Francesco Floris et al., J Fundam Renewable Energy Appl, 5:5
http://dx.doi.org/10.4172/2090-4541.S1.003

OMICS International
conferenceseries.com

International Congress and Expo on
Biofuels & Bioenergy
August 25-27, 2015 Valencia, Spain

Simulation of the gasification process of a characteristic forest biomass of northern Sardinia through the thermodynamic equilibrium analysis: The case study of the Pinus pinaster

Francesco Floris[1], Agata Pistis[2], Efisio Antonio Scano[1,2] and Claudio Tugulu[1]
[1]Università degli Studi di Cagliari, Italy
[2]Sardegna Ricerche, Laboratorio Biocombustibili e Biomasse, Italy

Being an island, Sardinia shares with the mainland the problem of the cost and energy supply at a larger extent. One the most significant kind of biomass exploitation is related to the thermochemical processes such as gasification because of emissions reduction (GHG gases). The gasification is one of the most promising technologies for the conversion of biomass in a gaseous fuel even if the Sardinian forests coverage is lower than the national mean value. In this work we have used the theory of thermochemical mass balance at high temperature to simulate the gasification process of an arboreal species typical of north of Sardinia: the Pinus pinaster better known as Maritime Pine. Starting from chemical characterization by proximate and ultimate analysis the percentages by weight of C, H, N, S and O were determined, from which it was possible to generate the Pine's empirical formula. Furthermore, the thermogravimetric analysis has allowed evaluating the percentages of ash, fixed carbon and volatile compounds. The Chemical Equilibrium with Applications program (free share CEA), developed by NASA predicts the fuel gas composition and the effect of the equivalence ratio and moisture on the calorific value and content of char, pollutant and humidity. The simulation identifies the best run conditions for the gasification of maritime pine. This work provides a simple approach useful in the gasification design in order to limit the experimental tests. The fuel gas could then feed the heat and power combined plant technology with advantages in land options for power supply.

Biography

Claudio Tugulu is M.Sc. in Mechanical Engineering and research fellow at Università degli Studi di Cagliari (Sardegna - Italy) with experience in modeling the gasification processes trough thermodynamic analysis of high temperature chemical equilibrium and skills in running experimental test with biofuels and biomass reactions. His research is focused on pyrolysis and gasification of biomass. He also collaborates with the Technology Park of Sardinia, performing experiments on catalytic pyrolysis pilot plant and fluidized-bed pilot gasifier.

claudiotugulu@gmail.com

Notes: