WOOD DELIGNIFICATION IN SUPERCRITICAL CO_2 MEDIUM

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Main industrial ways of producing fiber semi-finished products are environmentally unsafe. Environmental load of such industries may be significantly reduced only if existing technologies are improved or new ones are created. Supercritical fluid extraction seems to be unique among the rest of lignin's extraction methods. Properties of supercritical mediums (SCM) are similar to those both of gases and liquids. SCM have high dissolving capacity with respect to polymeric materials and high diffusion capacity, facilitating their penetration into wood's pores.

It should be mentioned that only CO_2 has relatively low pressure- (73 atm.) and temperature (31^0C) critical values among non-toxic, incombustible and environmental-friendly compounds. At the same time, its density is rather high (0,47 g/dm^3). Load of different modifiers allows to increase dissolving capacity of supercritical CO_2.

The aim of the given work is to define the fundamental possibility of carrying out the delignification by supercritical fluid extraction and to study the influence of different modifiers (traditional solvents in wood chemistry – ethyl and isoprophyl alcohol, dioxane and acetone), loaded to supercritical CO_2, on the delignification rate.

The subject of inquiry is ungraded spruce sawdust, being deresined by 96% ethyl alcohol. Lignin's content in prepared sawdust is (29,16±0,05)%, sample's dryness is (90,32±0,01)%.

Residual lignin's content in the treated material was defined using Klason-Komarov method.

Extracts were studied using direct UV-photometry to confirm lignin's presence. Presence of reducing substances was also tested to evaluate the stability of carbohydrates under treatment conditions.

Delignification effect of SCM appears under the pressure of 350 atmospheres. It is defined that temperature does not affect the delignification rate (temperature range was 80-140^0C). There are no reducing substances found in the extracts – that shows the stability of wood matrix' carbohydrates under treatment conditions. Lack of the delignification ability of pure supercritical CO_2 was shown. The greatest delignification rate was 4% when using isoprophyl alcohol as a modifier. Ethyl alcohol, dioxane and acetone haven't affected the delignification ability of supercritical CO_2.

Low values of delignification rate are accounted for low rate of destruction of the lignin-carbohydrate nanocomposite.