

Plastic recycling results in rare metals being found in children's toys and food packaging

February 17 2021, by Alan Williams



Dr Andrew Turner. Credit: University of Plymouth

Some of the planet's rarest metals—used in the manufacture of smartphones and other electrical equipment—are increasingly being found in everyday consumer plastics, according to new research.

Scientists from the University of Plymouth and University of Illinois at Urbana-Champaign tested a range of new and used products including children's toys, office equipment and cosmetic containers.

Through a number of detailed assessments, they examined levels of rare earth elements (REEs) but also quantities of bromine and antimony, used as flame retardants in electrical equipment and a sign of the presence of recycled electronic [plastic](#).

The results showed one or more REEs were found in 24 of the 31 products tested, including items where unregulated recycling is prohibited such as single-use food packaging.

They were most commonly observed in samples containing bromine and antimony at levels insufficient to effect flame retardancy, but also found in plastics where those chemicals weren't present.

Having also been found in beached marine plastics, the study's authors have suggested there is evidence that REEs are ubiquitous and pervasive contaminants of both contemporary and historical consumer and environmental plastics.

The study, published in *Science of the Total Environment*, is the first to systematically investigate the full suite of REEs in a broad range of consumer plastics.

While they have previously been found in a variety of environments—including [ground water](#), soils and the atmosphere—the study demonstrates the wide REE contamination of the "plastisphere" that does not appear to be related to a single source or activity.

Dr. Andrew Turner, Associate Professor (Reader) in Environmental Sciences at the University of Plymouth and the study's lead author, said:

"Rare earth elements have a variety of critical applications in modern electronic equipment because of their magnetic, phosphorescent and electrochemical properties. However, they are not deliberately added to plastic to serve any function. So their presence is more likely the result of incidental contamination during the mechanical separation and processing of recoverable components.

"The health impacts arising from chronic exposure to small quantities of these metals are unknown. But they have been found in greater levels in food and tap water and certain medicines, meaning plastics are unlikely to represent a significant vector of exposure to the general population. However, they could signify the presence of other more widely known and better-studied chemical additives and residues that are a cause for concern."

The research is the latest work by Dr. Turner examining the presence of toxic substances within everyday consumer products, marine litter and the wider environment.

In May 2018, he showed that [hazardous chemicals such as bromine, antimony](#) and lead are finding their way into food-contact items and other everyday products because manufacturers are using recycled electrical equipment as a source of black plastic.

His work was part of a successful application by the University to earn the Queen's Anniversary Prize for Higher and Further Education for its [pioneering research on microplastics pollution](#).

It also builds on previous work at the University, which saw [scientists blend a smartphone](#) to demonstrate quantities of rare or so-called 'conflict' elements in each product.

More information: Andrew Turner et al, Rare earth elements in

plastics, *Science of The Total Environment* (2021). DOI: [10.1016/j.scitotenv.2021.145405](https://doi.org/10.1016/j.scitotenv.2021.145405)

Provided by University of Plymouth

Citation: Plastic recycling results in rare metals being found in children's toys and food packaging (2021, February 17) retrieved 28 April 2024 from <https://phys.org/news/2021-02-plastic-recycling-results-rare-metals.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.