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R. Ravi, S. Thirumalini, N. Taher



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Analysis of Ancient lime Plasters - Reason behind Longevity of the Monument Charminar, India A Study

R.Ravi^a, S. Thirumalini^{b*}, N.Taher^c

^aDepartment of Civil Engineering, SRM University, Chennai, Tamilnadu, India, 603203.

^bSchool of Civil and Chemical Engineering, VIT University, Vellore, Tamilnadu, India, 632014.

^cSuperintending Archaeologist Archaeological Survey of India Hyderabad Circle Hyderabad Telangana

ravistrucl@yahoo.co.in
thirumaliniiselvaraj@vit.ac.in
n-taher2000@yahoo.com

*Corresponding author

Abstract

The present study has been taken up to analyse the ancient plasters at Charminar, Hyderabad, India for the effective conservation of the historic monument. The plasters were characterized adopting physicochemical analysis as well as modern analytical techniques including XRD, TGA with DTA, SEM and Infra-Red methods (FT- IR). The binder is calcium rich lime with binder aggregate ratio of 1:2.75 to 1:3.43 by weight and mineralogical analysis reflect load bearing phases vaterite, calcite and aragonite with some amount of alumina silicates contributing to strength of the mortars. The results of FT-IR substantiated the outcome of organic test. TGA confirms the results of XRD and indicated the loss of weight around temperature of 750°C showing decomposition of calcite and vaterite and release of CO₂. SEM images validated the presence of calcite and vaterite. The organics present in the lime plasters in the form of carbohydrates and proteins has mitigated the degradation of materials that could be the main reason behind the sound survival of the Charminar over the ages. On fermentation, organics were converted into alcohols of short chain and stabilised the formation of meta stable vaterite rather than calcite. This keeps the mortars young and hence the durability of the structure.

Keywords: Charminar ; XRD; FT-IR; TGA with DTA; Vaterite ;Organics

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