CHAPTER 3

Absorption technology for upgrading biogas to biomethane

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3.1 Introduction

Industrial development in the modern era has been boosted through the extensive use of fossil fuels, which now is considered a critical issue for global warming and greenhouse gas emission. Frequent natural disasters, population migrations, and an imbalance of environmental conditions are the results of excessive use of fossil fuels as well [1]. To cope with the global warming challenge, different methods to mitigate the increasing CO_2 emissions such as carbon capture, storage, and conversion are introduced [2]. Hence, all over the world, renewable energy sources are getting popular to meet the ongoing demand. According to a report by Murdock et al. [3], the progress is not satisfactory for economic implications to achieve the goal by 2050 [3]. The same report stated that in 2018, renewable energy was only 11% of the total energy consumption around the globe. Biofuel emerges as an effective alternative to fossil fuels as it requires lower initial and operating costs and has a wide range of raw material selection [4–6]. In 2012 the biogas energy consumption in the EU countries reached 29.5 GW which reaches almost double within a decade and will reach 25% of the total fuel consumption in 2050 [7,8]. The high CO_2 content in biogas reduces its calorific value and Wobbe index which hinders the optimal utilization of biogas [9]. Therefore upgrading via different methods, the CO_2 is reduced and instead of biogas, biomethane is produced which may be utilized in internal combustion (IC) engines, power generation, and transportation [10]. The scopes of biogas utilization have not been explored enough compared to the total global biogas production. Nevertheless, this industry is expanding,

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