

FAST PYROLYSIS OF WOOD WASTE

I. Urbanovich, G. Dobele, V. Jurkjaņe
Latvian State Institute of Wood Chemistry
E. Samulis
Joint-Stock Company "Kņavas granulas"
V. Kampars
Riga Technical University

Summary. Fast pyrolysis enables the conversion of solid wood biomass into a liquid product – bio-oil, which can be used as ecological fuel or as a raw material for producing valuable chemicals. The maximum yield of bio-oil was obtained - 63% of the dry raw material at the following conditions: drying temperature 200°C, 90 min and pyrolysis at 550°C. Chemical activation of the carbonisate was performed, and microporous active carbons with a highly developed porous structure were obtained.

The application of regularly renewable residues is favourable for the Earth's ecology. One of the most promising renewable sources of energy and chemicals is plant biomass waste, for example, low-grade wood, peat, straw and bark. There are the following thermal ways of the utilisation of wood waste biomass: combustion, gasification, carbonisation, pyrolysis.

One of the promising methods for utilising waste wood for energy, chemical, and ecological purposes is fast pyrolysis. Fast pyrolysis enables the conversion of solid wood biomass into a liquid product – bio-oil, which can be used as ecological fuel or as a raw material for producing valuable chemicals. As the fuel, bio-oil is neutral with respect to the release of carbon dioxide. Upon its burning, a low amount of nitrogen oxide is released, and no sulphur dioxides are formed.

In fast pyrolysis, carbonisate (solid product) and non-condensable gases are formed as by-products. Carbonisates can be used as a solid fuel (combustion heat 30 MJ/kg) or, by activating, to produce active carbon for purification of liquids and gases, etc. Non-condensable gases (15-20 MJ/nm³) can be used directly in the technological process to maintain the drying and pyrolysis of the raw material.

The aim of the present study was to investigate optimum conditions (biomass drying and pyrolysis temperature) for the possibility to obtain the maximum yield of bio-oil upon fast pyrolysis of deciduous wood in an ablation type reactor.

The maximum yield of bio-oil was obtained - 63% of the dry raw material at the following conditions: drying temperature 200°C, 90 min and pyrolysis at 550°C.

Chemical activation of the carbonisate was performed, and microporous active carbons with a highly developed porous structure were obtained.

The effect of the interaction between the carbonisate and the activator on the carbon yield and the porous structure was determined.

Igors Urbanoviĉs
Latvijas Valsts Koksnes ķīmijas institūts,
Latvija, Rīga, Dzērbenes iela 27, LV-1006
Tel.27893483, gdobele@edi.lv