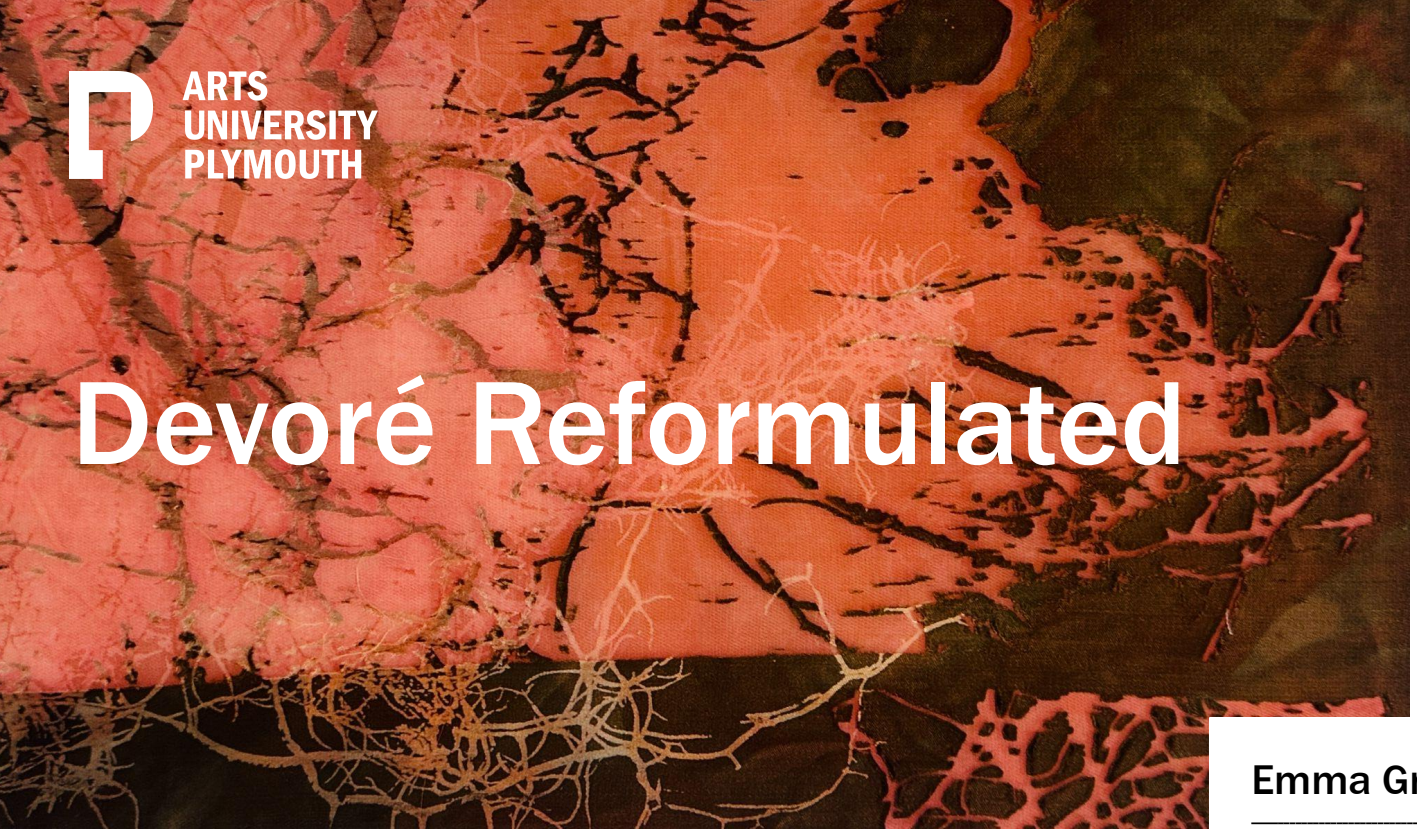

ARTS UNIVERSITY PLYMOUTH

Devoré Reformulated

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Project Overview

The Devoré textile print technique is historically significant both for its aesthetic qualities and for the material knowledge it embodies - how different fibres respond to chemical etching, heat, and subtractive processes.

Textile dyeing and finishing processes are widely recognised as significant contributors to water pollution and chemical waste (European Parliament, 2025), prompting increased scrutiny of hazardous substances used within both industrial and studio contexts.

Traditional Devoré relies on chemicals including aluminium sulphate and caustic soda, both of which pose risks to practitioners and the environment. In contemporary studio environments governed by stricter health and safety requirements and growing environmental accountability, processes such as Devoré are increasingly difficult to justify. Consequently, once a prominent feature of the textile industry, Devoré is gradually disappearing from studio practice due to the hazardous chemistry traditionally used in its production, and the environmental risks associated with its application.

This research extends beyond seeking to preserve Devoré simply as a legacy technique of a previous era, it crucially asks: How can the historically significant textile process Devoré be responsibly reformulated within contemporary environmental and regulatory frameworks?

The project emerged from an invitation to collaborate on the Green Maker Initiative (GMI) at MAKE Southwest, which supports sustainable craft innovation. Through interdisciplinary collaboration and practice-led experimentation, the research aimed to develop a safer alternative to the traditional Devoré formulation while retaining the distinctive structural and tactile qualities that made the process significant.

Research Method

This research adopted a practice-led methodology combining material experimentation with interdisciplinary collaboration. As a designer and academic leading the BA(Hons) Textile Design course at Arts University Plymouth, the project emerged from a studio-based pedagogical context in which Devoré has become increasingly difficult to justify due to health, safety, and environmental concerns.

A Devoré finish is achieved by applying a chemical paste to a mixed-fibre fabric, selectively etching away one fibre while leaving the other intact (Earnshaw, 1991). The paste is typically applied by screen print or brush, heat-pressed or baked, and then washed out to reveal contrasting opaque and sheer areas.

The study sought to develop a safer alternative to the traditional Devoré paste through the substitution of hazardous substances and iterative studio testing.

This collaborative framework was facilitated through a partnership between Arts University Plymouth, MAKE Southwest, and the Green Maker Initiative (GMI), which supported a micro-internship for a chemistry student to provide technical diagnostic support alongside creative practice in 2023. This interdisciplinary partnership enabled technical analysis of the original Devoré recipe alongside studio-based experimentation, combining chemical knowledge with textile practice.

The research process unfolded through cycles of testing and evaluation and finally refinement. Initial analysis focused on identifying the hazardous ingredients within the existing recipe, drawing on COSHH safety data, supplier information, and institutional risk assessments.

Success criteria for the the reformulated paste was defined across two areas:

- Reduction in the toxicity of individual substances and their combination in the formula to achieve reduce overall toxicity and a lower hazard classification.
- Preservation of the defining characteristics of traditional Devoré effect, including selective fibre removal, structural integrity of remaining fibres, clean print definition, and tactile contrast between opaque and sheer areas.

Studio testing was conducted using two different fabrics, a silk-viscose satin and silk-viscose velvet. Application methods, baking/heat press temperatures, and washout procedures were systematically varied and recorded. Iterative adjustments were made to viscosity and component ratios to ensure compatibility with screen printing and consistent fibre burnout.

All chemical handling and experimentation was conducted in accordance with institutional health and safety procedures.

Image: Gribble, E., (2023) *Devore Test* (photo credit: Emma Gribble)

Images: Gribble, E., (2025) *Devore studio tests* (photo credits: Emma Gribble)

Research Insights

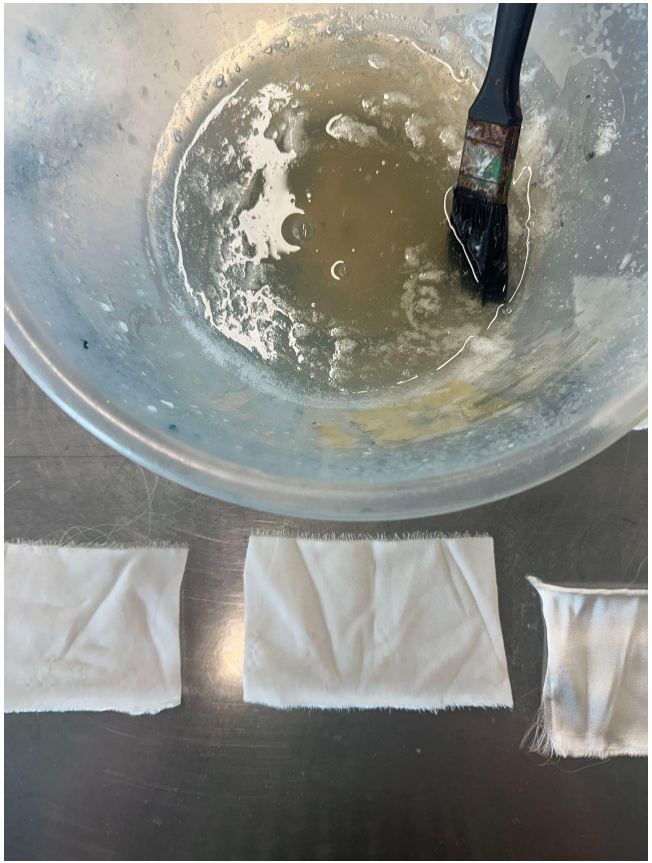
Aluminium Sulphate has historically functioned as one of the primary active agents within the Devoré process, a substance's classified as hazardous to human health and aquatic ecosystems, releasing of harmful gases during thermal decomposition.

Early formulation trials applied a provisional reformulated paste to silk - viscose satin and silk-viscose velvet. These initial tests confirmed that the cellulose fibre (viscose) could be selectively removed while preserving the silk, successfully replicating the fundamental effect of Devoré.

Alongside performance testing, the revised formulation was evaluated against established hazard criteria to ensure that the substitutions reduced risk relative to the traditional paste. However, the first mixture proved too viscous for effective screen application, resulting in uneven coverage and reduced print definition.

In response, the proportions of the paste components were incrementally adjusted through repeated studio trials. Viscosity was refined to enable smoother application through a T43 mesh screen while maintaining fibre selectivity during heat activation. With each revision, the balance between chemical effectiveness and practical usability improved, resulting in clearer print edges and more consistent burnout across both substrates.

The research demonstrated that the distinctive structural and aesthetic qualities of conventional Devoré formulations can be replicated through a reformulated paste that eliminates highly hazardous components, including aluminium sulphate. Selective fibre burnout was achieved consistently across silk–viscose satin and velvet substrates, preserving silk fibres while removing cellulose elements in a controlled and predictable manner.



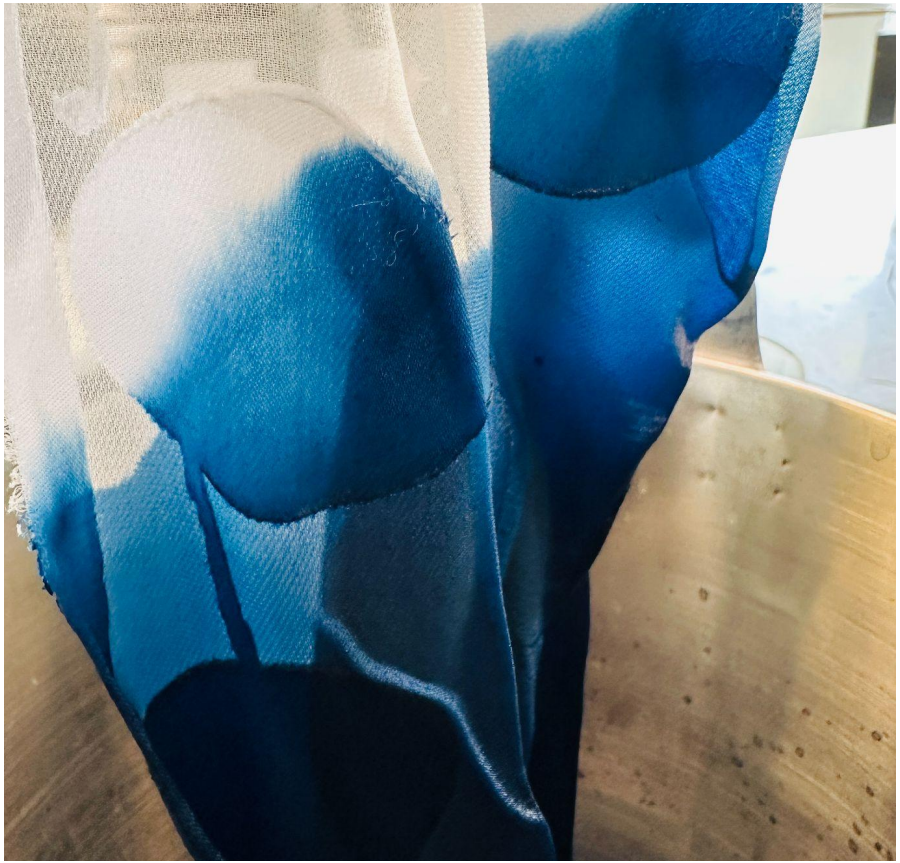
Images: Gribble, E., (2025) *Devore studio tests* (photo credits: Emma Gribble)

This first phase of this larger enquiry has established the following key outcomes:

Fibre Selectivity: The reformulated paste successfully reproduced the core technical function of Devoré: selective cellulose removal without compromising the structural integrity of the remaining silk fibres. Burnout occurred consistently at 180°C with a heatpress, clarity between opaque and sheer areas and no evidence of excessive fabric weakening during washout.

Hazard Profile: The substitution of aluminium sulphate and Indalca PA3R resulted in a reduction in hazard profile based on COSHH classifications. The reformulation removed the aluminium sulphate component associated with the release of harmful gases during thermal decomposition and reduced environmental toxicity concerns. This significantly improves suitability for studio-based teaching environments and mitigates risks for vulnerable users.

Collectively, these findings demonstrate that Devoré need not be categorised as an obsolete or inherently hazardous technique. Instead, it can be critically reformulated to align with contemporary environmental and health-and-safety standards. Rather than positioning environmental responsibility as incompatible with historically embedded craft techniques, the research demonstrates that reformulation can operate as a bridge between them. This has implications beyond Devoré, offering a model for re-examining other endangered textile processes whose decline has been driven by toxicity rather than obsolescence.



Images: Gribble, E., (2025) *Devore studio tests* (photo credits: Emma Gribble)

This study demonstrates that environmental responsibility and material knowledge need not evolve in opposition, but can instead be advanced together through informed, interdisciplinary, and collaborative innovation.

Importantly, this project represents the first phase of a wider ongoing enquiry into the reformulation of traditional textile processes through non-toxic and sustainable approaches. Future research will focus on the continued refinement and studio testing of the reformulated Devoré paste, including curriculum-based testing within educational settings, open-access dissemination of findings, and evaluation of scalability for broader application.

The next phase of the project will also expand this research framework to investigate other historically toxic textile processes, exploring how material innovation can support both environmental responsibility and the preservation of endangered craft knowledge. The finalised formulation for the reformulated Devoré paste will be published as part of this continuing research.

Image: Gribble, E., (2023) *Devore studio tests* (photo credit: Emma Gribble)

Images: Gribble, E., (2025) Devoré Samples, *Arts University Plymouth* (photo credits: Emma Gribble)

Image: Gribble, E., (2025) Devoré Sample, *Arts University Plymouth* (photo credit: Emma Gribble)

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Credits

This is an Arts University Plymouth Research and Innovation activity and the university has provided Resources to enable this research.

Emma Gribble has led the research from Conceptualisation, Methodology, Investigation, Analysis, and Writing.

This research was supported by MAKE Southwest through the Green Maker Initiative (GMI), providing funding for a Chemist through a micro-internship; intern Hermione Graham contributed scientific knowledge to the Investigation.

Image: Gribble, E., (2023) *Devore studio tests* (photo credit: Emma Gribble)

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