

B91 Newly Commercialized Recycled Paints: Are They as Variable as They Seem?

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Learning Overview: The goal of this presentation is to share the knowledge acquired on the analysis of recycled paints. The few studies conducted to date show that the expected variation in composition is counterintuitive at first but makes much more sense if we consider the multiple numbers and origins of the paint sources.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by presenting attendees with new information on recycled paints. This presentation will help attendees make informed decisions when confronted with association/comparison cases by considering the particularities of this newly encountered type of paint trace.

A few recent studies have tried to evaluate the utility of differentiating paints at a production batch level with very mixed results, depending largely on the paint type.¹⁻³ A survey of the literature published to date shows that batch level differentiation is much more arbitrary and subject to many unknowns, such as the quality controls and adjustments the paints are undergoing, the varying origins of raw materials, or the decision to make changes in the paint recipes for improvement or discontinuity of raw materials.^{1,2} All these reasons suggest that a particular production batch may suddenly present a substantially different composition than the one produced immediately before or after it. While forensic scientists are still undergoing studies to understand the potential of discrimination between paints, industrials have taken it a step further. Several paint companies now include a range of recycled paints among their proposed products. These recycled paints are composed of wastes collected by recycling plants. First sorted by their color and binder type (i.e., latex, alkyds), all the leftovers are mixed together in large tanks to form the basis material for future formulations.² This lot can be used as-is for lower quality paints or undercoats or may be adjusted to meet required specifications. Quality control for these recycled batches is obviously less precise, and a higher variation is expected in the esthetic properties of the paint. While it is not directly monitored by the producers, the variation in chemical composition should follow the same trends, if not greater.

A collaboration with a North American company allowed access to their samples, paint formulations recipes, and a summary of the quality controls they performed on each production batch. The whole study was conducted “blindfolded” and a final verification was made with the manufacturer to evaluate the accuracy of the results. The products obtained from the company consisted of white and colored recycled paint samples collected from different production batches. All samples were analyzed by microscopy, infrared spectroscopy, Raman spectroscopy and pyrolysis Gas Chromatography/Mass Spectrometry (GC/MS).

Reference(s):

1. Quevillon, S., Toupin, N., Tremblay, A., Fournier, R., and Muehlethaler, C. Batch-to-batch variation in domestic paints: Insights into the newly commercialized recycled paints. *Forensic Science International* 303, (October 2019), 109946. doi: <https://doi.org/10.1016/j.forsciint.2019.109946>.
2. Falardeau M., Moran V., and Muehlethaler C. (2019). A random object-oriented population study of household paints measured by infrared spectroscopy. *Forensic Science International* 297, (April 2019): 72-80.
3. Muehlethaler C., Massonnet G., Deviterne M., Bradley M., Herrero A., Diaz de Lezana I., Lauper S., Dubois D., Geyer-Lippmann J., Ketterer S., Milet S., Bertrand M., Langer W., Plage B., Gorzawski, G., Lamothe V., Marsh L., and Turunen R. Survey on batch-to-batch variation in spray paints: a collaborative study. *Forensic Science International* 229 (June 2013): 80-91.

Microscopy, Infrared Spectroscopy, Population Study