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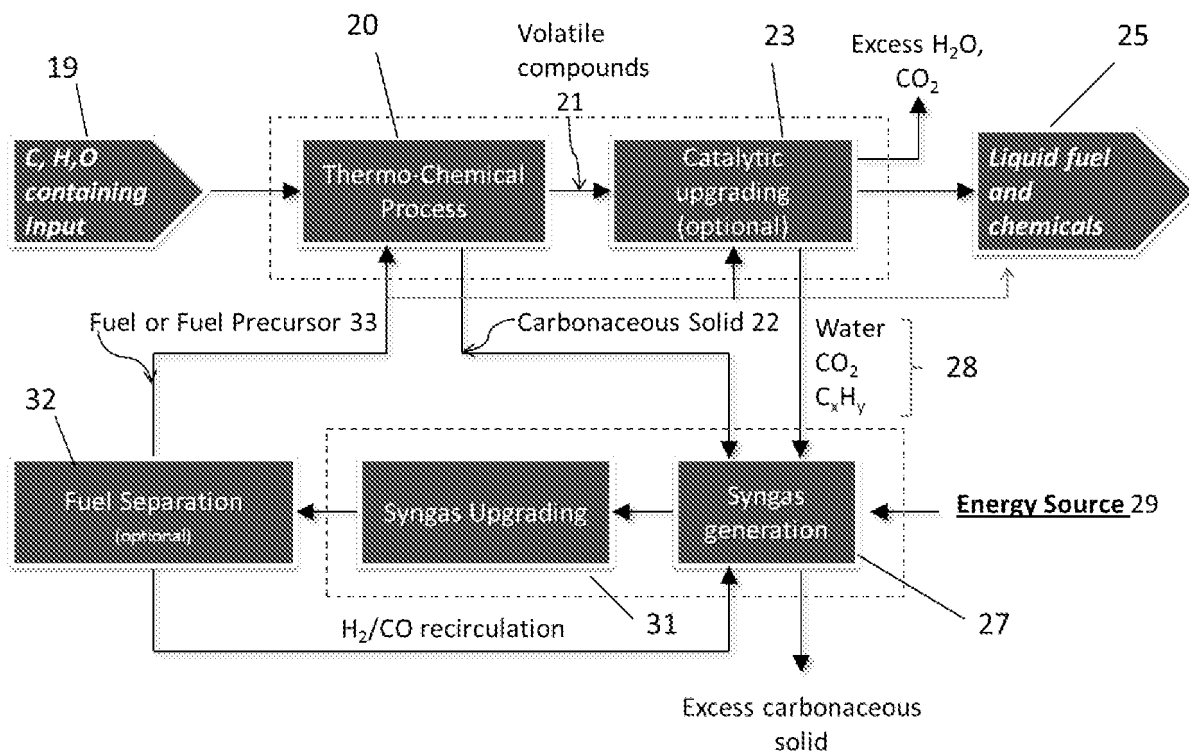


Fig. 1

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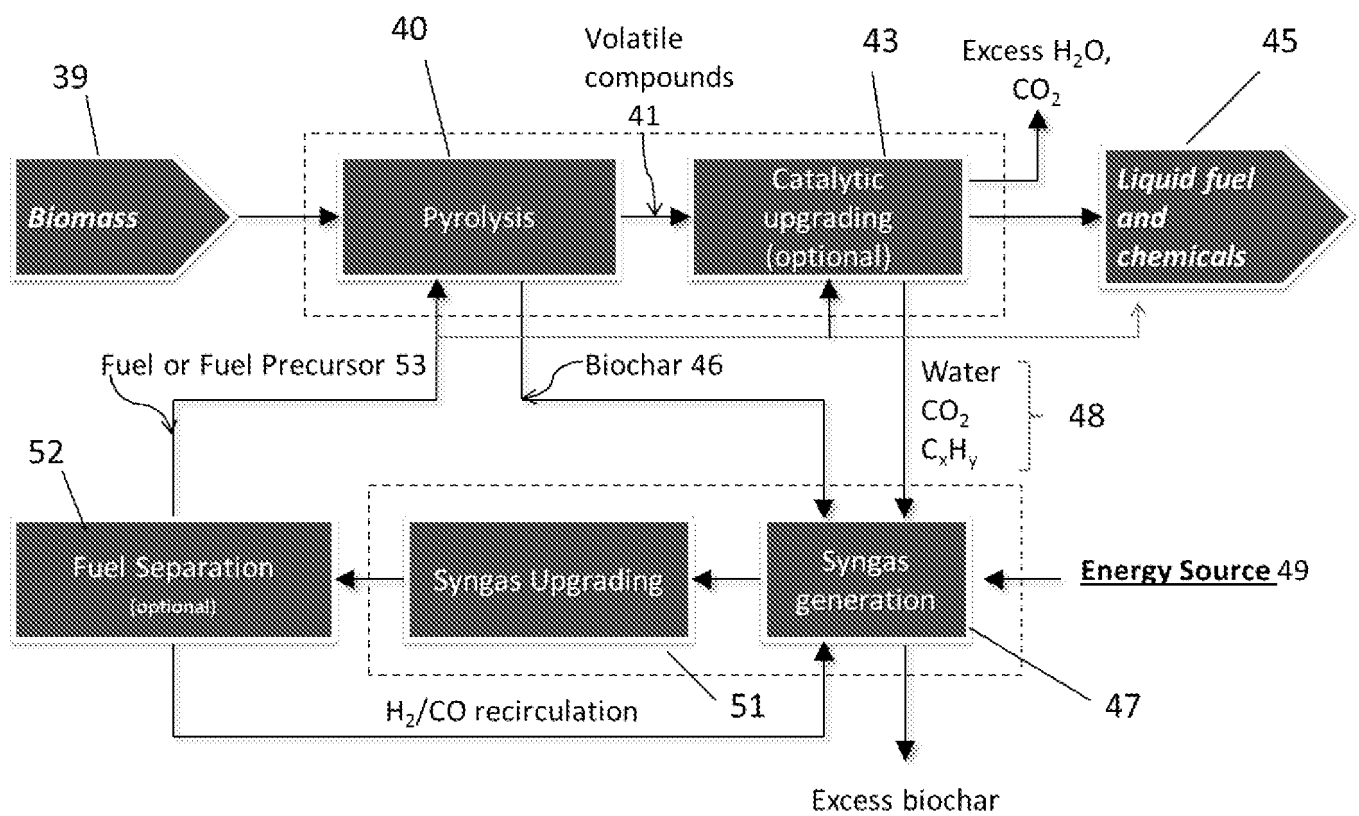


Fig. 2

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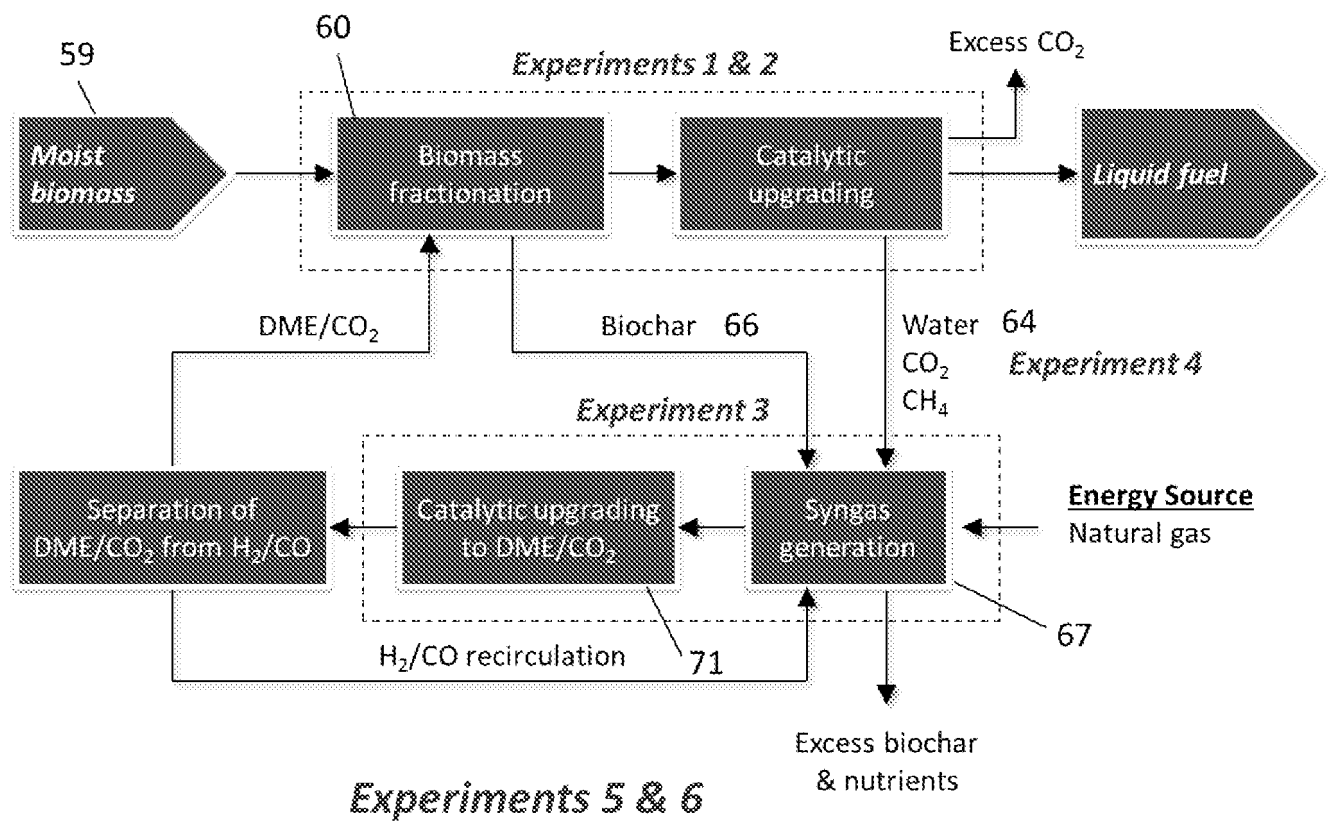
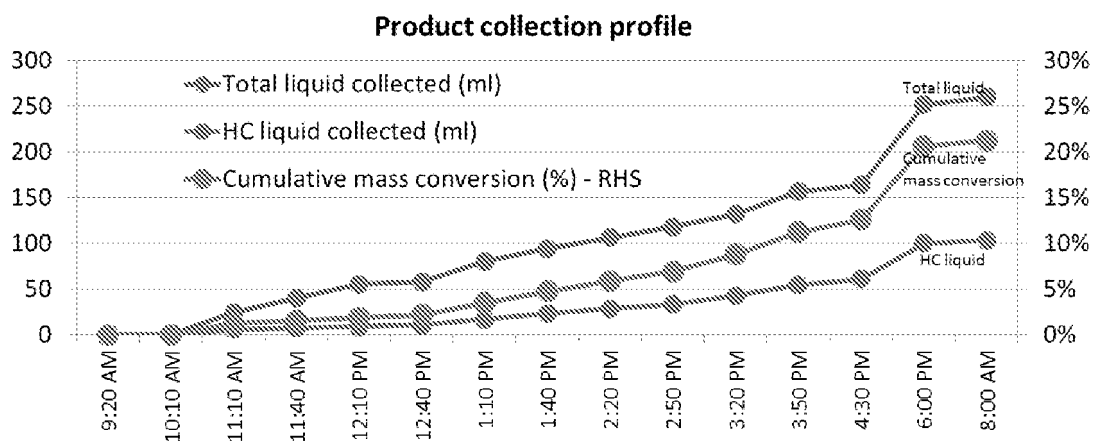


Fig. 3

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Experiment 1 – Front End

ID:	VRS102	Carrier:	CO ₂ at 8 psi
Date:	10/27/2011	Product SG:	0.84
Feeds:	200 gr fine grade corn cobs	Total product:	86.5 gr
	180 gr corn cobs (est. dry basis)	Char:	63 gr
	227 gr DME (total feed: 407 gr)	Liquid m-m conversion:	86.5/407 = 21.3%

**Fig. 4**

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Experiment 2 – Bubbler

ID: 90 (set of 3 batches)

Date: 9/21/2011

Batch time: ~2 hours

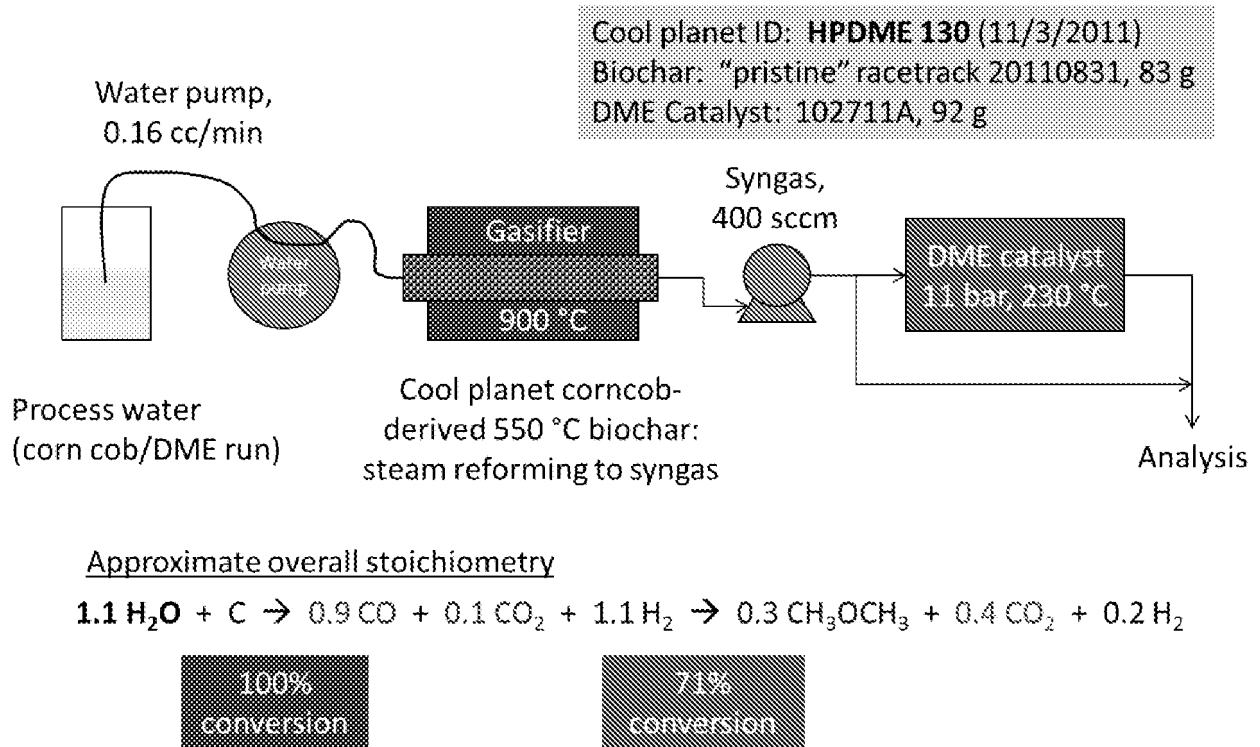
Experiment description

Fractionator gases were bubbled through chilled liquid fuel for a period of ~2 hours. At the end of the period, the weight gain is summarized below:

	<u>Batch 1</u>	<u>Batch 2</u>	<u>Batch 3</u>
Starting liquid fuel:	255.5 gr	251.5 gr	254.5 gr
Liquid fuel post lights condensation:	273.5 gr	277.0 gr	279.5 g
% mass gain:	7.0%	10.1%	9.8%

Fig. 5

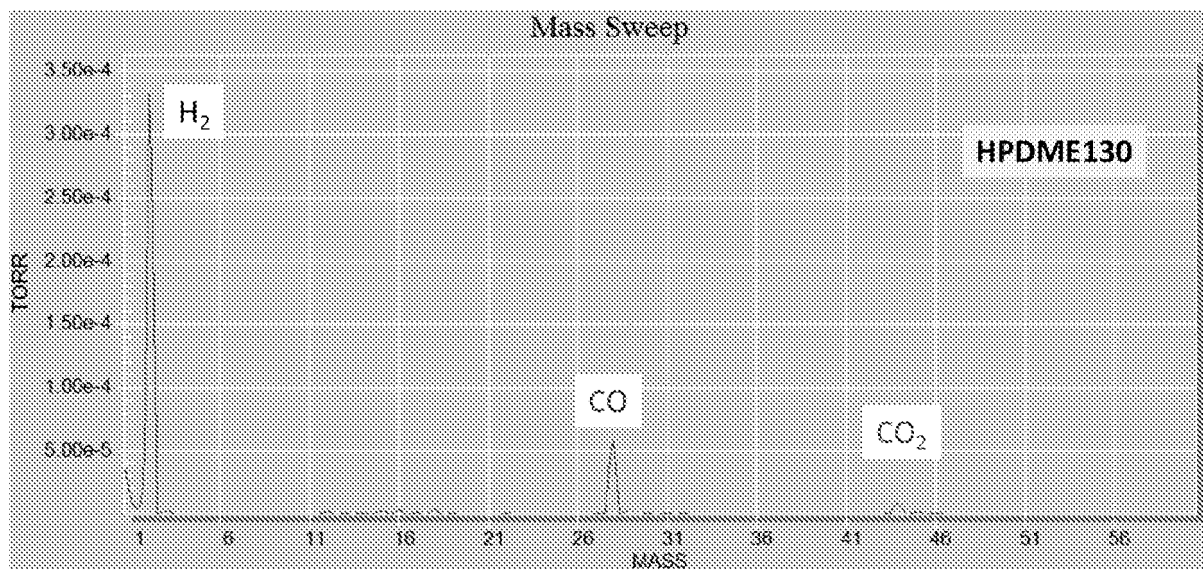
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Experiment 3 – Back-End Process Run from Corn Cobs**Fig. 6**

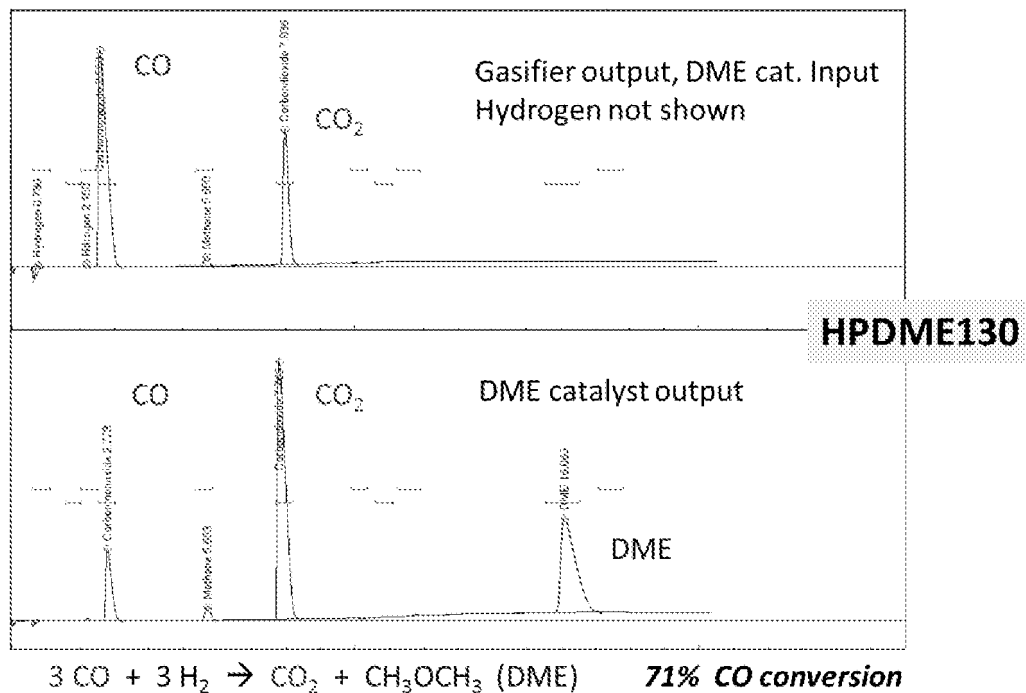
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Experiment 3 (cont.)**Biochar Gasifier Output (Mass Spec snapshot) – DME catalyst feed**

- 0.16 cc/min process water + biochar @ 900C → 400 sccm syngas
- Mass spec shows hydrogen whereas previous GC is not sensitive to hydrogen

**Fig. 7**

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Experiment 3 (cont.)**Gasifier, DME catalyst output - Gas Chromatography (TCD det.)****Fig. 8**

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Experiment 4. Methane + CO₂ to Syngas
BMF Corn Cob Char - Best Tested

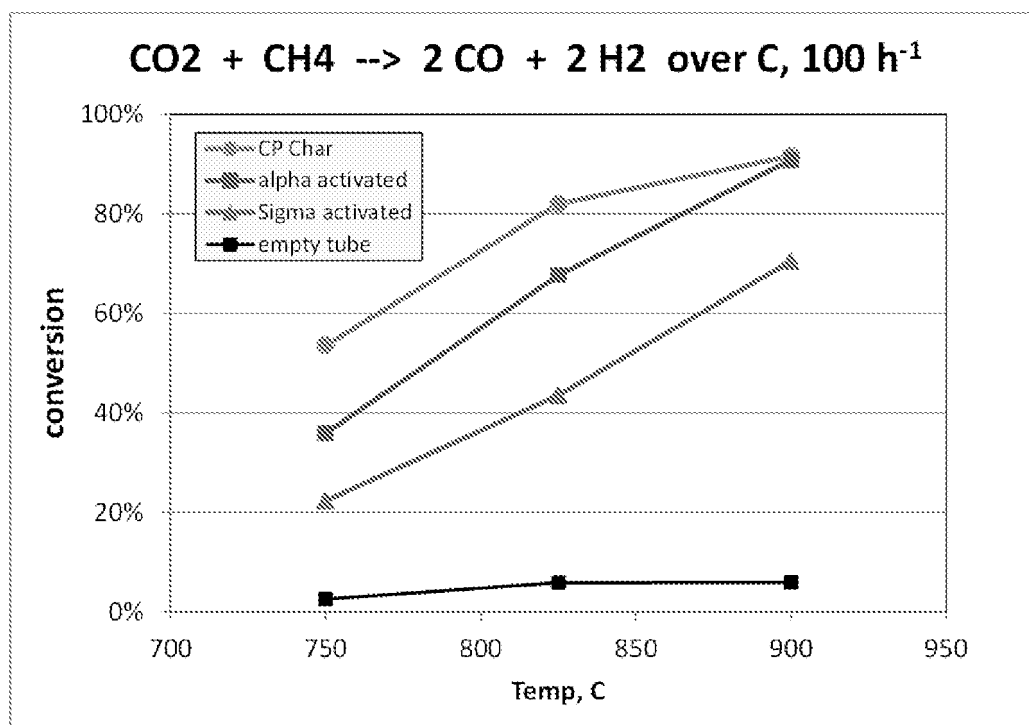


Fig. 9

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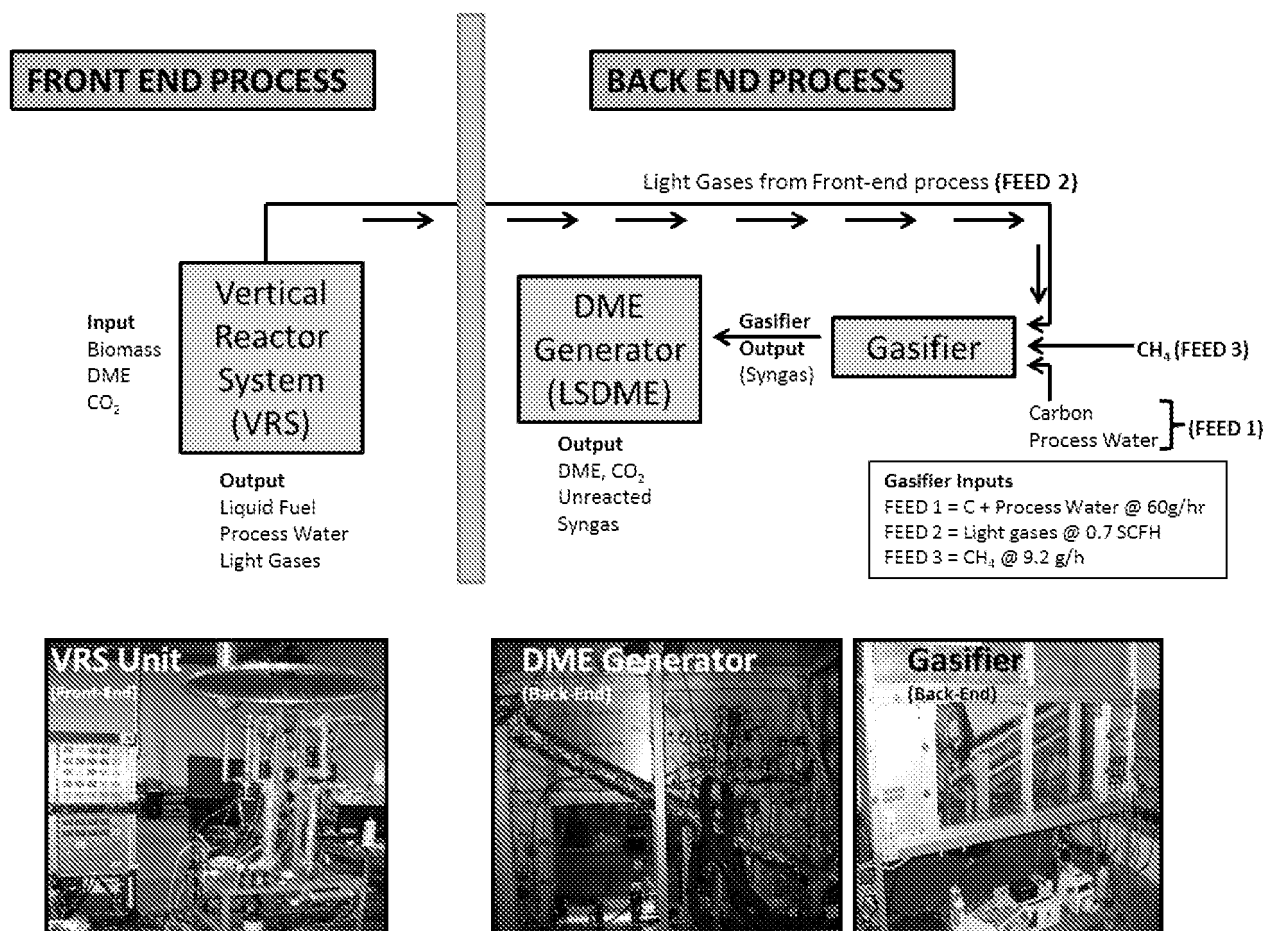


Fig. 10

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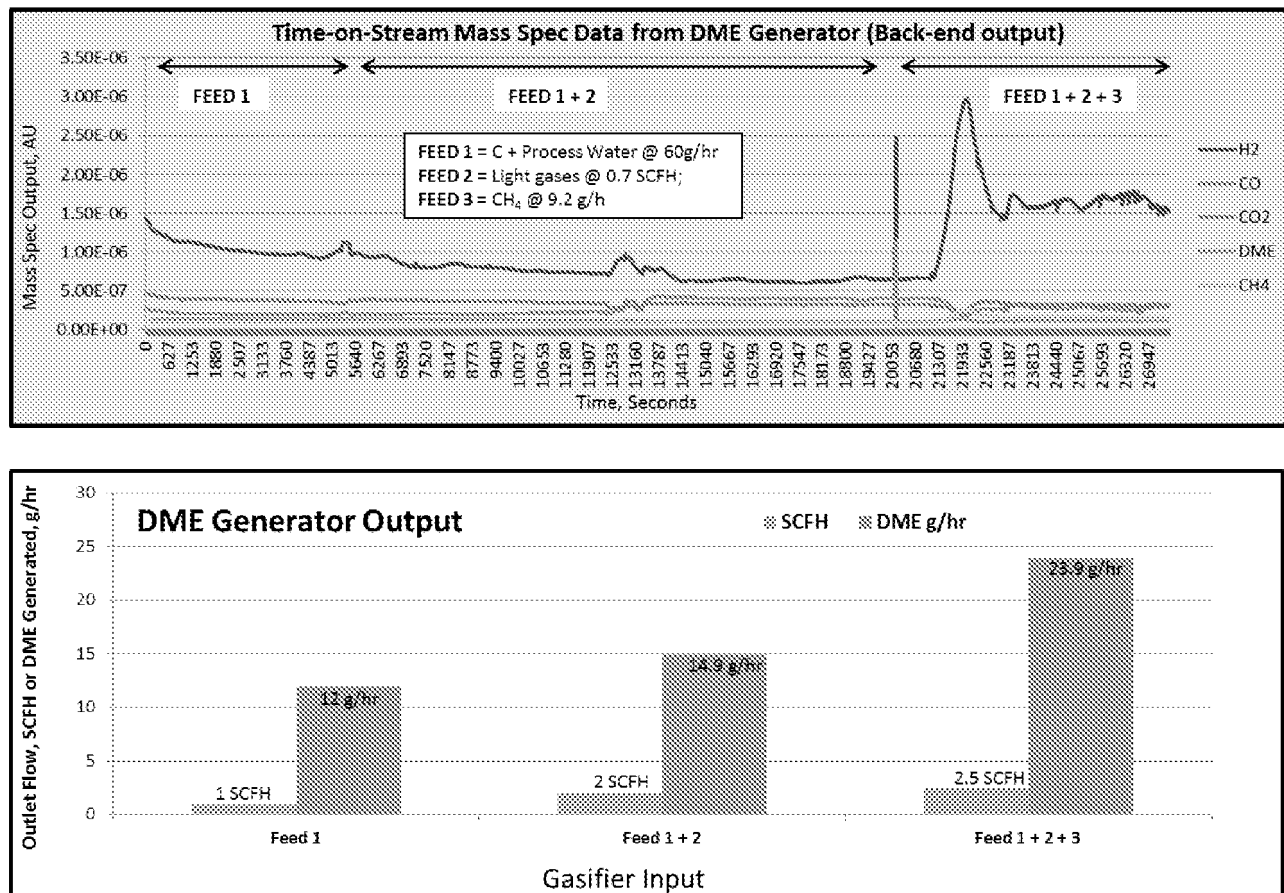
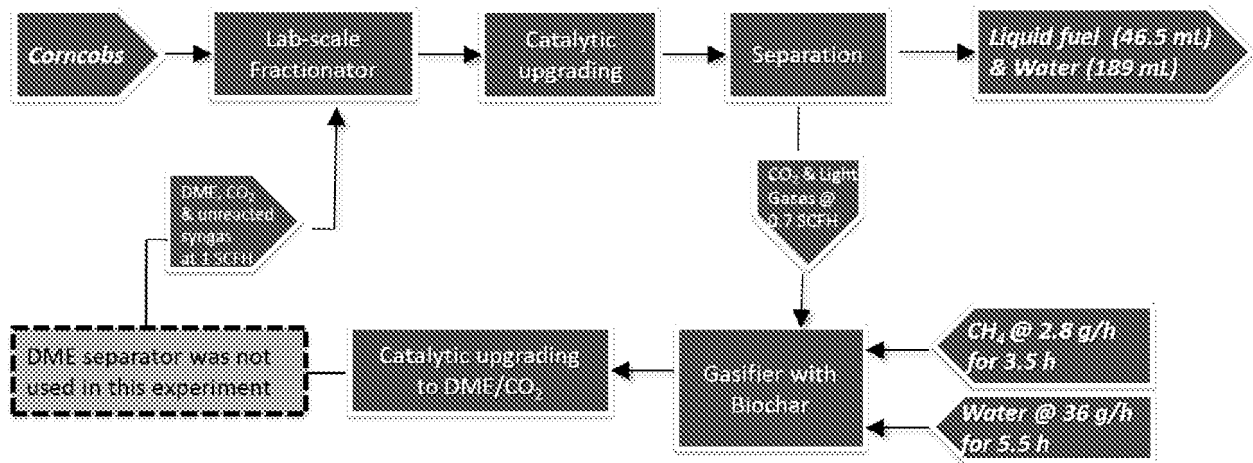


Fig. 11

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Experiment 6: Integrated System without DME separation



Highlights

- About 64 grams of DME produced in the loop in 6 hours yielding 46.5 mL of eBTX.
- Excess biomass and excess carbon used in the experiment.
- Excess H_2 is generated from 2.8 g/h CH_4 used.
- Water produced $\approx$ water consumed
- DME feed rate restricted by operational space velocity, and presence of unreacted gases and CO_2 .
- Need to use a DME separator to enrich DME concentration to operate at optimal space velocity

Fig. 12