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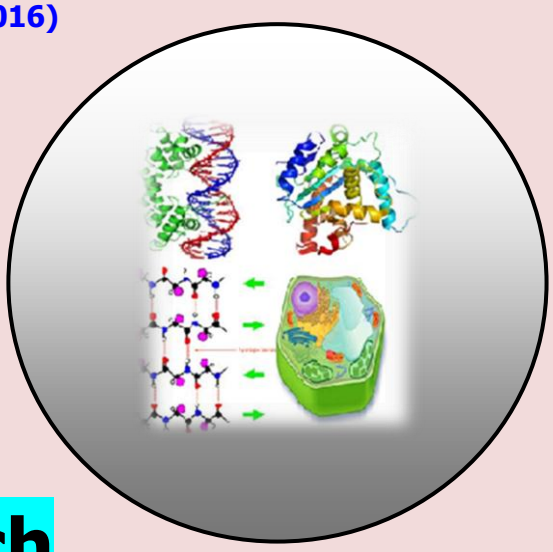

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REVIEW ARTICLE

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Production of Bio-Gas: Substrate Dependence

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ABSTRACT

BIO-GAS the mixture of mainly CH_4 and CO_2, is being produced by the anaerobic digestion of any Bio mass in presence of suitable microbes. Use of bio-gas capsules containing certain chemicals VIZ $NaNO_3$ can accelerate the formation of BIO-Gas and methanogenesis starts just in 6 days. B.G as bio-fuel can enhance the farmers income by promotion of sugar industries, use of Barren land, Diversification of agriculture and thus paris climate can be achieved. The water of ponds containing Algal vegetation generally become poisonous due to excess presence of NH_3. Alage consumes excess NH_3 thus act as water purifier and bio mass can be used as fodder for animals. The amount of Bio-gas produced depends upon the type of substrate that is cellulosic, sugary, lignin or materials containing excess urea. Urea can only produce CO_2 and production of CH_4 reported to zero level. Organic compound containing Bio-mass with variety of oxidation states of C affect the bio-gas production. Petrol mixed with C_2H_5OH is called as ethanol blended petrol (EBP). Sustainable Alternative towards affordable transportation (SATA) scheme to establish an eco-system for production of compressed Bio-gas (C.B.G.) from various Bio-mass.

Keywords: Bio-mass, Methanogenesis, Microbes, Urea, Ethyl Alcohol, Ecosystem, Purifier, Sugarcane, Urea and Diversification.

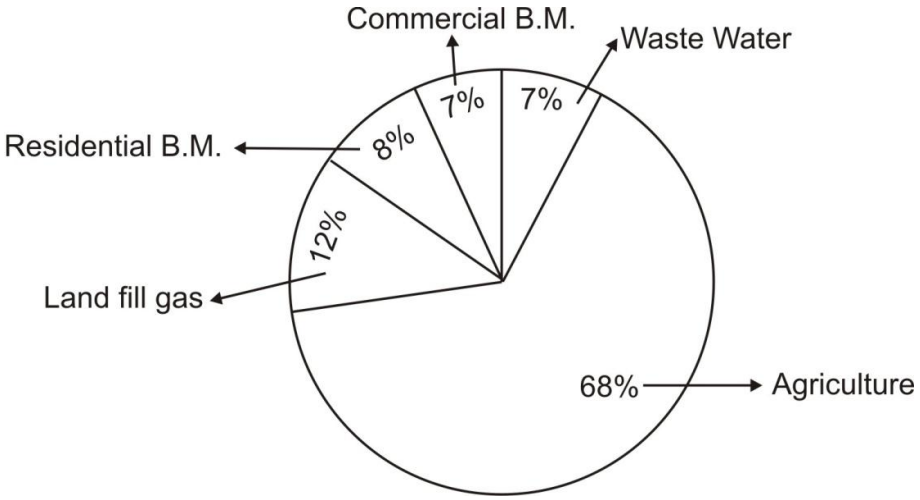
INTRODUCTION

New technology enables Bio-gas plant optimization and agriculture diversification by using barren land for agricultural Farming. The ecosystem can be made much purified by use of CH_4 and moter fuel and for production of electricity. At present 56% B.G. we import from other countries.

Bio-fuel Co-ordination committee reported that the ethanol supply increases as follows:-

2013	380	million Lit/Yr
2019	1.89	billion Lit/yr
2021-22	3.5	billion lit/yr

Primary raw material for Et OH is sugarcane and it's by products. 90% fuel EtOH comes from this source. Bio-gas production from Bio-sludge is common and affordable, but Bio-gas from waste water treatment is very rare, because it's recovery is very costly. Bio-gas contain CH_4 as well as CO_2, so purification by financially affordable method/ technology has to be adopted.



BIO-GAS PRODUCATION POTENTIAL BY SOURCE

Various Anaerobic processes are used for production of bio-gas. Inadequate mixing may result in formation of dead zone inside reactor. The microbial mass is immobilized on fixed surface of the digester.

$C_6H_{12}O_6 + \left[n - \frac{a}{4} - \frac{b}{2}\right] H_2O \left[\frac{n}{2} - \frac{a}{8} + \frac{b}{4}\right] CO_2 + \left[\frac{a_n}{2} + \frac{a}{8} - \frac{b}{4}\right] CH_4$

$C_6H_{12}O_6$ + [6-3-3] $H_2O \rightarrow$ [3-1.5 + 1.5] CO_2 + [3 + 1.5-1.5] CH_4

$C_6H_{12}O_6 \rightarrow 3CO_2 + 3CH_4$

Therefore one mole of glucose produce 3 mole of CH_4 and 3 mole of CO_2 (0.4 L CH_4/9 COD)

EXPERIMENTAL PROCEDURE

2 ml of each Methanol, Ethanol, Ethylene, Acetone, Ethylene Glycol, Glycerine, Phenol, glucose (2gms), Acetic acid, lactic acid, oxalic acid is taken in separate Reactor of 25ml capacity. The reactor are maintained at 30^o and left for bio-methanation. The bio-gas produced in each reactor is measured in liters/gm substrate. The temperature is recorded by thermometer fitted with system. P^H varies according to the substrate taken for observations. A favorable condition for bio-methanogenesis is maintained.

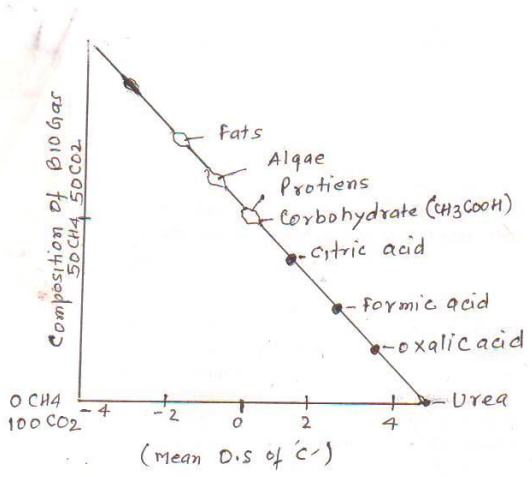
RESULT AND DISCUSSIONS

Study of observation tables and graphs indicate following results-

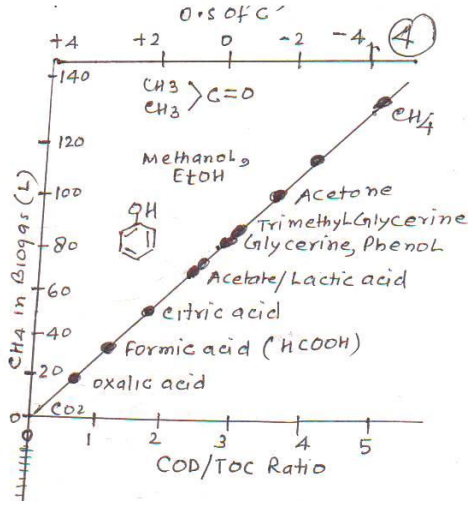
1. Complete mineralization of substrate gives high yield of CH_4
2. The C' with zero O.S. like in corbohydrates as substrate yields 50% CO_0 and 50% CH_4
3. The C' in +1 and+2 O.S. like citric acid, formic acid gives less CH_4 and more CO_2
4. Urea produces 100% CO_2 and 0% CH4
5. The C' in -2 O.S. viz CH_3OH gives more CH_4 & less CO_2.
6. Food waste, fat produce more CH_4 less CO2

COD/TOC ration also affect the yield bio-gas from different substarate. The substrate which have high value of COD/TOC ratio yields high amount of CH_4.

S.No.	Compound	n a b (C) (H) (O)	$_9$COD $C_2H_5O_2N$	$_9$ Toc $C_2H_5O_2N$	COD/TOC	C O. State	CH_4%
1	Methanol	1 4 1	1.5	0.38	4	-2	75
2	Ethanol	2 6 1	2.09	0.51	4	-2	75
3	Ethylene	2 4 0	3.40	0.56	4	-2	75
4	Ethylene Glycol	2 6 2	1.28	0.39	3.33	-1	62.5
5	Glucose	6 12 6	1.07	0.40	2.67	0	50
6	Citric Acid	6 8 7	0.75	0.38	2.00	1	37.5
7	Oxalic acid	2 2 4	0.14	0.27	0.67	3	12.5
8	Formic Acid	1 2 2	0.35	0.26	1.33	2	25
9	Food waste	n n n	2.95	0.64	4.60	-	78
10	Fat	n n n	3.02	0.59	5.00	-	81



Biogas produced in relation with O.S. of 'C' in specific substrate



CH_4% in relation to COD/TOC ratio CH_4% = 18.75

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