

Aldona Stępień, Investigation of Paper Fillers in Japanese Woodcuts
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The main aim of this research was to determine the physico-chemical characteristics of papers by identifying mineral and organic fillers found in Japanese woodcuts made in the early Taishō period. In order to understand the changes in paper production methods used for printing *ukiyo-e*, a comparative analysis of woodcuts was carried out using Jens Wiebel's collection created in the above-mentioned period and originals from the Feliks Jasieński collection both owned by the National Museum in Krakow. The techniques employed include Fourier transform infrared spectroscopy (FTIR), X-ray fluorescence spectrometry (XRF), Raman spectroscopy (RS), optical microscopy (OM) and scanning electron microscopy (SEM). These techniques allowed the identification of chemical compounds and elements present in the samples. In order to develop the best measurement methodology, an analysis was also performed for contemporary Japanese handmade paper standards with a known filler composition. The conducted research allowed to characterize the paper substrates and identify the following compounds: silica, talc, mica, chalk, gypsum, starch, cellulose and protein, as well as elements, i.e. calcium (Ca), silicon (Si), magnesium (Mg), aluminum (Al), potassium (K), sulfur (S), sodium (Na) and various pollutants. Based on the analyzes, it can be concluded that the papers used in the graphic artworks from the Wiebel collection contain a series of characteristic features that distinguish them from the works from the Feliks Jasieński collection. The results concluded that papers used in papermaking from the Taishō period have features characteristic for this period and are consistent with historical records and the current knowledge about the technologies and materials used at that time.

Key words: ukiyo-e, fillers, paper properties, mineral products