

NON-DESTRUCTIVE INVESTIGATION OF OLD GRAPHICS PAPER WITH THE USE OF X-ART M ANALYZER

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Today the problem of non-destructive methods of analysis is important for everyone, who has to deal with studying, analysis and identification of paper. The appearance of great amount of well-done forgeries during the last period of time makes it necessary to develop new methods of examination, based on achievements in modern science such as X-ray fluorescence (XRF) analysis.

Among the other methods of element analysis (such as chemical or emissive spectral – both destructive methods) a non-destructive XRF approach gives a greater advantage in studying works of art. While papermills can make experiments with brands of paper produced on those factories the specialty of museum and criminology work doesn't give this chance.

Traditionally, the paper was dated through watermarks, character of casting, color and character of an organic base - rag, cellulose, *etc.* Complexity of exact dating by classical methods is obvious - watermark not always is present, accuracy of dating of many watermarks is not high, up to the middle of XIX century the majority of a paper was on a rag basis, color under influence of natural factors varied. Organic components are less susceptible to influence of an environment and their connection long years are kept in paper weight.

By means of XRF analysis one can reliably define the presence of about 20 elements, lightest of the elements is Silicon and heaviest - is Bismuth. The concentration of some discovered elements in the earth is insignificant and their high density in the examples of paper can't be explained by accidental hitting from the water, raw material and equipment. According to this we can put forward some chronological periods the relative density in paper manufactures for XVIII-XX century.

The method described represents doubtless interest for the experts who study works of art on a paper base (figures, water colors, books, manuscripts, *etc.*). Non-destructive analysis is especially important in those areas where even the minimal damage of the sample is inadmissible. High reliability of the method is concerned with high accuracy of measurements at small concentration of impurities in paper and, hence, unequivocal definition of presence or absence of the elements of interest.