Cyclosiloxanes

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Cyclosiloxanes

- Cyclosiloxanes have silicon–oxygen atoms singly bonded in a ring structure.
- Cyclosiloxanes in common usage:

<table>
<thead>
<tr>
<th>D4</th>
<th>D5</th>
<th>D6</th>
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<tbody>
<tr>
<td>Octamethylcyclotetra-</td>
<td>Decamethylcyclopenta-</td>
<td>Dodecamethylcyclohexa-</td>
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Exposure or potential exposure

- Widely used for industrial applications and in consumer products
  (e.g., antiperspirants, hair sprays, skin creams, shaving products, and cosmetics)
- Annual U.S. import/production volume
  - 100–500 million pounds (D4, D5)
  - 10–50 million pounds (D6)
- Human exposure occurs via:
  - Use of personal care and other consumer products
  - Environmental exposures
Exposure in humans

- Horii and Kannan (2008) estimated daily exposure in the U.S. to cyclosiloxanes from consumer products as:
  - D4: 1 mg/day
  - D5: 233 mg/day
  - D6: 22 mg/day

- Indications of long half-lives in humans: elevated levels found in women several years after removal of silicone breast implants
Persistence in the environment

- Found in air, soil, sediment, sludge, and water
- Detected in fish and other aquatic organisms
Known or suspected health effects

- D4
  - Weak estrogenic effects
  - Benign uterine tumors (adenomas) in rats
- D5
  - Uterine endometrial adenocarcinomas in female rats
    - Relevance to humans has been questioned
  - Effects on neurotransmitter dopamine and hormone prolactin
- D6
  - Liver and thyroid enlargement
  - Reproductive effect in rats
Need to Assess Efficacy of Public Health Actions

- Cyclosiloxanes substituted as safer alternatives for a variety of uses
  - Important to know if substitutes for existing chemicals are accumulating in people
- Concerns regarding persistence and toxicity
Laboratory considerations

- Availability of analytical method
  - Methods available
  - Contamination, evaporation are potential issues

- Adequate biospecimens
  - Plasma and blood

- Incremental cost
  - Equipment available in laboratory
  - Can bundle cyclosiloxanes with each other but not with other chemicals