

Experimental and applied study on the removal of polyurethane adhesive from the archaeological textiles

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Abstract

The objective of this work is to evaluate the efficacy of the gel and nanostructured fluids in the removal of polyurethane adhesive stuck to an archeological textile fragment that suffers from many deterioration forms. The study is divided into two sections; (a) in-vitro experiments, which were conducted on modern sheep woolen textile mock-ups after brushing with fresh polyurethane adhesive and accelerated aging. Three techniques were used in the removal of polyurethane from these mock-ups. Colorimeter, Fourier transform infrared spectroscopy, stereo microscope, and weight measurements were used to assess the selected experiments. The obtained results revealed that Nano restore Cleaning ®Polar fluid confined in Nano restore Gel ®Peggy is the most effective and suitable technique among the examined ones. (b) The applied section, which was assigned to using Nano restore Cleaning ®Polar fluid confined in Nano restore Gel ®Peggy in the removal of polyurethane adhesive from the case-study fragment, after identifying its fibers and dyes using a Fourier transform infrared spectroscopy and a high-performance liquid chromatography-diode array detector-mass spectrometry. The obtained results revealed using blank linen and sheep wool dyed with weld dye (beige color) and indigo natural dye (brown color). Beige and brown yarns were used in weaving the fragment background using the tapestry structure, and the beige wefts were used in the additional embroidery stitches. The used gel-confined fluid Nano restore Cleaning ®Polar fluid confined in Nano restore Gel ®Peggy was capable of the safe removal of the adhesive form the fragment, which was then washed and supported by a new linen fabric using thin needles and dyed silk threads. The fragment was finally re-exhibited in a standard museum display.

Keywords:

Polyurethane adhesive, Coptic textiles, Nano restore, Gel cleaning, Archaeological conservation.