

Characterisation of thermal processing of olive mill wastes

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Turkish Olive Oil Industry is the second largest olive cultivator in the world and is also among the top five countries in olive oil production (Turkish Statistical Institute, 2012). It is estimated that 220.000 metric tons of olive oil is produced in each year. This industry is characterized by relevant amounts of by-products which creating problem with them disposal. Nowadays the production techniques of olive oil were mostly changed from press and three-phase (oil-water-paste) continuous systems to two-phase systems to produce less wastes (Roig *et al.*, 2006; Christoforou E. *et al.*) but anyway in Turkey we can meet all of these processes.

Main by-products such olive mill wastewater, olive cake, olive stone, olive seed and olive husk after pre-treatment process can be used in energy processes.

In this paper combustion behaviour of olive by-products from different methods of olive oil production was investigated using thermal analysis techniques. Olive mill waste by-products from three-phase and two-phase systems were taken into consideration.

Thermogravimetry (TG-DTG) and differential scanning calorimeter (DSC) techniques were used. The reaction regions, ignition and burnout temperatures, heat flow rate values of the samples are determined. The changes of activation energy (E_a) are calculated using different model-free isoconversional methods: Friedman, Ozawa-Flynn-Wall and Kissinger-Akahira-Sunose.

Finally, the characteristic thermodynamic parameters including pre-exponential factors (A), as well as the changes of enthalpies (ΔH), free Gibbs energies (ΔG) and entropies (ΔS) of the thermal decomposition were determined and evaluated. Last part of paper presents proposal for energy application of olive mill wastes.

References

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