

Evaluation of temperature on the pyrolysis of residual biomass

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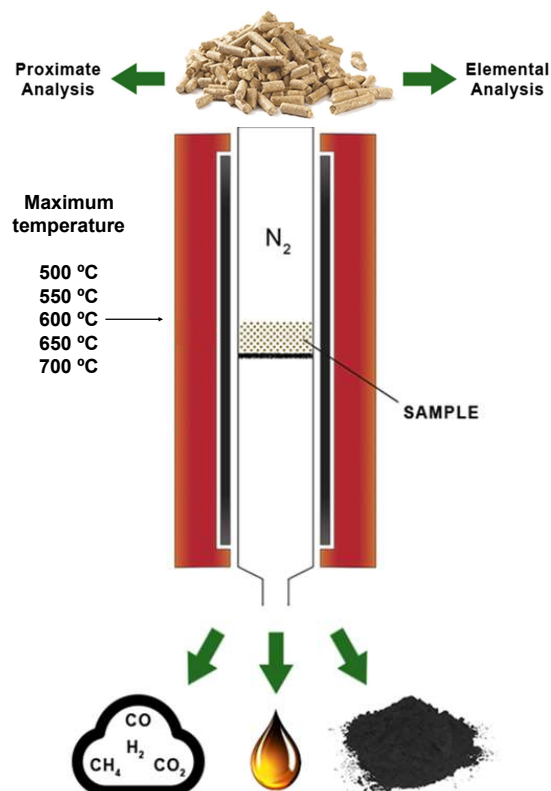
INTRODUCTION

One of the greatest challenges humanity has to deal with nowadays is climate change. In this context, residual biomass is considered a critical potential source for its mitigation, as biomass is a renewable, sustainable and nearly endless available source for the generation of fuels, chemicals and other carbon-based materials. Due to its carbon neutrality, residual biomass is being widely studied, and one of the main technologies for fuel and/or energy production are pyrolysis, gasification, or combustion [1].

Among technologies for biomass conversion, pyrolysis is widely used. It consists of a thermal decomposition process in an atmosphere without oxygen, to convert biomass into biochar, bio-oil and gases, generating no waste during the process [2].

The complexity of biomass pyrolysis arises from the difference in the decomposition of the biomass components combined with the several parameters encompassed on the pyrolysis process. The reaction mechanisms and reaction rates depend on the thermal processing conditions and reactor designs, among those the pyrolysis temperature significantly influences the distribution and properties of the products [3].

1. EXPERIMENTAL



3. CONCLUSIONS

- ✓ Pyrolysis of biomass proved to be a viable technology for the valorization of a worldwide produced waste, as biomass, without producing renewable energy.
- ✓ The gas fraction was the product which the yield was more affected by the enhancing of the temperature, varying from 53.5 % to 66.6 %wt.
- ✓ The maximum pyrolysis temperature proved to be a critical element for this process, as higher temperatures enhance the production of the gas fraction, whilst reducing the solid fraction.

ACKNOWLEDGMENTS

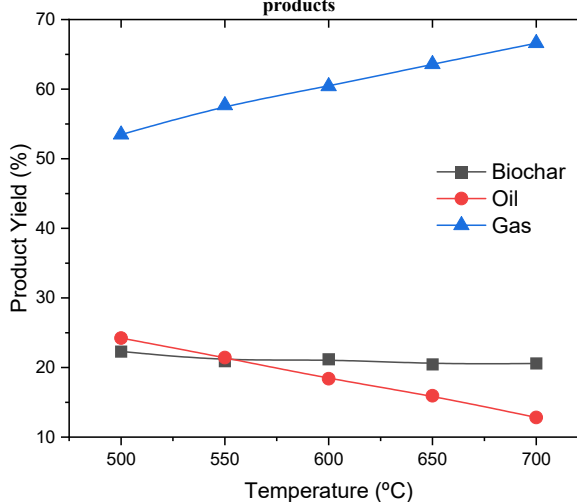
This work is funded by the Portuguese Foundation of Science and Technology (FCT) within the framework of the SUBe Project, ref.: PCIF/GVB/0197/2017. The authors are grateful to the Foundation for Science and Technology (FCT, Portugal) for financial support through national funds FCT/MCTES (PIDDAC) to CIMO (UIDB/00690/2020 and UIDP/00690/2020) and SusTEC (LA/P/0007/2021).

2. RESULTS

Table 1: Pellets biomass characterization

Parameter	Value (wt%)
Moisture	7.130
Volatile compounds	73.651
Ashes	0.350
Fixed Carbon (FC)	18.877
C	46.526
H	5.576
N	0.119
S	0.000
O	47.779

Figure 1. Effect of temperature on the yield of biomass pyrolysis products



- ✓ Pellets have a low value for ashes, being a suitable feedstock for the pyrolysis, as biomass with low ash content has a lower chance to clog the pyrolysis oven;
- ✓ The increment of the maximum temperature caused a reduction of the biochar and bio-oil yield. Higher maximum temperatures can provide more energy for the cracking of biomass molecules into smaller ones, enhancing the gaseous particles yield.

References:

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