EFFECT OF PRESSURE AND GAS VELOCITY ON BIOCHAR FORMATION: HINDERED TAR EVAPORATION OR TAR CRACKING?

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Pyrolysis is a process corresponding to the thermal decomposition of materials in inert atmospheres. It is also the first phenomenon involved in all the thermochemical conversion processes (pyrolysis, but also gasification and combustion).

The roles of heating rate and final temperature on biomass pyrolysis have been extensively studied and are quite well understood. But little and contradicting results were obtained regarding the influence of pressure on the pyrolysis of biomass. Therefore, this work investigates the effects of pressure and N_2 velocity on oak pyrolysis product yields for char, tar and non-condensable gaseous products.

In general, yields for char and non-condensable gases increased significantly with pressure and decreased with gas velocity. Pressure and gas velocity do not lead to significant changes regarding the product compositions.

These effects of pressure and gas velocity on product yields do not seem to be independent: the observed results may be correlated thanks to a single parameter - mean tar concentration – that is altered by total pressure and N_2 velocity.

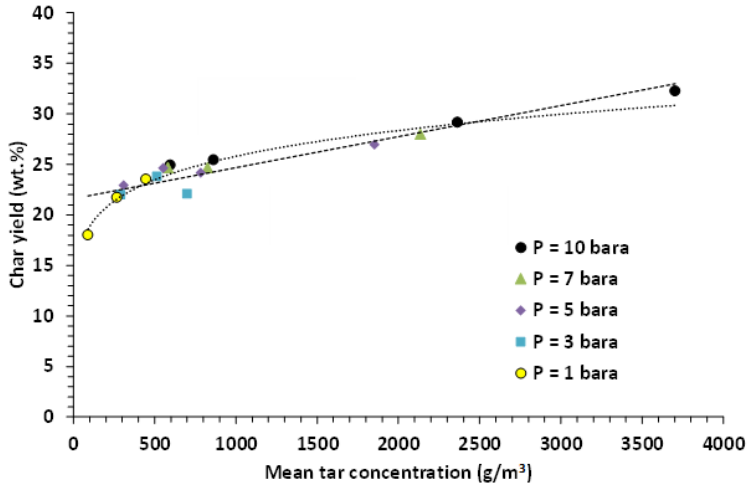

Figure Char yield as a function of the mean tar concentration and total pressure

The figure above shows that mean tar concentration increases the biochar yield. To explain this correlation, a double bed experiment, whose principle and results will be mentioned in the poster, was conceived. It allows understanding if this effect is due to:

- Tar hindered evaporation – that would favour primary char formation.
- Or tar cracking - that would produce secondary carbon from gas conversion of tar over char surface.