08 February 2018
Issue 502

Subscribe to free weekly News Alert

Source: Filella, M. and Rodríguez-Murillo, J. C. (2017). Less-studied TCE: are their environmental concentrations increasing due to their use in new technologies? *Chemosphere*, 182: 605-616. DOI: http://dx.doi.org/10.1016/j.chemosphere.2017.05.024

Contact:
montserrat.filella@unige.ch

Read more about:
Chemicals, Emerging risks, Innovation and new technologies, Risk assessment, Sustainable consumption and production

European Commission

Science for Environment Policy

Are concentrations of certain critical metals and metalloids increasing in the environment due to their use in new technologies?

A recent study has assessed the environmental impact of a group of technology-critical elements (TCEs) — niobium (Nb), tantalum (Ta), gallium (Ga), indium (In), germanium (Ge) and tellurium (Te) — that, to date, have been relatively under-researched. The researchers reviewed published concentrations of these elements in environmental archives and evaluated trends over time in surface waters. Overall, they found no evidence that the rising use of these elements in modern technologies is causing environmental concentrations to increase on a global level. These findings are relevant to future policy discussions regarding the source, usage and presence of less-studied TCEs, particularly in relation to critical raw metals.

Due to the rise of modern technologies, humans are now using minerals and metals in greater quantities than ever before, disturbing the natural cycling of metals. Elements classified as TCEs are deemed important to emerging technological applications, but there is concern that their supply may not meet demand. The environmental impact of some TCEs is relatively well established — for example, the effects of palladium (Pd) and platinum (Pt) have been extensively studied, since, as platinum-group elements (PGE), they have been used at high levels in automotive catalytic converters since the 1970s. However, for those TCEs that have been used at far lower levels, there have been far fewer studies. Although these less-studied TCEs are often produced in relatively low quantities, their use is nonetheless on the rise.

In order to determine the potential environmental impact of this increased use, scientists working with the European Cooperation in Science & Technology Cost Action TD 1407 (which aims to create a network of scientists working on and interested in TCEs — from environmental to human health perspectives) have reviewed the available literature on environmental concentrations of the six less-studied TCEs.

First, the researchers reviewed published data from natural-environment archives from around the world, including those concerning ice, ombrotrophic peat bogs (peatbogs which receive water, chemical elements and compounds from the atmosphere and have no water outlet), mosses and lake sediments. These archives provide a useful means of tracing chemical-element use and dispersion over time, since they store signals of atmospheric flux, gradually building up a time record of environmental changes. The researchers also evaluated the existence of possible temporal trends in surface waters, using data from Lake Geneva in Switzerland.

Overall, the available evidence indicates that the rising use of these elements in modern technologies is not resulting in increased environmental concentrations on a global scale. This makes sense, since historically the only clear observations of global effects linked to anthropogenic TCE use have been associated with direct releases at a much larger scale — for example, due to the massive amounts of PGE released into the atmosphere by catalytic converters.

Continued on next page.

08 February 2018
Issue 502

Subscribe to free weekly News Alert

Source: Filella, M. and Rodríguez-Murillo, J. C. (2017). Less-studied TCE: are their environmental concentrations increasing due to their use in new technologies? *Chemosphere*, 182: 605-616. DOI: http://dx.doi.org/10.1016/j.chemosphere.2017.05.024

Contact:
montserrat.filella@unige.ch

Read more about:
Chemicals, Emerging risks, Innovation and new technologies, Risk assessment, Sustainable consumption and production

European Commission

Science for Environment Policy

Are concentrations of certain critical metals and metalloids increasing in the environment due to their use in new technologies? *(continued)*

Indeed, several studies even pointed to decreased environmental concentrations of these less-studied TCEs. This may be because anti-pollution measures are reducing indirect emissions produced during coal combustion and non-ferrous smelting. According to the researchers, such indirect emissions are likely to be significantly higher than any direct emissions related to the TCEs' technological applications, and so are a more probable driver of environmental change.

These findings are relevant to policy surrounding the source, usage and presence of less-studied TCEs in the environment. In particular, they could inform current and future strategies, for the use of these elements, in new technologies or applications. However, while the findings suggest that current usage levels of less-studied TCEs are unlikely to disrupt natural cycling, it is important to acknowledge that data on the environmental concentrations and behaviours of these elements remain limited. Additional research on this topic would allow for better understanding and more informed policymaking in the future.