PROPERTIES OF PEROXIDE PULP OF WHEAT STRAW

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The kinetics delignification of wheat straw (Triticum sp.) in a system «H_2O_2-H_2O-AcOH-AcOOH-catalyst» is considered from position of the common theory of homogeneous catalysis. As the catalyst of sodium tungstate is used. The constants of velocities of delignification and acidic condensation of lignin at the temperature range 313...363 K and the effective activation energy of these processes (respectively 76,8 and 102,1 kJ/mol) are defined. These values are close to certain previously at cooking of coniferous wood (respectively 68.1 and 92.4 kJ/mol).

Carbohydrate composition and dynamics dissolution of the wheat straw's polysaccharides is investigated. Glucopiranose (cellulose), xyloglukan and arabinoxylan are identified in source raw materials. In the hydrolyzate of straw's mannose discovered, but galactose is not discovered. The basic components, passing in the solution in the first period the peroxide pulping of wheat straw, are lignin and arabinoxyilan. The further reducing of output if you continue cooking comes from the dissolution products of oxidative and hydrolytic degradation of the solid residue's polysaccharides.

Stems of wheat delignificated with mixture of acetic acid, hydrogen peroxide, water (respectively 65 : 12 : 23 on weight) and sodium tungstate (concentration 0,0015 gmol/dm^3); liquid module 6; temperature 80° C; isotherm cook's duration 4,5 h. Characteristics of peroxide cellulose fibers from straw (the characteristics of sulfate cellulose fibers from the same raw material put in brackets) are studied by using L&W Fiber Tester:): the number of fibers in the 1 g 20.0×10^3 (20.1×10^3); weight mean length 1.34 (1.22) mm; arithmetic mean length 0.577 (0.509) mm, weight mean width 19.3 (17.8) µm; arithmetic weight mean width 17.8 (16.8) µm; wall thickness 1.65 (1.65) µm; shape factor 90.7 (86.3) %. On these properties the straw pulp fibers like to libriform fibers of hardwood – birch and aspen.

Peroxide pulp and sulfate pulp are beaten to 30° SR. Morphological characteristics of fibers (length, width, number of breaks, coarseness, shape factor), strength and deformation properties of paper castings (breaking length, flexural rigidity, modulus of elasticity) were determinated. Peroxide pulp is less degraded during the beat process and doesn't concede to sulfate pulp along the fundamental and technological properties. Under identical mechanical stress straw peroxide pulp's sheet is less deformed than sulphate pulp's sheet.

Relaxation processes of the polysaccharides and lignins was identified by dielectric spectrometric metod. Peroxide delignifikation is accompanied by destruction of amorphous areas of pulp, therefore part of amorphous phase in the product decrease up to the complete disappearance at the sufficiently prolonged cooking.

Peroxide pulp for bleaching from wheat straw had been with yield 55,7 % and whiteness 76,9 %. The bleaching was produced by hydrogen peroxide at pH 10.5 and at concentration of fibrous suspension 10 % in one stage in accordance to accepted technology for this process. Dependence of the whiteness and chemical loss from the hydrogen peroxide concentration (range 0.5…1.5 %), temperature (40…50 ^{o}C) and bleaching duration (30…90 min) had approximated by regression equation of second order. It was found the easy bleaching of the peroxide straw cellulose. Optimal bleaching conditions was found by nonlinear programming method: temperature 40 ^{o}C; concentration H_2O_2 1 %; duration 63 min. Bleaching results to optimal condition: cellulose whiteness 89 % (correspond to State Standard for hard wood sulfate cellulose), chemical loss 5,7 %.