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**Mineralogical, petrographic and physical-mechanical study of Roman construction materials from the Maritime Theatre of Hadrian's Villa (Rome, Italy)**

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**Abstract**

This paper presents the study of various Roman materials used in the construction of the Maritime Theatre, one of the main buildings in the Hadrian's Villa complex, a designated UNESCO World Heritage Site located in Tivoli (Rome, Italy), dating to the first half of the II century A.D. The plaster layers (*arriccio* and *intonachino*) and overlying original Roman paintings that form the concave wall of the *portico* as well as some bedding mortars of the pyramidal stone elements (*i.e. cubilia*) of the circular masonry have been studied in particular. In addition, the acid volcanic rocks of the *cubilia* have been investigated, aiming to understand their state of alteration and geological origin.

By mineralogical-petrographic microscopy (OM), diffractometry (XRPD), Raman spectroscopy, Point Load Tests (PLT), helium pycnometry, and particle size analysis, the composition and granulometric distribution of the aggregate, type and characteristics of the binder, and various physical-mechanical properties (density, porosity, water absorption, imbibition and saturation indices, mechanical resistance) of mortars and stones were defined. In addition, through digital image analysis of thin sections, the binder / aggregate ratio and some geometric characteristics of the aggregates (*e.g.* circularity) were determined.

The research aims to improve the knowledge of the constructive technologies of the Maritime Theatre through the analysis of its materials.

**Keywords:** Roman technology, Aggregates, Binder, Volcanic *Cubilia*, XRPD, Raman, Physical-mechanical properties

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