# Green Refinery Feed *via* Catalytic Flash Pyrolysis of Biomass


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## Introduction

Flash pyrolysis is a promising route for thermo-chemical conversion of wood, agricultural waste or biomass in general, yielding a bio-oil that can be a potential substitute for transportation fuels. However, the bio-oil obtained from conventional flash pyrolysis has low quality in term of high oxygen content. The oxygenate components are mainly responsible for most of deleterious properties of the bio-oil: high viscosity, non-volatility, high acidity. Research on catalytic after-treatment of the bio-oil has not shown any promising results because of fast de-activation of the catalyst. In this work, a novel approach is introduced for the production of high quality bio-oil where flash pyrolysis and catalysis are integrated in a single reactor. Integrated catalytic flash pyrolysis of biomass offers the possibility to improve the quality and stability of the oil by *in-situ* de-oxygenation and cracking. The high quality bio-oil obtained by catalytic pyrolysis of biomass may be used as a co-feedstock for conventional refineries and in this way the existing infrastructure can be utilized for the production of sustainable transportation fuels.

## Experimental Set-up

A continuous bench scale unit of 1kg/hr feedstock capacity is built up to study the effect of the key process variables on *in situ* catalytic flash pyrolysis of biomass. The reactor is a cylindrical quartz tube of 3.3 m length with an internal diameter of 5 cm. The reactor is heated electrically and is operated in a temperature range of 400 °C to 550 °C. Premixed feedstock (catalyst & biomass) enters the reactor at its top. Under inert atmosphere the thermo-chemical conversion of biomass particles takes place in a few seconds yielding a gas composed of condensables (bio-oil) and non-condensables.

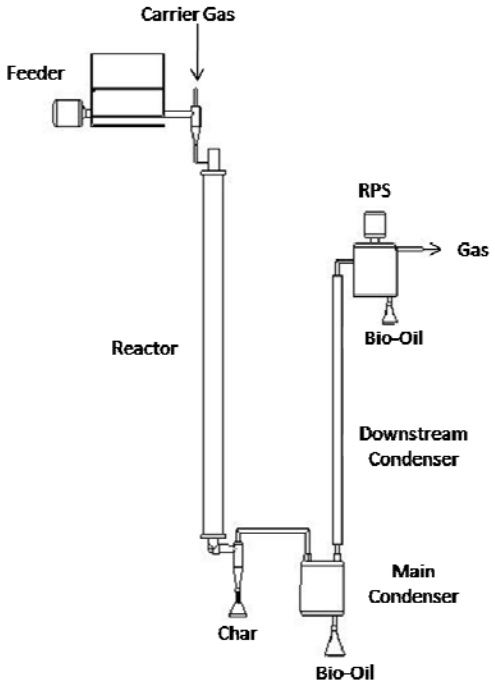


Figure: Schematic of the experimental setup

## Results

The unit demonstrated good operating stability and flexibility for varying operating conditions. Preliminary experiments conducted with zeolites based acidic catalysts have shown that both the pyrolysis of biomass and the de-oxygenation of product vapours can be achieved in a single reactor and an improved quality bio-oil can be produced using catalysts *in situ* during the pyrolysis process.


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