

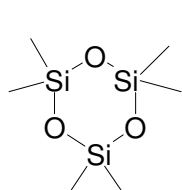


## BMF 59 Cyclic Siloxanes

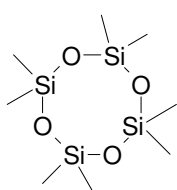
Cyclic siloxanes are used in the manufacturing of silicones, in combination or alone in personal care products, and as carriers, lubricants and solvents in a variety of commercial applications. They are of interest due to their extensive use and the fact that certain siloxanes are persistent in the environment, resisting oxidation, reduction, and photodegradation.

Siloxanes are chemicals with a backbone structure of silicon and oxygen atoms, alternating in occurrence, and have hydrocarbon groups attached to the silicon side chain. The cyclosiloxanes contain single silicon-oxygen bonds which form the ring. They are named after the number of silicon-oxygen "groups" they consist of; hexamethylcyclotrisiloxane is called D3, octamethylcyclotetrasiloxane is called D4, etc.

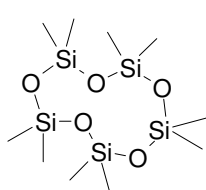
**Chiron AS now offers high quality standards for analysis of cyclic siloxanes surfactants– get 15% discount when purchasing the whole set!**



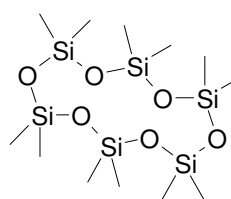
D3



D4



D5



D6

Chiron No.	Product	CAS
9684.6	Hexamethylcyclotrisiloxane (D3)	541-05-9
9685.8	Octamethylcyclotetrasiloxane (D4)	556-67-2
9686.10	Decamethylcyclopentasiloxane (D5)	541-02-6
9687.12	Dodecamethylcyclohexasiloxane (D6)	540-97-6

Available as 1000µg/mL solution in isooctane (1mL), or as 10 mg neat.

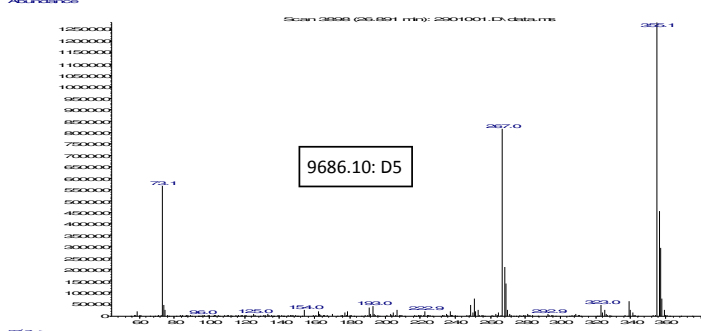
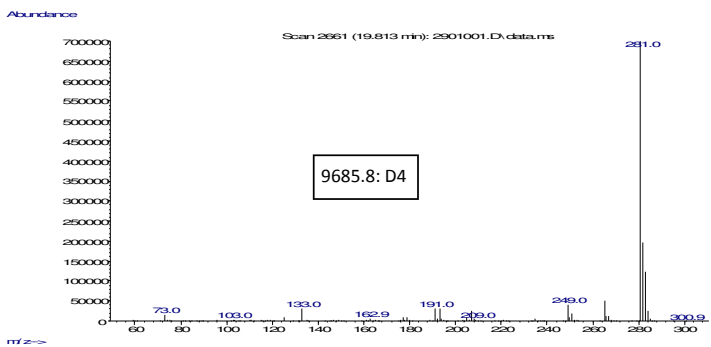
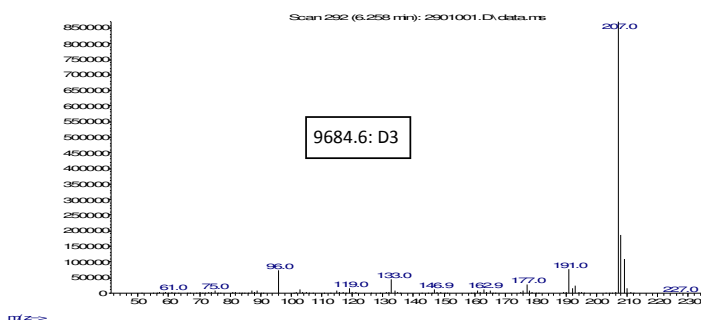
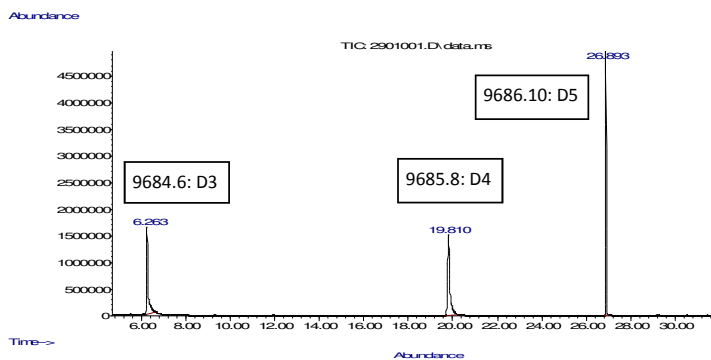
Recently, the use of cyclosiloxanes in cosmetics and personal care products has received increased attention. Organizations like Environment Canada, Office of Environmental Health Hazard Assessment (OEHHA), and Norwegian Institute for Air Research (NILU) have released reports on the distribution of cyclosiloxanes in the environment and their potential health and environmental effects. **There is still much controversy regarding the potential toxicity to humans and/or the environment from these widely used compounds.** Reports differ from that they are completely harmless to that they interfere with hormone function and are harmful to the human liver, to fish and to other wildlife.

The main products of interest are D4 and D5. D3 is very volatile and subject to analytical difficulties. D6 has been shown not to react in the environment in the same manner as D4 and D5, and is currently not of concern.

Up until approximately a decade ago, D4 was the main ingredient in personal care products giving benefits like silkiness in conditioners, a non-greasy feel from skin creams, and ease of application of deodorants. Due to the concern for potential toxicity and bioaccumulation in marine environments, D4 was replaced by D5. They have very similar characteristics and are even listed under the same name on ingredients labels; the general "cyclomethicone". Just recently, concerns about D5 have also been raised, especially in Canada.



Below you'll find a GC chromatogram of D3, D4 and D5 and corresponding mass spectra:



References:

1. M. Reisch, Chemical and Engineering News,10-13, 2011.
2. <http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=546F7166-9C61-4CA5-BB67-804EC3F2A0ED>, and <http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=13CC261E-1>.
3. <http://oehha.ca.gov/multimedia/biomon/pdf/1208cyclosiloxanes.pdf>.
4. <http://www.nilu.no/Nyhetsarkiv/tabid/74/language/en-GB/NewsId/139/Skin-care-chemicals-end-up-in-your-blood--and-in-the-Arctic.aspx>.