

## Potentiality of Biohythane Process for the Gaseous Energy Recovery from Organic Wastes

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**Abstract :** A two-phase anaerobic process combining biohydrogen followed by biomethane (biohythane technology) serves as an environment-friendly and economically sustainable approach for the improved valorization of organic wastes. Suitability of the pure cultures like *Klebsiella pneumonia*, *C. freundii*, *B. coagulans*, etc. and mixed acidogenic cultures for the biohydrogen production was already studied. The characteristics of organic wastes play a critical role in biohydrogen production. The choice of an appropriate combination of complementary organic wastes can vastly improve the bioenergy generation besides achieving the significant cost reduction. Suitability and economic viability of using the groundnut deoiled cake (GDOC), mustard deoiled cake (MDOC), distillers' dried grain with soluble (DDGS) and algal biomass (AB) as a co-substrate were studied for a biohythane production. Results show that maximum gaseous energy of 20.7, 9.3, 16.7 and 15.6 % was recovered using GDOC, MDOC, DDGS and AB in the two stage biohythane production, respectively. Both GDOC and DDGS were found to be better co-substrates as compared to MDOC and AB in terms of hythane production, respectively. The maximum cumulative hydrogen and methane production of 150 and 64 mmol/L were achieved using GDOC. Further, 98 % reduction in substrate input cost (SIC) was achieved using the co-supplementation procedure.

**Keywords :** Biohythane, algal biomass, distillers' dried grain with soluble (DDGS), groundnut deoiled cake (GDOC), mustard deoiled cake (MDOC)

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