Environmental stewardship program for polymers used in cleaning products

K. Stanton[1] M.W. Lam[2] A. Carrao[3]

[1]American Cleaning Institute, [2]The Procter & Gamble Company, [3]Kao USA Inc.

Ingredient Stewardship

What? Water-soluble polymers are important ingredients in down-the-drain cleaning products as they have multiple functions and bring unique performance benefits.

Why? Polymers have been exempted from regulatory actions globally, but registration of new polymers is now required in some countries (e.g., US, Canada, Australia, Japan, Korea). Polymers are expected to undergo REACh registration in the near future.

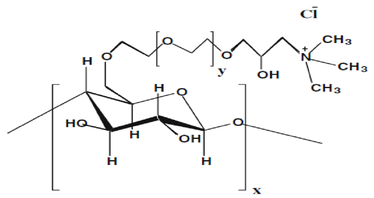
How? The objective of this program is to prepare industry for the anticipated need to register polymers and also to support the environmental safety of polymers that are used in household cleaning products. To that end, the American Cleaning Institute (ACI) is leading an environmental stewardship program for key polymers used by its members in the formulation of cleaning products.

Data Generation Efforts

Cationic Polymers:

As a class, polyquaternium-10 were prioritized for assessment based on the Pecquet et al., 2019 work. This group of polymers is a lead candidate to generate improved aquatic effects data by the CEFIC LRI ITAP research program (Improved Toxicity Assessment of Polymers), led by Hans Sanderson (Aarhus University).

Polyquaternium-10 is a cationic cellulose polymer with quaternary ammonium functionality, varying in charge density and MW. A representative structure is illustrated below:



PQ10 uses include household cleaning and personal care products at a concentration range of ≤0.1-5%.

Activated Sludge Kd Studies

Activated sludge Kd will be used to derive a waste-water treatment plant removal to support the environmental exposure assessment for polyquaternium-10. Preliminary findings suggest that polyquaternium-10 is irreversibly sorbed at low concentrations. Follow-up studies are in progress to measure Kd at concentrations that the polymer will be present in the water column of these studies.

Towards an Refined Environmental Safety Assessment

By leveraging the data on aquatic effects to algae, Daphnia and fish embryo, and using the new activated sludge Kd data, a robust and data-based environmental safety assessment will be conducted for Polyquatermium-10.

Future efforts are planned to evaluate additional classes of polyquaterniums.

Landscape Assessment of Available Data to Support Ecological Risk Assessment

Web of Science

ECOTOX Knowledgebase

Scopus

TOXLINE
A TOXNET DATABASE

Environment Complete

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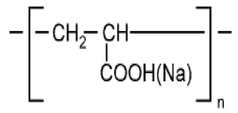
Environmental Management

Polymers Used in US Household Cleaning Products: Assessment of Data Availability for Ecological Risk Assessment

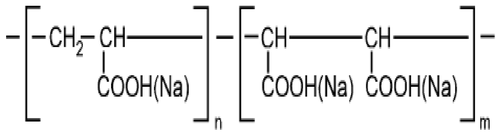
Alison Pecquet,† Drew McAvoy,‡ Charles Pittinger,§ and Kathleen Stanton||*
†Department of Environmental Health, University of Cincinnati, Cincinnati, Ohio, USA
‡Department of Chemical and Environmental Engineering, University of Cincinnati, Cincinnati, Ohio, USA
§Charles Pittinger LLC, Cincinnati, Ohio, USA
||American Cleaning Institute, Washington, DC, USA

Industry Level Ecological Safety Assessment

High volume anionic polymer: Polycarboxylates:



Polyacrylate/Polyacrylic acid



Polyacrylic Acid-Maleic Acid Copolymer

EU Volume: 21, 000 mT (HERA, 2014); Similar volumes expected in NA.

Use: Sequester hard water ions to enable higher efficiency of surfactants, enables a lower chemistry load, avoids the use of phosphates.

ACI is partnering with Integral Consulting to conduct an environmental risk assessment leveraging the available data generated over the past 3 decades (HERA 2014) and considers current North American volumes for the environmental exposure assessment. Further details on this effort is discussed in poster MP072 (DeLeo, P et al., SETAC NA 2019).

CONCLUSIONS AND NEXT STEPS

- Continue to progress PQ10 activated sludge Kd.
- Evaluate additional classes of polyquaterniums, cationic polymers.
- Build knowledge-base and capability.