

## Licensing and Technology Transfer Opportunity

**Title of Technology Available:** A composition for enhancing biogas production during anaerobic digestion from biomass comprising animal waste and agricultural waste

**Brief Description of Invention:** The present invention is generally related to a field of biogas production. The present invention is more particularly related to a chemical additive mixture for promoting anaerobic digestion process to convert the organic waste into biogas and fertilizer.

**Brief Background of Invention:** Biogas is the common name of the gas produced from anaerobic fermentation of organic matter by microorganisms. Biogas generally comprises methane (50-60% by volume), carbon dioxide (35-45 % volume), nitrogen (0-3% volume), hydrogen (0-1% volume) and hydrogen sulphide (0-1% volume). Biogas is eco-friendly and an alternative source of energy. We have determined a composition of biogas additive mixture (BAM) for increasing biogas production in a plurality of reactors/digesters during anaerobic digestion of organic matter, comprises the following. A predetermined amount of ferric chloride ( $\text{FeCl}_3$ ), a predetermined amount of nickel chloride ( $\text{NiCl}_2$ ), a predetermined amount of urea ( $\text{CH}_4\text{N}_2\text{O}$ ), a predetermined amount of calcium carbonate ( $\text{CaCO}_3$ ) and a predetermined amount of ash.

**Describe the final product:** It is an additive mixture comprising of ferric chloride ( $\text{FeCl}_3$ ), nickel chloride ( $\text{NiCl}_2$ ), urea ( $\text{CH}_4\text{N}_2\text{O}$ ), calcium carbonate ( $\text{CaCO}_3$ ) and ash.

**Technological Domain (Keywords):** biogas, increase biogas ; additive mixture; anaerobic digestion

**Proof of Concept:**

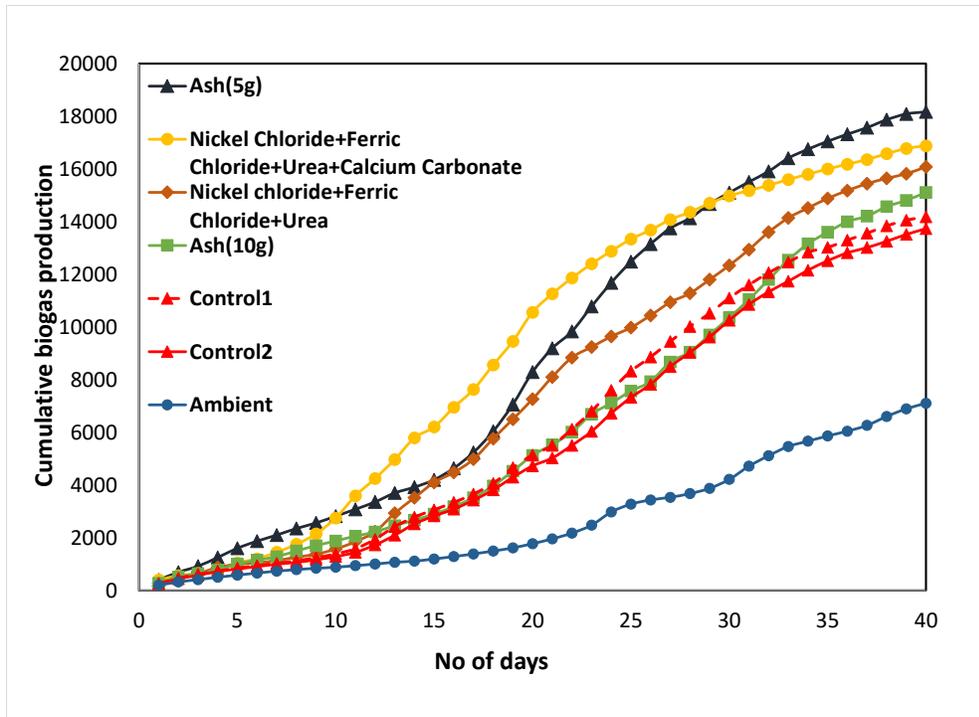


Fig 1: Cumulative graph showing production by different additives. Base Feed – Cow Dung (500 g) + Water (450mL) + Inoculum (50mL) for all digesters. Total solids (%) = 8.2%, and volatile solids was 92 (% of TS).

The experimental results show that ash with concentration of 5mg/L produces the highest yield repeatedly, which also tallies with the previous experiments to get a production of around 16 L during 33rd day in both the experiments. The increase in production of biogas using ash and NiCl<sub>2</sub> and FeCl<sub>3</sub> additive is seen repeatedly. The Calcium Carbonate added with the combination of other additives, shows a promising graph trend probably due to the pH stabilization which creates a favorable environment for the anaerobic bacteria. The results also indicate that combination of additives can be better than a single additive.

#### Stage of Development:

Advanced Prototype/Ready to Market technology

Provide Information on Competitors who manufacture and/or sell similar products: NA  
Biogas Plus (German company)

<https://www.biogasplus.info/biogas/milestones/>

**What are the unique advantages your innovation has compared to the competition:** Lower cost, more stable biogas production, better product, more yield of biogas

**A few potential companies who might be interested in this technology:**

COMPANY	COUNTRY	WEBSITE
AAT Abwasser- und Abfalltechnik GmbH	Austria	<a href="http://www.aat-biogas.at">www.aat-biogas.at</a>
AEV Energy GmbH	Germany	<a href="http://www.aev-energy.de">http://www.aev-energy.de</a>
Aikan A/S (Dry AD)	Denmark	<a href="http://www.aikantechnology.com">http://www.aikantechnology.com</a>
Anaergia GmbH	Germany	<a href="https://www.anaergia.com/">https://www.anaergia.com/</a>
Andion Italy SpA	Italy	<a href="http://andiontechnology.com">http://andiontechnology.com</a>
BEKON GmbH Technologieführer im Bau von Batch-Biogasanlagen zur Energieerzeugung aus Abfällen	Germany	<a href="https://www.bekon.eu/">https://www.bekon.eu/</a>
BioGTS Ltd	Finland	<a href="https://biogts.com/">https://biogts.com/</a>

Many biogas companies are in India also such as BioUrja.

Intellectual Property Status: Indian Patent application with number filed in s

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