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Hazardous components: A case study in textile waste management

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Textile waste, a problem that has been somewhat overlooked for many years, is now coming to the fore.¹ The textile value chain is long and complex, with over 8000 chemicals used in different manufacturing processes.² A wide variety of chemicals are used in the manufacture of textile products for the improvement of essential properties and performance of textiles. Chemicals used in textiles significantly improve their quality and appearance. However, the harmful effects of these chemicals can occur at various stages of textile production and processing, such as dyeing, printing and finishing, as well as during use by consumers and at the end-of-life stage.³ There is a lack of safety information on the presence and use of all of these chemicals in consumer products.

In particular, dyes and pigments are usually toxic and ecotoxic because of the rather high content of heavy metals. Both wastewater and landfill leachate contain water-soluble heavy metal ions and compounds characterized by high persistence and bioaccumulation in the environment.⁴ Per- and polyfluorinated alkyl substances (PFAS), which are widely used in the textile industry for their excellent oleophobic and hydrophobic properties, are another hazardous group with a high persistence and bioaccumulation capacity.⁵

The emission of chemicals throughout the life cycle of a textile product is one of the biggest sustainability issues, and the identification of potentially toxic compounds and their synergistic effects in end-of-life textiles is currently a major research gap. To fulfill this gap, leaching tests will be carried out as an advanced waste characterization method, simulating the geochemical behaviour of textile waste under real conditions. The results will be discussed with a view to obtaining specific chemical information on the hazardous chemicals that are used and emitted in practice.

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