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Unknown
Planetary
Boundary Threats
from Chemical
Pollution



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ON THE COVER: Three conditions that must be simultaneously met for chemical pollution to pose a planetary boundary threat are identified. Approaches to single out chemicals that could fulfill those conditions are discussed, and a proactive hazard identification strategy that considers long-range transport and the reversibility of chemical pollution is outlined.

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Confronting Unknown Planetary Boundary Threats from Chemical Pollution

Linn M. Persson,* Magnus Breitholtz, Ian T. Cousins, Cynthia A. de Wit, Matthew MacLeod, and Michael S. McLachlan

Rockström et al. proposed a set of planetary boundaries that delimitate a "safe operating space for humanity". One of the planetary boundaries is determined by "chemical pollution", however no clear definition was provided. Here, we propose that there is no single chemical pollution planetary boundary, but rather that many planetary boundary issues governed by chemical pollution exist. We identify three conditions that must be simultaneously met for chemical pollution to pose a planetary boundary threat. We then discuss approaches to identify chemicals that could fulfill those conditions, and outline a proactive hazard identification strategy that considers long-range transport and the reversibility of chemical pollution. Rockström et al. proposed a set of planetary boundaries that delimitate a "safe operating space for humanity". One of the planetary boundaries is determined by "chemical pollution", however no clear definition was provided. Here, we propose that there is no single chemical pollution planetary boundary, but rather that many planetary boundary issues governed by chemical pollution exist. We identify three conditions that must be simultaneously met for chemical pollution to pose a planetary boundary threat. We then discuss approaches to identify chemicals that could fulfill those conditions, and outline a proactive hazard identification strategy that considers long-range transport and the reversibility of chemical pollution.

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Highly Efficient and Mild Electrochemical Mineralization of Long-Chain Perfluorocarboxylic Acids (C₉–C₁₀) by Ti/SnO₂–Sb–Ce, Ti/SnO₂–Sb/Ce–PbO₂, and Ti/BDD Electrodes

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Bifunctional Polymer Hydrogel Layers As Forward Osmosis Draw Agents for Continuous Production of Fresh Water Using Solar Energy

Amir Razmjou, Qi Liu, George P Simon, and Huanting Wang*

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Outer-Selective Pressure-Retarded Osmosis Hollow Fiber Membranes from Vacuum-Assisted Interfacial Polymerization for Osmotic Power Generation

Shi-Peng Sun and Tai-Shung Chung*

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Influence of Amine Structural Characteristics on *N*-Nitrosamine Formation Potential Relevant to Postcombustion CO₂ Capture Systems

Ning Dai and William A. Mitch*

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Seungmin Lee, Yohan Lee, Jaehyoung Lee, Huen Lee, and Yongwon Seo*

13191  [dx.doi.org/10.1021/es403516f](https://doi.org/10.1021/es403516f)

A New Porous Material to Enhance the Kinetics of Clathrate Process: Application to Precombustion Carbon Dioxide Capture

Ponnivalavan Babu, Rajnish Kumar, and Praveen Linga*

Correspondence

13199 [dx.doi.org/10.1021/es402872r](https://doi.org/10.1021/es402872r)

Comment on “New Clues to the Local Atomic Structure of Short-Range Ordered Ferric Arsenate from Extended X-ray Absorption Fine Structure Spectroscopy”

Dogan Paktunc* and Alain Manceau

13201 [dx.doi.org/10.1021/es404284r](https://doi.org/10.1021/es404284r)

Response to Comment on “New Clues to the Local Atomic Structure of Short-Range Ordered Ferric Arsenate from Extended X-ray Absorption Fine Structure Spectroscopy”

Christian Mikutta,* Petar N. Mandaliev, and Ruben Kretzschmar

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Comment on "Iodine-129 and Iodine-127 Speciation in Groundwater at the Hanford Site, U.S.: Iodate Incorporation into Calcite"
Zunli Lu*

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Response to Comment on "Iodine-129 and Iodine-127 Speciation in Groundwater at Hanford Site, U.S.: Iodate Incorporation into Calcite"

Saijin Zhang,* Chen Xu, Danielle Creeley, Yi-Fang Ho, Hsiu-Ping Li, Russell Grandbois, Kathleen A. Schwehr, Daniel I. Kaplan, Chris M. Yeager, Dawn Wellman, and Peter H. Santschi

Additions and Corrections

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Correction to Mechanistic Modeling of Broth Temperature in Outdoor Photobioreactors

Quentin Béchet, Andy Shilton, Oliver B. Fringer, Raul Muñoz, and Benoit Guieysse*

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[dx.doi.org/10.1021/es4048736](https://doi.org/10.1021/es4048736)

Correction to Simple Estimate of Entrainment Rate of Pollutants from a Coastal Discharge into the Surf Zone

Simon H. C. Wong, Stephen G. Monismith, and Alexandria B. Boehm*