

## Abstract

The cleaning of ancient wood objects is considered one of the most significant treatment and conservation processes in the field on wood conservation. Such treatment must be carried out with care due to the unique nature of wood as a heterogeneous organic material. Several cleaning materials and methods are used for ancient wood conservation purpose such, these include mechanical techniques (i.e. laser and ultrasonic cleaning); dry cleaning using organic solvents (i.e. ethyl alcohol, acetone, toluene, and benzene); and wet cleaning using diluted alkaline solutions (i.e. ammonium hydroxide) and diluted acidic solutions (i.e. diluted citric acid). However, these treatments are not used base on scientific knowledge of their effects on the properties of wood. Accordingly, the researcher chose to evaluate these treatments and study the change promoted in the chemical structure and crystallinity of cellulose, as well as change in the mechanical and optical properties of wood as a result of applying these treatments.

The study evaluated the following cleaning treatments: pure ethyl alcohol, diluted ethyl alcohol (80%), pure isopropyl alcohol, diluted isopropyl alcohol (80%), toluene, acetone, benzene, diluted citric acid (0.5 – 1%) and diluted ammonium hydroxide (0.5 – 1%).

Scientific assessment of the selected treatments was carried out using visual inspection and digital microscope to evaluate the visible color change. The change in the topography of the treated samples was studied by means of atomic force microscope. A spectrophotometer was used to assess the precise change in the color of the treated samples and compare it to that of the standard samples. Mechanical behavior of the samples were followed using the dynamometer. Fourier transform infrared was used to study the changes in the chemical structure of wood post treatment. Finally, the changes in the crystallinity of cellulose was carried out using X-ray diffraction.