

ŠTUDENTSKÁ VEDECKÁ A ODBORNÁ ČINNOSŤ NA DREVÁRSKEJ FAKULTE VO ZVOLENE

STUDENT SCIENTIFIC CONFERENCE FACULTY OF WOOD SCIENCES AND TECHNOLOGY IN ZVOLEN

Already 53rd year of Student's scientific conference was organised under the hosting of the Dean of the Faculty of Wood Sciences and Technology on May 10, 2012. The conference attended 50 students with their projects divided into following sections: technical and technological; section of design art; section of economics and management; section of marketing, trade and innovation management and the section of the protection of persons and property against fire. Besides the students of our university, the Conference attended students from foreign universities (ULS Poznań, UTB Zlín, MZDNU Hungary, MU Brno, ZČU Plzeň, Izhevsk State Technical University) and other universities in Slovakia (UCM Trnava, EU Bratislava, TU Košice, ŽU Žilina, MTF STU Trnava, UMB Banská Bystrica). This year, a technical section for postgraduate students was opened first time, works are published in the following abstracts.

DETERMINATION OF POLYMERIZATION DEGREE OF CELLULOSE AND HEMICELLULOSES IN PAPER DURING ACCELERATED AGEING

Anna Briškárová

Cellulose is the main component of paper as the information medium, which are stored in libraries, museums and archives. Degradation of cellulose, as well as hemicelluloses, is an important factor influencing its chemical, mechanical, physical and optical properties, as well as paper longevity. Accelerated ageing of newsprint paper has been performed at 98 °C for 0, 1, 2, 3, 7, 10, 15, 20, 30 and 60 days. Degradation of polysaccharide contribution has been studied by gel permeation chromatography (GPC) and high performance liquid chromatography (HPLC) to determine degree of polymerization (DP). The results proved degradation of cellulose and hemicelluloses, whereby decrease rate of hemicelluloses DP is higher than cellulose one. The value of DP of cellulose residual decreased by 54,97 % after 60 days ageing process. Decrease of DP for hemicelluloses fraction A is 80,48 % and for fraction B is 66,67 % during accelerated ageing.

Key words: paper, degradation, degree of polymerization, cellulose, hemicelluloses.

DETERMINATION OF VOLATILE COMPOUNDS AT HYDROLYSIS OF RECYCLED FIBRES

Lenka Halajová

The burning of fossil fuels is contributing to serious degradation of the environment. Therefore mankind has to think how to supply them and how to improve contemporary state of the environment. The solution is utilization of the renewable sources of energy, including lignocelluloses, too. Lignocellulose materials are composed mainly of cellulose. Other components are hemicelluloses and lignin. Because they have the high content of saccharides, they have big potential to be valuable raw for production on bioethanol. The most effective way to evaluate lignocellulosics is acid hydrolysis.

In this work, there is described the influence of acid hydrolysis with 0,5 % H₂SO₄ (temperature 140, 160, 180 °C, duration 2, 5, 10, 20, 30, 60, 120 min., hydromodule 1:40 (w/v)) on samples of recycling fibres from waste paper. For the determination of volatile compounds (acetic acid, formic acid, 2-furaldehyde and 5-hydroxymethyl-2-furaldehyde) we used the method of liquid chromatography. We observed the decrease of pH values in hydrolysates. At conditions of hydrolysis, the concentration of acetic acid increases due to the saccharides deacetylation. The maximum concentration of formic acid was observed at the temperature 160 °C in time 30 minutes. The 2-furaldehyde arises by the saccharides dehydration. The increase of concentration of 2-furaldehyde and 5-hydroxymethyl-2-furaldehyde is retarded due to their participation in the condensation reactions.

Key words: recycled fibres, volatile compounds, liquid chromatography, acid hydrolysis.

HEAT-INSULATION MATERIAL BASED ON WASTE PULP

Michaela Tisoňová

Waste sludge of pulp and paper production represents one of the biggest problems in pulp and paper industry. This thesis presents some new possibilities of assessing of paper sludge in a building industry. It suggests about the possibility of utilization this waste as heat-insulation material. This thesis analyses important properties of proposed heat-insulation material and compares them with features of the heat insulation Climatizer Plus. From all the features of insulation material, the thesis are concentrating on the: factor thermal conducting, combustion heat and ash content from the view of fire safety. Sludge and insulation are compared because they have similar textures fibre. Climatizer Plus is heat insulation based on waste paper. Pulp and paper sludge are waste fibres of pulp and paper production. Based on results, the insulation ability was higher about 63 % in commercially available cellulose insulation. Thermal conductivity was higher in the paper sludge. The combustion heat was lower in paper sludge about 42 to 45% in comparison with commercial insulation. The ash content in the paper sludge was twice higher. Both materials have some advantages and disadvantages, results of the thesis show that recovery of waste sludge from pulp and paper industry is promising and perspective.

Key words: heat-insulation, paper sludge, paper sludge recovery.