

Whitening of oak wood with hydrogen peroxide

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Abstract : *Whitening of oak wood with hydrogen peroxide.* Whitening of oak wood with hydrogen peroxide was tested. Different concentration of hydrogen peroxide were used. Samples were soaked for: 5min, 15min, 30min, 1h, 6h, 12h, 24h, 168h (7 days). After drying color was determined. Basing on the obtained results, brightness, hue and saturation changes were calculated.

Keywords: oak, hydrogen peroxide, X-Rite

INTRODUCTION

Every wood species has its natural color. Wood can be tinted in many hues, from white thru yellow, red, brown to black. Coreless species are bright on whole section, core species have distinct darker colors of heartwood from bright sapwood. Color of core species may cover whole spectrum, depending on quantity of non-structural substances. These substances include dyes, tanning agents and gums [Krzysik 1978].

Wood color is mostly dependent on the species, but is also influenced by climate and environmental conditions [Krzysik 1978]. Oak wood, in dependence on the environment may have colors ranging from beige to black [Prażmo 1968].

After tree falling, wood changes its color under influence of light, fungi and chemical substances present [Szczuka 1970].

Considering domestic species, they may be divided into color groups such as: whitish (fir, spruce, aspen, hornbeam, beech, maple, great maple), yellowish (birch, Swiss stone pine), reddish (yew, larch, pine, cherry, plum), brownish (oak, ash, elm), or close to black (walnut) [Krzysik 1978].

Whitening of wood is applied in aim to remove stains or discolorations forming due to improper storing and to simply unify color. Hydrogen peroxide is most common whitening agent used for oak wood. Oxalic acid, citric acid, calcium hypochlorite, potassium oxalate and sodium sulfate are also being used.

METHODIC

Oak samples of 30x50x5 mm dimensions were prepared for tests. Each sample was tested with X-Rite model SP 60 spectrophotometer. Measurement area for each sample was defined (8mm circle for spectrophotometer). Measured samples were arranged into packets allowing easy hydrogen peroxide penetration into material's faces (Fig.1.). Packets were tightened with white thread, preventing falling apart and put into seven containers filled with different hydrogen peroxide solution of different concentration. samples were loaded with glass plugs, in aim to keep them submerged. Containers were tightened and placed in the dark, remaining three samples were treated as a reference.

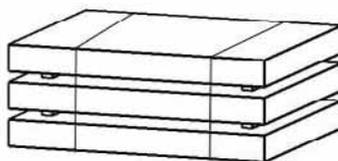


Fig. 1. Packet of samples used in the experiment.

Following concentration of hydrogen peroxide were used: 2%, 5%, 10%, 15%, 20%, 25%, and 30%.

Samples were soaked for: 5min, 15min, 30min, 1h, 6h, 12h, 24h, 168h (7 days). After each stage packets were removed, soaked and left for drying in the dark place. After drying color was determined, using the same spot as before procedure. Basing on the obtained results, brightness, hue and saturation changes were calculated.

RESULTS

Application of hydrogen peroxide on oak wood causes brightening of the material. It was determined that solution strength and extended time causes brighter wood color (Fig. 2.).

In the initial whitening stages colors of the samples are very diversified, probably as a result of different dye and tannin washing from the internal parts of wood [Tyszka 1987], and their settling on the tested surfaces.

Quickest color change occurs during first hour of treatment, in this time happens 40% of whole change of 7 days soaking. After that discoloration occurs at much slower ratio.

Highest brightness change occurs after week of treatment, and equals 14,04 [Semak 2009].

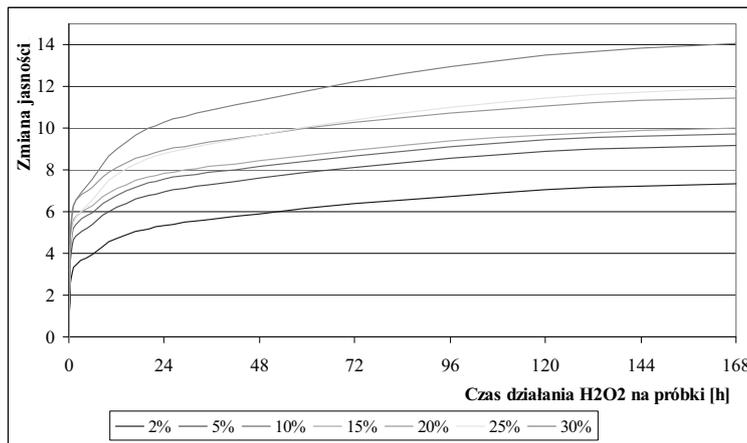


Fig. 2. Changes

of brightness in whitened samples.

Sample pictures of natural and whitened oak wood are presented on figure 3.

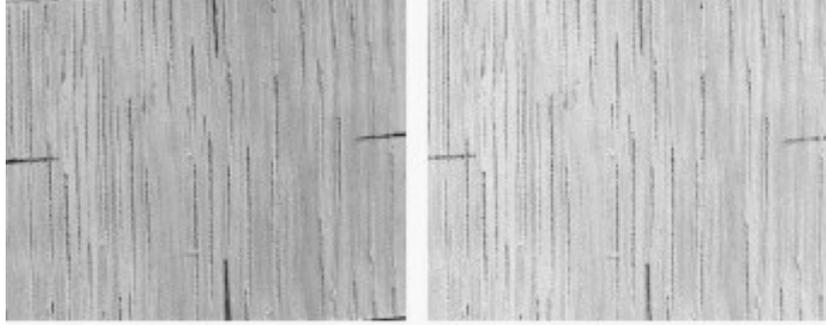


Fig. 3. Sample color change. Oak wood before and after 7 days treatment with hydrogen peroxide.

CONCLUSION

1. Application of hydrogen peroxide on oak wood causes its brightening.
2. Greatest brightness change of oak wood occurs during first hour of soaking in hydrogen peroxide solution.
3. Brightening effect is proportional to strength of hydrogen peroxide solution.
4. Extending soaking time of oak wood in hydrogen peroxide solution increases brightening effect.

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Streszczenie: *Bielenie drewna dębu nadtlentkiem wodoru.* W artykule przedstawiono wyniki badań bielenia drewna dębowego przy użyciu nadtlenu wodoru. Zastosowano różne stężenia roztworu i różny czas moczenie drewna. Zmiany koloru rejestrowano spektrofotometrem sferycznym X-Rite.

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