Measurement of behavior of traditional mural paintings in relation to its principal actions

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Behavior is a complex parameter that is necessary to identify the state of decay occurring in a mural painting and the type of interventions necessary for its survival. The member parameters of behavior belong to the processes of dynamic physical actions, chemical reactions, and changes imposed by these actions and the response of the painting to these changes. Measurement of behavior need to be done with respect to principal measurable actions. This study determines these principal actions that include the effect of causative actions also.

Principal actions that govern the behavior were identified using two categories of painting samples. These are samples with clay ground and organic paint and samples with lime based ground and mineral paint. Four sets of five samples were placed in open air, under varying degrees of moisture absorption rates, five relative humidity values, five illumination levels and varying temperatures respectively. Rate of moisture absorption, rate of moisture transmission, rate of moisture evaporation and thermal movement were the parameters of behavior measured periodically. Significance of imposed physical factors to the parameters of behavior was determined.

Only moisture absorption and temperature gave significant results ($P<0.01$ and $P<0.05$ respectively). The overall relationship between moisture absorption rate and composite behavior is linear up to a certain maximum ($r=0.72$ and 0.89 for clay and lime based samples respectively). Correlation between temperature and composite behavior is linear above a certain minimum ($r=0.68$ and 0.73 respectively). It was, therefore, established that the moisture transmission rate and thermal movement are the main parameters of behavior. Behavior could be measured accurately according to the moisture absorption rate until the point of moisture saturation. Behavior depended on temperature beyond this point and could be measured in relation to it.

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