

Determination of degree of effectiveness of repair intervention on the simulated samples of traditional Sri Lankan mural paintings using an indirect method of measurement of rate of decay

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The relative effectiveness of methods of repair intervention on traditional mural paintings is decided according to their contribution to reduce the rate of decay. The rate of decay could be quantitatively determined using measurements of rate of chemical reactions and physical actions involved. The rate could also be alternatively determined by measuring the amount of change of chemical, physical and mechanical properties within a given period. However, in this study we needed an accurate and efficient non-destructive method to measure the rate of decay. This was accomplished using simulated samples of traditional mural paintings. Production processes of simulated samples were reformulated using information obtained from traditional technical texts and analyzing structure and composition of samples of paintings. Samples were produced and their behavior and patterns of decay were compared with their respective originals. This analysis led to the finding that two categories of samples consisting lime-based ground and clay ground could represent all traditional Sri Lankan mural paintings. These two categories of samples were used to test whether visual characteristics indirectly measure the rate of decay. Actual rate of decay was calculated according to the differences in chemical physical and mechanical properties. Hue and visual defects were the indirect parameters measured. Relationship of the variation of hue with the amount of decay was linear up to a certain moderate level of decay ($r=0.81$ and 0.88 for two categories of samples respectively). An acceptable degree of linearity existed between the amount of visual defects and the rate of decay at higher levels of decay ($r=0.72$ and 0.71 respectively). This principle was applied to measure the rate of decay of samples subjected to repair intervention. Repair was done using lime-clay mixture and gum-clay mixture for two categories of samples respectively. Intervention was done so as to return the behavior of samples to its original value. Moisture transmission rate, moisture evaporation rate and thermal movement were the parameters of behavior taken into account. Measurement of rate of decay of repaired samples proved that the methods of repair intervention were effective.

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