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Biogas Conditioning Using Selective Alkaline Chemicals and Microalgae

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ABSTRACT: Renewable energy deriving from biomass sources has great potential for growth to meet our future energy demands. Biogas is one of a very important source of renewable methane produced from anaerobic biodegradation of biomass in the absence of oxygen with the help of anaerobic microorganisms. Raw biogas contains about 55–65% methane (CH_4), 30–45% carbon dioxide (CO_2), traces of hydrogen sulphide (H_2S) and fractions of water vapour. Pure methane has a calorific value of 9100 kcal/m^3 at 15.5 $^{\circ}$C and 1 atm; the calorific value of biogas varies from 4800 to 6900 kcal/m^3. Biogas purified and enriched in methane can be used for household applications, automobile fuel (liquefied) or electricity generation.There are three primary compounds that must be removed to improve the combustibility of biogas. First, water vapour in biogas is problematic for compressibility and should be removed prior to storage. Secondly, biogas typically contains a high percentage of CO_2, which decreases its caloric value. Finally, H_2S, which also present in biogas, is toxic and exhibits corrosive effects on process equipment if not removed prior to compression and storage. Chemical solids absorbents, such as quicklime, are capable of removing all three compounds, while liquid absorbents, such as ethanol amines, remove only CO_2 and H_2S. Using NaOH as CO_2 absorber in biogas 24.83% reduction of CO_2 was seen and increase 2.81% CH_4. While using $Ca(OH)_2$ and KOH reduction of CO_2 was 15.27% and 29.25% respectively. We have used microalgae, *Chlorella* Sp. for absorption of CO_2 and other gases in biogas which is the innovative approach of biogas enrichment. While passing the biogas through the culture of microalgae CO_2 was reduced up to appreciable extent for its growth and also produced the microbial biomass. Microalgae are conventionally utilized for removing nutrients in water. Currently carbon dioxide capture by microalgae cultivation has been investigated as one of the mitigation processes of global warming. In combination with methane fermentation, lipid extraction or other bioenergy conversion processes, it is expected to produce carbon-neutral energy from carbon dioxide in the air. *Chlorella* sp. was analysed in terms of conditioning biogas as a result the biogas components CO_2 and H_2S were reduced up to 97.07% and 100%, respectively. © 2014 iGlobal Research and Publishing Foundation. All rights reserved.

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