Cyclomethicone

1 Nonproprietary Names

USPNF: Cyclomethicone

2 Synonyms

Dimethylcyclopolysiloxane; *Dow Corning 245 Fluid*; *Dow Corning 246 Fluid*; *Dow Corning 345 Fluid*.
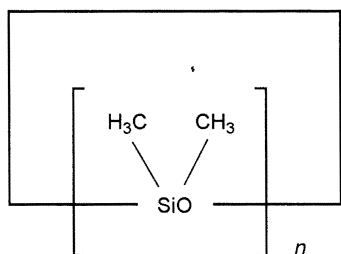
3 Chemical Name and CAS Registry Number

Cyclopolydimethylsiloxane [69430-24-6]

4 Empirical Formula Molecular Weight

The USPNF 20 describes cyclomethicone as a fully methylated cyclic siloxane containing repeating units of the formula $[-(CH_3)_2SiO-]_n$ in which n is 4, 5, or 6, or a mixture of them.

5 Structural Formula

6 Functional Category

Emollient; humectant; viscosity-increasing agent.

7 Applications in Pharmaceutical Formulation or Technology

Cyclomethicone is mainly used in topical pharmaceutical and cosmetic formulations such as water-in-oil creams.[1-3]

Cyclomethicone has been used in cosmetic formulations, at concentrations of 0.1–50%, since the late 1970s and is now the most widely used silicone in the cosmetics industry. Its high volatility, and mild solvent properties, make it ideal for use in topical formulations because its low heat of vaporization means that when applied to skin it has a 'dry' feel.

See also Dimethicone.

8 Description

Cyclomethicone occurs as a clear, colorless and tasteless volatile liquid.

9 Pharmacopeial Specifications

See Table I.

Table I: Pharmacopeial specifications for cyclomethicone.

Test	USPNF 20
Identification	+
Limit of nonvolatile residue	⩽0.15%
Assay of $(C_2H_6OSi)_n$ calculated as the sum of cyclomethicone 4, cyclomethicone 5, and cyclomethicone 6	⩾98.0%
Assay of individual cyclomethicone components	95.0–105.0%

10 Typical Properties

Solubility: soluble in ethanol, isopropyl myristate, isopropyl palmitate, mineral oil, and petrolatum at 80 °C; practially insoluble in glycerin, propylene glycol, and water.

See also Table II.

11 Stability and Storage Conditions

Cyclomethicone should be stored in an airtight container in a cool, dry, place.

12 Incompatibilities

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13 Method of Manufacture

Cyclomethicone is manufactured by the distillation of crude polydimethylsiloxanes.

Table II: Typical physical properties of selected commercially available cyclomethicones.

Grade	Boiling point (°C)	Flash point (°C)	Freezing point (°C)	Refractive index at 25 °C	Surface tension (mN/m)	Specific gravity at 25 °C	Viscosity (kinematic) (mm²/s)	Water content (%)
Dow Corning 245 Fluid	205	77	< −50	1.397	18.0	0.95	4.0	0.025
Dow Corning 246 Fluid	245	93	< −40	1.402	18.8	0.96	6.8	0.025
Dow Corning 345 Fluid	217	77	< −50	1.398	20.8	0.957	6.0	0.025

14   Safety

Cyclomethicone is generally regarded as a relatively nontoxic and nonirritant material. Although it has been used in oral pharmaceutical applications, cyclomethicone is mainly used in topical pharmaceutical formulations. It is also widely used in cosmetics. Studies of the animal and human toxicology of cyclomethicone suggest that it is nonirritant and not absorbed through the skin. Only small amounts are absorbed orally; an acute oral dose in rats produced no deaths.[4,5]

See also Dimethicone.

15   Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of material handled.

16   Regulatory Status

Included in the FDA Inactive Ingredients Guide (oral powder for reconstitution). Included in nonparenteral medicines licensed in the UK.

17   Related Substances

Dimethicone.

18   Comments

The EINECS number for cyclomethicone is 209-136-7.

19   Specific References

1   Goldenberg RL, Tassof JA, DiSapio AJ. Silicones in clear formulations. *Drug Cosmet Ind* 1986; **138**(Feb): 34, 38, 40, 44.
2   Chandra D, DiSapio A, Frye C, Zellner D. Silicones for cosmetics and toiletries: environmental update. *Cosmet Toilet* 1994; **109**(Mar): 63–66.
3   Forster AH, Herrington TM. Rheology of siloxane-stabilized water in silicone emulsions. *Int J Cosmet Sci* 1997; **19**(4): 173–191.
4   Anonymous. Final report on the safety assessment of cyclomethicone. *J Am Coll Toxicol* 1991; **10**(1): 9–19.
5   Christopher SM, Myers RC, Ballantyne B. Acute toxicologic evaluation of cyclomethicone. *J Am Coll Toxicol* 1994; **12**(6): 578.

20   General References

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21   Author

PJ Weller.

22   Date of Revision

27 May 2002.