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Study of the Wall Painting from the Vladychaya Palata of the Novgorod Kremlin (Velikiy Novgorod, Russia) Using Complementary Physico-Chemical Methods

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This work presents the results of a comprehensive study that applied complementary physico-chemical methods to 29 mural fragments from the Vladychnaya Palata in the Novgorod Kremlin. Plaster samples were subjected to neutron activation analysis (NAA) at the WWR-K research reactor (Institute of Nuclear Physics, Kazakhstan) to determine elemental composition. The pigment composition of the paintings was studied using a combination of methods: X-ray fluorescence analysis, micro-Raman spectroscopy, as well as optical and polarized microscopy.

NAA results were statistically treated. K-means clustering revealed two groups of plaster samples. Comparing the statistical treatment results with the pigment composition revealed a richer palette of pigments for one of the sample groups. Visualization of the k-means clustering results with color coding of samples clearly demonstrates the differences between the groups.

Combining results of complementary physico-chemical methods enabled a detailed characterization of the materials used in the wall painting of the Vladychnaya Palata. This data can serve as a basis for further studies in the fields of art history, restoration, and preservation of cultural heritage of Novgorod.

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