other gases, such as CO2, O2, H2S and others, either decrease the calorific value of biogas or cause corrosive damage to instruments used in biogas exploitation. The objective of this paper was to design a theoretical technological schematic, to remove CO2 from biogas and by doing that, turning the mixture into the highly calorific biomethane. Biogas production stream from "Kauno Nuotekų Valykla" (eng. -Kaunas sewage treatment plant), made during anaerobic digestion of wastewater sludge, a process which was analyzed during professional practice, was chosen as the raw material scheme for the schematic. This stream is equal to 7119,2 kg/h of biogas. The goal for the technological schematic was to get a gas stream of 97% (molar)methane concentration, by removing a large portion of CO2from the raw material stream. Chemical absorption by MDEA was chosen as the biogas cleaning method. The schematic can be divided into 3 distinct sections: CO2absorption, MDEA regeneration, preparation of the MDEA mixture for a new absorption cycle. The separated CO2 was used as a raw material for unrelated processes, MDEA was fully regenerated and reused. The designed technological schematic can produce 4781,31 kg/h of biomethane, which, if used as fuel for electricity, can produce up to 69057 kWh of electricity. Operating the system requires 5500 kWh of electricity, or ~8% of the potential product energy output. Aspen HYSYS was chosen as the designing application.

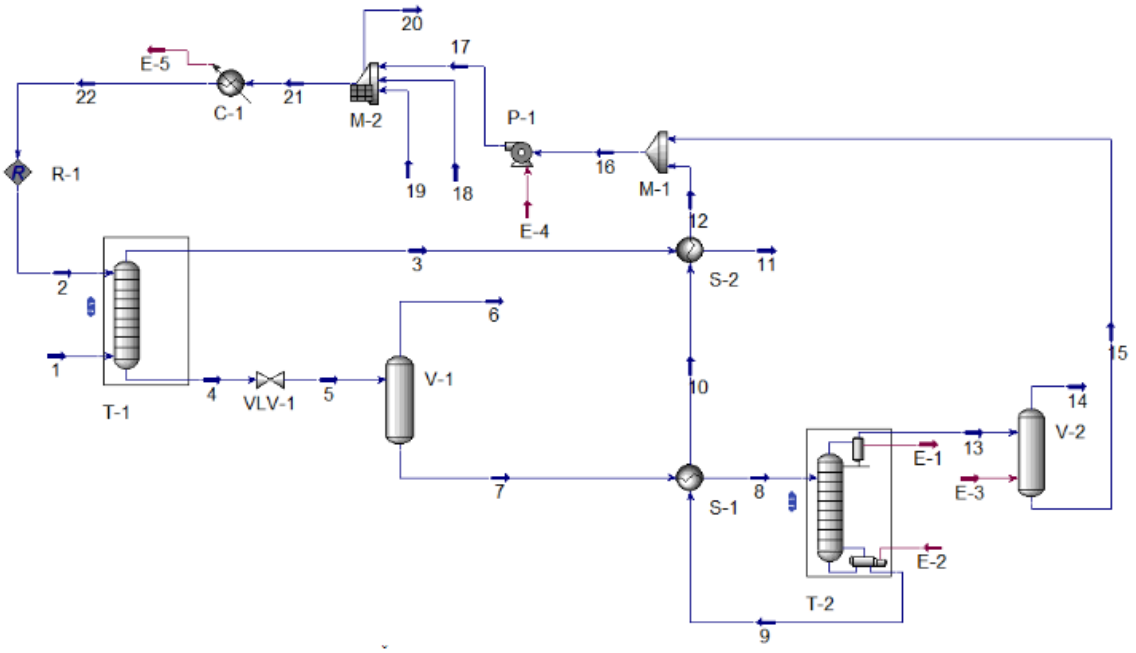

Fig. 1. Full technological schematic for CO_2 chemical absorption via an MDEA solution