# Microscopic Investigations of Yellow Traffic Paint Particles Subjected to Aqueous Dissolution

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Yellow traffic paint is a blend of organic polymers and pigments that often includes crocoite ($PbCrO_4$) crystals. Therefore, it is a potential source of environmental pollution and a possible human health hazard as both Pb and $Cr^{6+}$ pose a significant risk to human health. However, comprehensive studies investigating the chemical and morphologic evolution of yellow traffic paint, in the context of human health and environment relevance, have not been performed. Therefore, we designed dissolution experiments to simulate human (inhalation and ingestion) and environmental (rainwater) interactions with yellow traffic paint containing crocoite from Philadelphia, Pennsylvania, USA.

After interaction with simulated rainwater, lung fluid, and gut fluid, scanning electron microscopy results demonstrated that yellow traffic paint particles, while not statistically significant, were overall smaller. This may demonstrate the deagglomeration of paint matrices, which could liberate crocoite crystals through time – increasing their likelihood of inhalation and ingestion. Transmission electron microscopy revealed that the individual crocoite crystals in the paint were coated with a ~20 nm thick amorphous Si-rich layer, which persisted after all interactions. In terms of dissolution, this Si-rich layer reduced the leachability of Pb and Cr, as demonstrated by the lack of aqueous Pb and Cr in simulated rainwater, lung fluid, and gut fluid from yellow traffic paint. In gut fluid, the leachability of Pb and Cr from yellow traffic paint was significantly lower than that from non-coated crocoite, confirming that coating crocoite with a Si-rich layer may lower its solubility and risk to humans [1]. However, the conditions under which degradation of this coating takes place must be better understood in future studies.

[1] Pier *et al*., (1991) *Environ. Toxicol. Chem.* **10,** 1247-1253.