RESEARCH OF THE ESTIMATION OF CALORIFIC VALUE OF BIOMASS

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Abstract: *Biomass has played and plays an important role in the potential's energy economizing. Biomass resources play an important role in the planet's economy, although often biomass is only used for raw material production in the woodworking industry but can be an excellent energy material with the potential to produce energy through conversion or direct combustion processes. According to more recent researches, the highest inferior calorific value for cereal energy product is obtained for sunflower lighters 17070-17370 kJ/kg, which have a moisture content of 5,9 -6,2%. Determination of the calorific value of wood materials and biomass of lignocellulosic materials is the energy determination of the fuel, lived for the purpose of assessing the amount of energy contained in biomass.*

Keywords: *biomass, calorimeter bomb, value calorific, wood*

1. Introduction

In 2017, the estimated contribution of wood biomass to the European Union energy supply amounted to 20000 PJ.

This contribution was about two-thirds of total renewable energy production in the European Union.

For bio-energy, the following trends were observed:

- The heat: In 2014, the production of biomass heat was about 1500 PJ.

- Electricity: Electricity production from biomass amounted to 90 PJ in 2000 and increased to 116 PJ in year 2014.

- Fuels: The current contribution of biofuels is about 25 PJ, almost negligible in total bio-energy production. The production and use of biofuels has increased rapidly over the past ten years. Bio-disel production has risen from 80 ktonne in 2003 to 780 ktonne in 2014. Ethanol production in the European Union rare from 48 to 216 ktonne over the same period.

To date, six European Union member states want to implement tax programs to support the use of biofuels (Austria, Belgium, Germany, Spain, Italy, Sweden). Under these tax schemes, biofuels are partially exempt from taxes compared to fossil fuels used for transport.

In Romania, an energy consumption of 34.9 Mtoe (million tonnes of oil equivalent) is projected by 2020.

Biomass covers more than 60 % of total renewable energy sources, 190-200 PJ/year.

At present, much of the energy needed by mankind is produced from fossil fuels.

Fossil fuels, according to research conducted by the European Union, damage the environment.

The greatest danger of using fossil fuels is the harmful emissions that are eliminated in the atmosphere. The extraction processing and use of fossil fuels emit 98% of the total carbon dioxide in the atmosphere, which negativ influences both the evolution of living microorganims and human life.

Wood has a high energy capacity and can be delivered at a much lower to energy consumer than fossil fuels.

2. Biomass-important energy source

Biomass is a renewable energy source, as it grows year after year, it is widespread in the world and presents low costs composed to fossil fuels.

The biomass resources from which the fuel material is produced may include wood and wood waste, agricultural cereals and waste resulting from their production.

Biomass is one of the forms of renewable sources that can be converted into solid, liquid and gaseous fuel, and which can generate both heat in the form of heat by combusting it and electricity through conversion processes.

Biomass is plant form is a complex compound and varies from one species to another. It encompasses all forms of vegetable matter that grow on land, water, as well as substances produced by biological development.

Biomass takes part in the carbon cycle in nature by using carbon dioxide. Carbon dioxide participates both in photosystems processes during growth, but is also the component that causes a complete burning.

Biomass is a friend of the environment. Carbon dioxide is observed by plants during growth and forms a closed circuit.

3. Materials and method

The installation used to determine the calorific value of wood biomass was the XRY-1C explosive type burner produced by Shanghai Changji Geological Institute in China (fig.1).

The method of determining the calorific value of wood material refers firstly to the preparation of the raw material, the to the actual determination and ultimately to the final result.

The test sample 1 binds to the cotton yarn 2 and put in the crucible of the bomb 3.Connect the spiral nickel wire 4 to the sample and the cotton yarn, the place the protective cap 5 correctly.

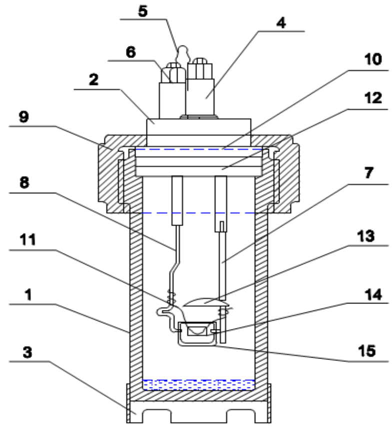

Fig. 1. *Calorimeter bomb*

The crucible is connected to the calorimetric bomb cap 6 by 2 electrodes 7 and 8, which continues with the electrical coupling bomb of the calorimetric bomb 9 and 10.

By bombing cap, the bomb 11 is coupled throught the stator 12 to the oxygen cylinder, introducing 3 atmospheres.

The test contains three distinct periods (fig.2).

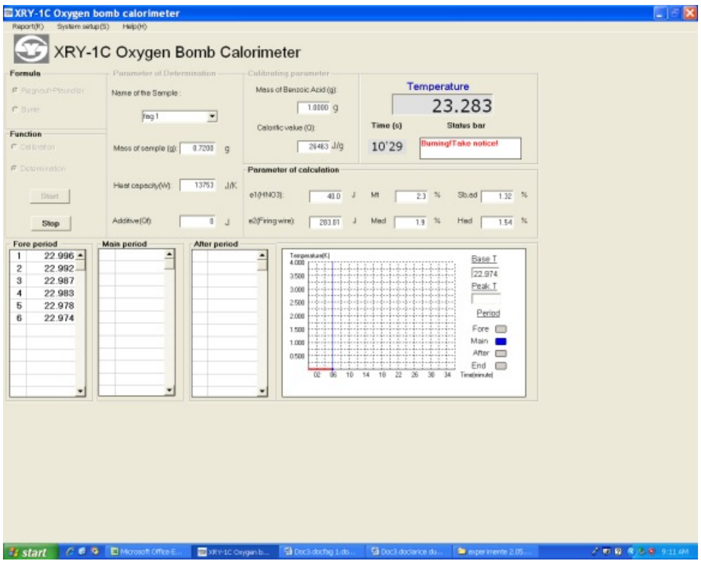

Fig. 2. *Three distinct period at calorimeter bomb*

The initial period aim to determine the the temperature variations of the water in the calorimetric vessel due to the heat exchange with the outside before the combustion.

The main period start with the ignition of the sample and consequently increases the temperature of the water in the calorimetric vessel.

The final period aim to determine the average temperature variation of the water in the calorimetric vessel due to heat exchange with the outside.

For fraxinus excelsior, m1 = 0,6600 g, U = 0%, gross calorific value is 19008 kJ/kg, net calorific value is 18370 kJ/kg ,m2 = 1,1180g, U = 10 %, gross calorific value is 16238 kJ/kg, net calorific value is 15987 kJ/kg, m3 = 1,2640 g, U = 20%, gross calorific value is 13788 kJ/kg, net calorific value is 13285 kJ/kg, m4 = 1,2770 g U=50%, gross calorific value is 6436 kJ/kg, net calorific value is 5179 kJ/kg.

In fig.3 is presented variation calorific value for fraxinus excelsior.

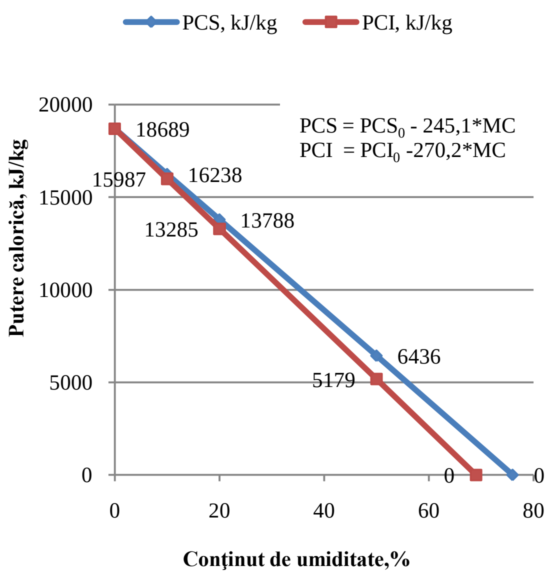

Fig. 3. *Variation value calorific for fraxinus excelsior*

For acer pseudoplatanus, m1 = 0,851 g, U = 0%, gross calorific value is 18802kJ/kg, net calorific value is 18336 kJ/kg, m2 = 0,960g, U = 10 %, gross calorific value is 16805 kJ/kg, net calorific value is 16618kJ/kg, m3 = 1,006, U = 20%, gross calorific value is 15041 kJ/kg, net calorific value is 14668 kJ/kg, m4 = 0,945 g, U=50%, gross calorific value is 9749 kJ/kg, net calorific value is 9166 kJ/kg.

In fig.4 is presented variation valorific value for acer pseudoplatanus.

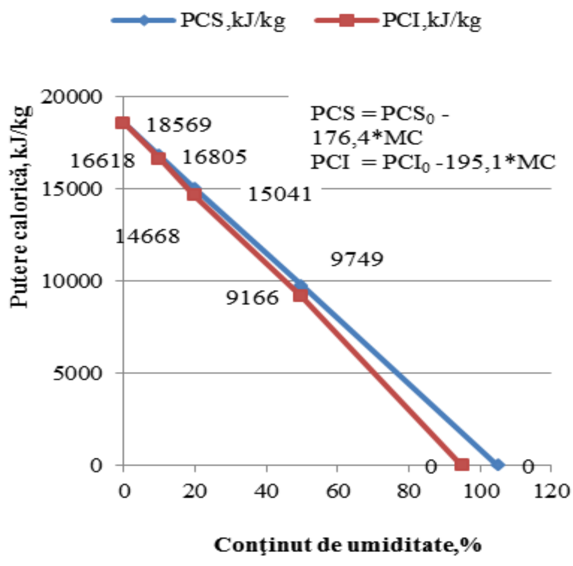

Fig.4. *Variation value calorific for acer pseudoplatanus*

4. Conclusions

- Energy is the basis of all human activities and its evolution can not be interrupted combustion is one of the most important thermo-chemical processes of energy production;
- At present, all countries in the world are strngthening their investments in alternative energy generation, which is projected to reach 20% of the total energy used in Europe.

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