Natural and Biologically Active Products from Abies, Larix, Birch and Aspen Bark

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Wood bark wastes contain different extractive compounds and they can surve as a source of valuable natural and biologically active products.

Earlier it was shown by us that short-time activation of *Larix sibirica* bark and *Abies* bark by overheated water-steam increases the yield of tannids isolated by alcohols and water. The increased yield of betuline isolated from activated birch bark was also observed. In order to increase the yields of valuable compounds from wood bark the acidic and basic catalytic additives were applied in this work.

The process of *Larix* and *Abies* bark activation by overheated water-steam was studied at temperatures 180-240^{o}C and residence time 0.5-5 min. It was found the activation treatment in the presence of NH_4Cl increases by 2 times the yield of tannids from *Abies* and *Larix* bark. The heating of *Abies* and *Larix* bark with ethanol in the presence of HCl produces the mixture of antocyanidine dyes with a high yield. They were divided into individual natural dyes: antocyanidine, paeonidine and delphinidin using column chromatography with polyamide sorbent and C_2H_5OH as eluate. These compounds were identified by UV and IR spectroscopy.

The activation treatment in the presence of NaOH or KOH makes possible to isolate betuline from birch bark with the yield up to 96-97% from theoretical one.

For the utilization of aspen bark the methods of fractional extraction by sets of solvents with different polarity was used. Low polarity extractants isolate lipids from bark with the yield up to 12 wt.%. They were presented mainly by neutral lipids and were divided into some groups of compounds by different methods (column chromatography et.al.). The composition of aspen bark extracts was studied by gas-liquid chromatography, NMR, IR spectroscopy and chemical methods.

Two approaches were used for the utilization of solid residue of bark extraction: oxidative pyrolysis in a fluidized catalytic bed and catalytic hydrolysis by steam. At the first case the powdery porous chars were produced and at the second-sugar containing fodder component.

The technological schemes for producing the natural and biologically active compounds from wood bark of different origin were described.