

## The Role of Metallic Mordant in Natural Dyeing Process: Experimental and Quantum Study on Color Fastness

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**Abstract :** It is known that the natural dyeing of cloth results moderate color, but with poor color fastness. This study points out the correlation between the macroscopic color fastness of natural dye to the cotton fiber and the microscopic binding energy of dye molecule to the cellulose. With the additive metallic mordant, the new-formed coordination bond bridges the dye to the fiber surface and thus affects the color fastness as well as the color appearance. The density functional theory (DFT) calculation is therefore used to explore the most possible mechanism during the dyeing process. Finally, the experimental results reflect the strong effect of three different metal ions on the natural dyeing clothes.

**Keywords :** binding energy, color fastness, density functional theory (DFT), natural dyeing, metallic mordant

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