

Heavy Metals, Phthalates, and Volatile Organic Compounds in Hair Dye

STUDY OBJECTIVES

The objectives of this study were to:

- Determine the levels of heavy metals (arsenic, cadmium, chromium, lead, and mercury), phthalates, and a suite of 62 volatile organic compounds (VOCs).
- Use this information to inform the public about the occurrence and potential risks of these contaminants in hair dye.
- Urge regulatory agencies to act to reduce their contamination in hair dye and the resulting human exposure.

TESTED PRODUCTS

We tested 23 hair dyes (one sample each). We selected the products based on available marketplace data, availability, and, when appropriate, their ranking among the top 10 products sold.

TEST APPROACH AND METHODOLOGY

Each sample was shipped to an independent, accredited laboratory for heavy metals, phthalates, and VOC analyses.

The samples were prepared and analyzed for VOCs, phthalates, and heavy metals in accordance with the following methods:

- VOCs by gas chromatograph-mass spectrometry (GC-MS) following Environmental Protection Agency method 8260C. This procedure gives gas chromatographic/mass spectrometric (GC/MS) conditions for the detection of parts per billion (ppb) levels of volatile organic compounds. A sample aliquot is injected into the gas chromatograph (GC) by the purge-and-trap method. The compounds are separated on a fused silica capillary GC column. The compounds are detected by a mass selective detector (MSD), which gives both qualitative and quantitative information.
- Heavy metals (arsenic, cadmium, chromium, lead, and mercury) by inductively coupled plasma-mass spectrometry (ICP-MS) following EPA method 6020B.
- Phthalates by GB 5009.271-2016.

RESULTS

For heavy metals, phthalates, and VOCs, we reported the analytical results for every product sample, including a detailed examination for each of the concentrations. If substances were not measurable in any sample, they were recorded as non-detectable (ND).