

Cyclosiloxanes

Rachel Roisman, M.D., M.P.H.

California Environmental Contaminant Biomonitoring Program
Office of Environmental Health Hazard Assessment

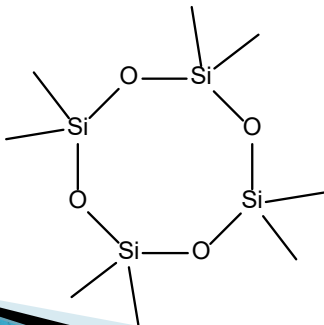
Presentation to Scientific Guidance Panel December 5, 2008

Cyclosiloxanes

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

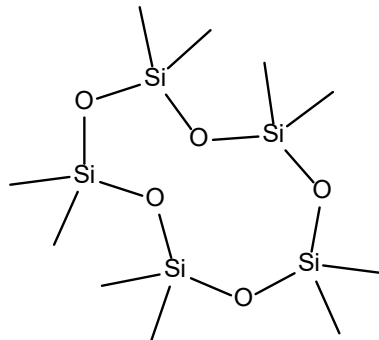
D4

Octamethylcyclotetra–



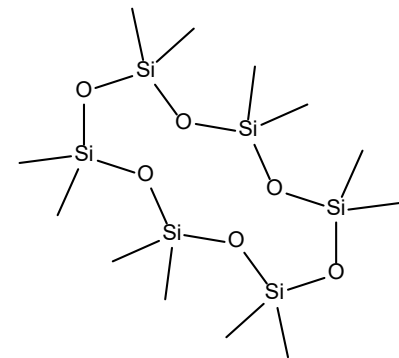
D5

Decamethylcyclopenta–



D6

Dodecamethylcyclohexa–



Exposure or potential exposure

- ▶ Widely used for industrial applications and in consumer products

(e.g., antiperspirants, hair sprays, skin creams, shaving products, and cosmetics)

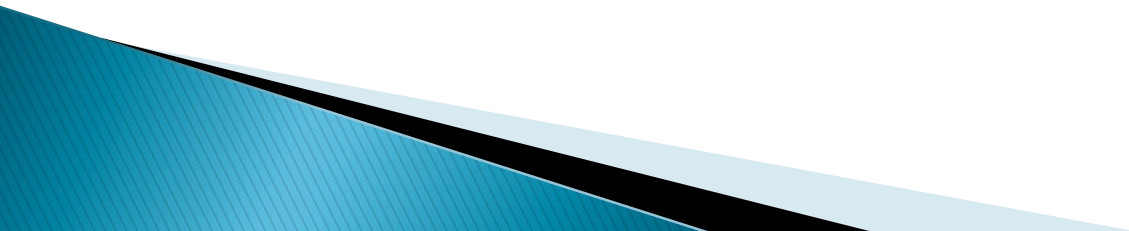
- ▶ Annual U.S. import/production volume
 - 100–500 million pounds (D4, D5)
 - 10–50 million pounds (D6)
- ▶ Human exposure occurs via:
 - Use of personal care and other consumer products
 - Environmental exposures

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

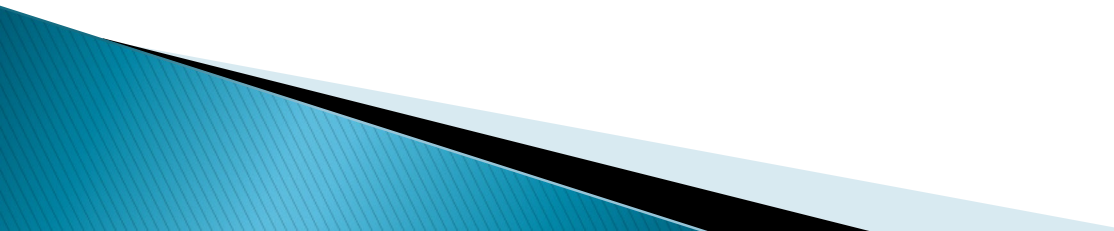
▶ D4

- 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