

ABSTRACT

The objective of this work is to describe and compare colmated and non-colmated stoppers cork stoppers, regarding their differences in appearance (image analysis), structure (analysis with scanning electron microscopy- SEM), and mechanical behavior (compression test). For this study 75 natural cork stoppers were used and divided equally in 3 groups: (i) stoppers of superior class; (ii) stoppers of inferior class to be colmated; (iii) colmated stoppers.

Image analysis techniques were applied on the surfaces of superior and inferior (pre-colmated) class of stoppers, to analyze their porosity. Porosity features showed differences between two classes: higher values of all features in the inferior class and lower in the superior quality class. Water absorption test performed on colmated and pre-colmated group of stoppers showed small differences between them: colmated stoppers absorbed less water (92.1%) than pre-colmated class (98.8%) and the same trend was found with dimensional variations (swelling) (lower swelling of colmated stoppers was reported).

The behavior of the colmated and pre-colmated stoppers under compression performed in axial and radial direction was studied. Young's modulus for compression in axial direction were 21.2 MPa and 18.4 MPa for colmated and pre-colmated group respectively, while the compression in radial direction was characterized with the range of force for the given deformation, with mean values of 147 kN and 135 kN for 1 mm deformation.

Colmated stoppers were additionally analyzed by SEM, where the observations emphasis was given to the colmation material impregnation in the interior of the stoppers. Colmation material presence was mainly reported on the stoppers surface.

It can be concluded that colmation process primarily improves the appearance of the stopper, covering successfully the undesirable surface pores, which is the main objective of the colmation.

Key-words: wine cork stoppers, colmation, porosity, cellular structure, cork compression, swelling