Environmental Risk Assessments for Topical Antiseptic Ingredients: Benzalkonium Chloride

Benzalkonium chloride risks to aquatic and benthic invertebrates are uncertain, depending on bioavailability. Exposures via biosolids are not of concern.

**INTRODUCTION**

Benzalkonium chloride (BAC) is a cationic surfactant used in cleaning and personal care products, as well as agricultural and industrial applications. Benzalkonium chloride (BAC) is a group of quaternary ammonium salts with this structure:

\[
\text{H}_2\text{N}^+\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3
\]

**EXPOSURE ASSESSMENT**

Projected future scenario:

BAC levels estimated through modeling (95th percentile exposure point concentrations (EPC)) for a future scenario.

- **Surface water EPC:**
  - Mean: 0.1 µg/L
  - Median: 0.05 µg/L
  - 95th percentile: 0.4 µg/L

- **Soil EPC:**
  - Mean: 7 µg/kg
  - Median: 5 µg/kg
  - 95th percentile: 70 µg/kg

- **Soil microbes-a:**
  - Mean: 0.27 mg/kg
  - Median: 0.1 mg/kg
  - 95th percentile: 1.5 mg/kg

- **Soil microbes-b:**
  - Mean: 0.1 mg/kg
  - Median: 0.05 mg/kg
  - 95th percentile: 0.75 mg/kg

- **Soil microbes-c:**
  - Mean: 0.1 mg/kg
  - Median: 0.05 mg/kg
  - 95th percentile: 0.75 mg/kg

**EFFECTS ASSESSMENT**

Aquatic species sensitivity

- **EC50s:**
  - Mean: 1.8 µg/L (recent past)
  - Median: 1.0 µg/L (recent past)
  - 95th percentile: 9.0 µg/L (recent past)

- **EC10s:**
  - Mean: 0.6 µg/L (recent past)
  - Median: 0.1 µg/L (recent past)
  - 95th percentile: 0.9 µg/L (recent past)

**RISK CHARACTERIZATION**

- **Surface water:**
  - Mean: 0.1 µg/L (recent past)
  - Median: 0.05 µg/L (recent past)
  - 95th percentile: 0.4 µg/L (recent past)

- **Soil:**
  - Mean: 7 µg/kg (recent past)
  - Median: 5 µg/kg (recent past)
  - 95th percentile: 70 µg/kg (recent past)

**RISK CONCLUSIONS**

- **Surface water:**
  - No effect on aquatic organisms at current concentrations.

- **Soil:**
  - No effects predicted from soil contamination.

**OPTIONS TO REFINE ASSESSMENT**

- Investigate factors that affect chronic BAC toxicity to invertebrates, to better understand long-term effects.

**WANT TO KNOW MORE?**

- Miranda Henning, Phyllis Fuchsman, Kathleen Stanton, Nathan I. Mrdjen, Phyllis Fuchsman, Kathleen Stanton, Nathan I. Mrdjen, Phyllis Fuchsman, Kathleen Stanton, Nathan I. Mrdjen

**REFERENCES**