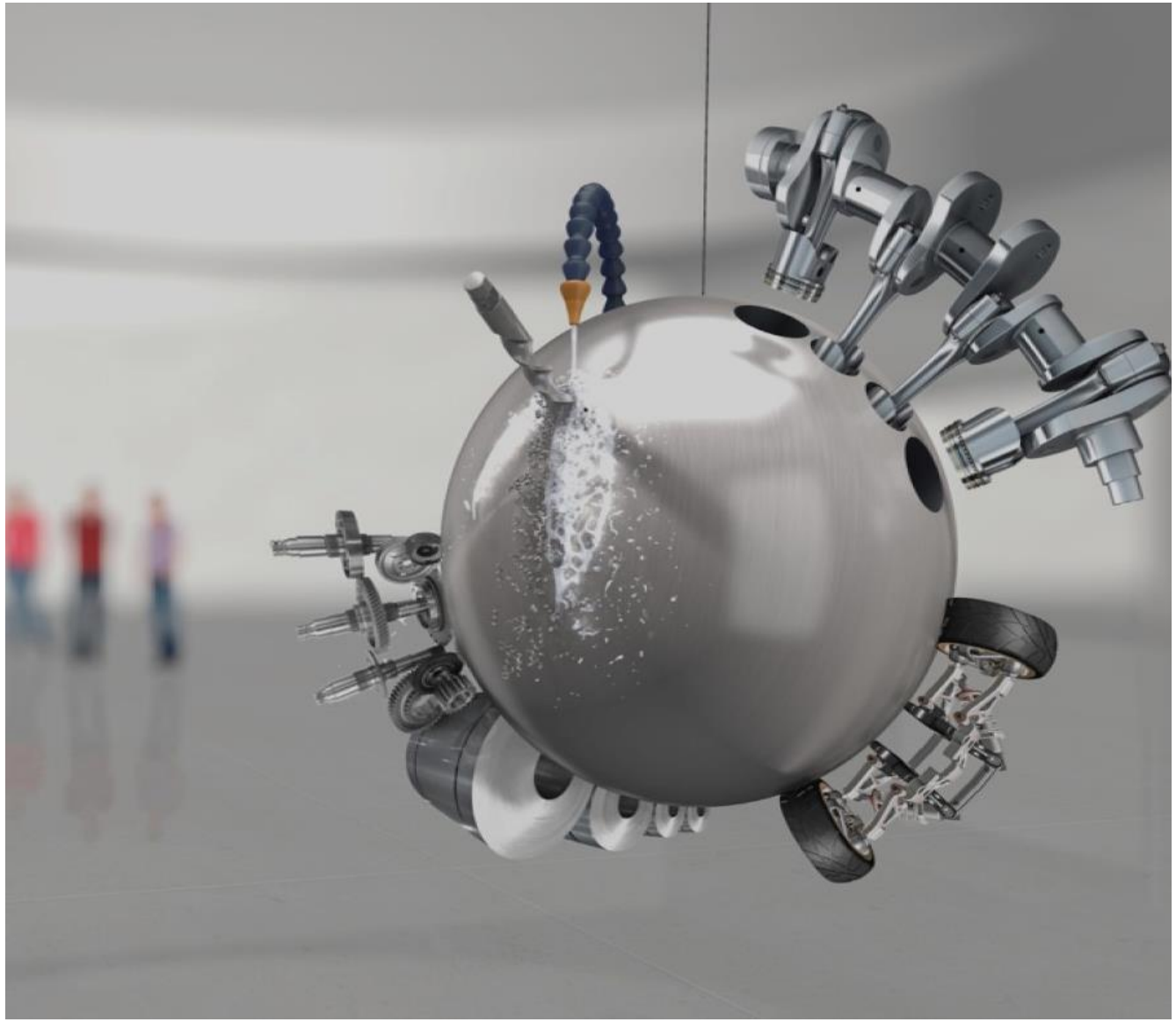
No Fear of OMS

Organo Modified Siloxanes



Evonik Operations GmbH – Specialty Additives
Interface & Performance
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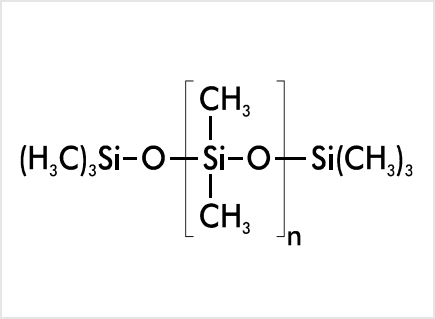
Polydimethylsiloxanes (PDMS) versus Organo Modified Siloxanes (OMS)

Polydimethylsiloxanes (PDMS; silicone oil)

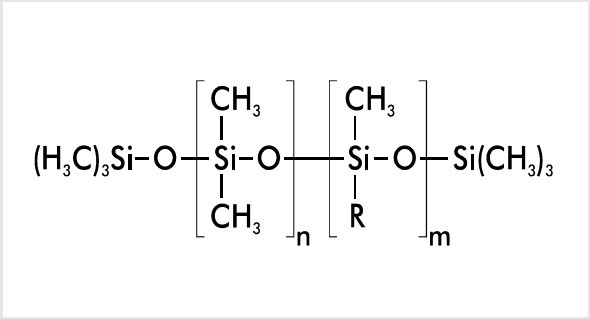


- Chemical inertness
- Good temperature stability
- Excellent surface activity
- Very low surface tension (21 mN/m)

- Poor compatibility with water- and oil-based systems

- The poor solubility of PDMS in hydrophilic/lipophilic systems prevents the full utilization of their advantageous properties. Therefore, OMS were developed.

Organo Modified Siloxanes (OMS)



- OMS are based on a PDMS backbone that guarantees a low surface tension typical for PDMS.
- Organic side chains, which are chemically bonded to the PDMS backbone provide a high compatibility with aqueous and/or oil-based media.

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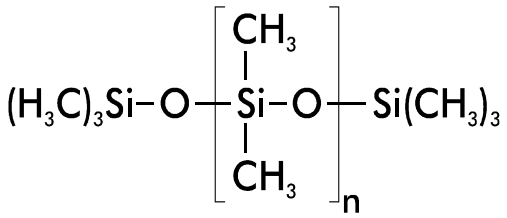
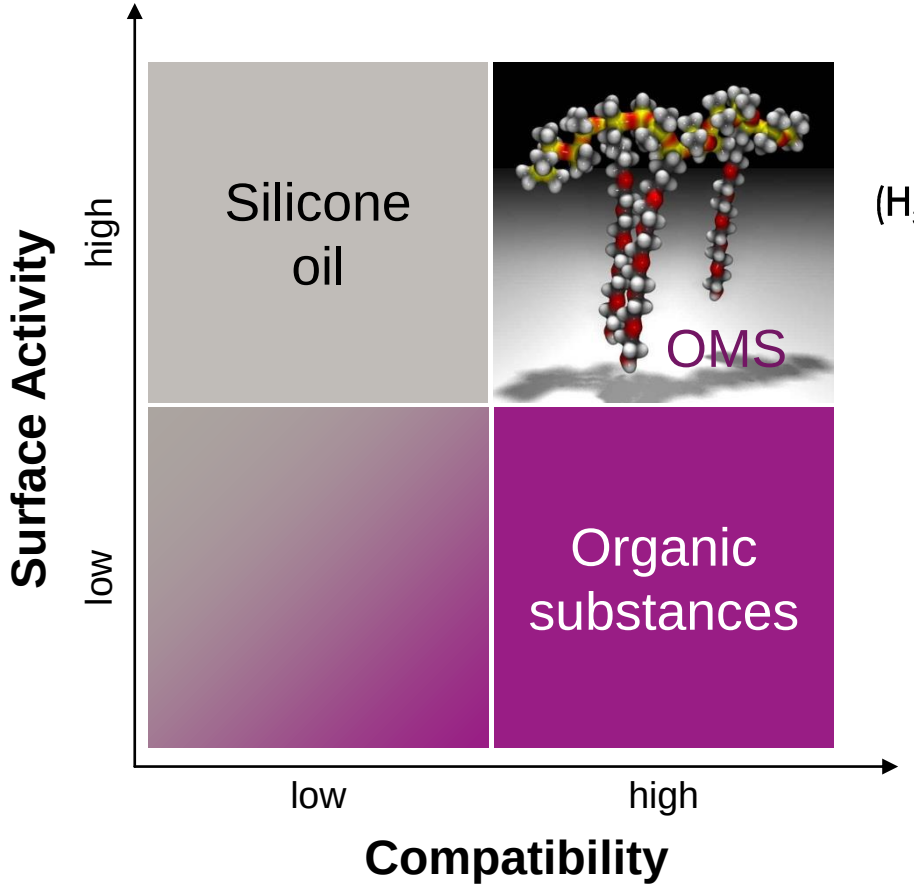
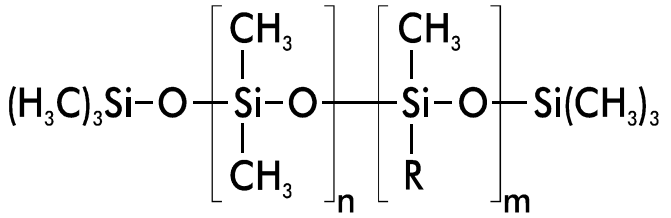
Organo Modified Siloxanes (OMS)
Surface Activity versus Compatibility



Silicone Oil (PDMS)





Organo Modified Siloxane (OMS)

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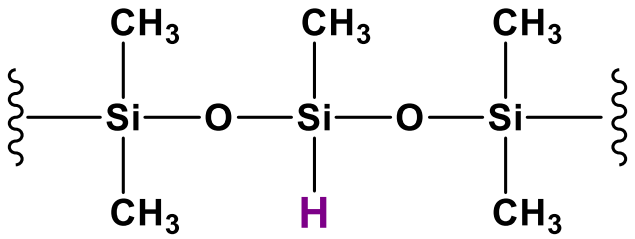
Synthesis of Organo Modified Siloxanes (OMS)
Two step process

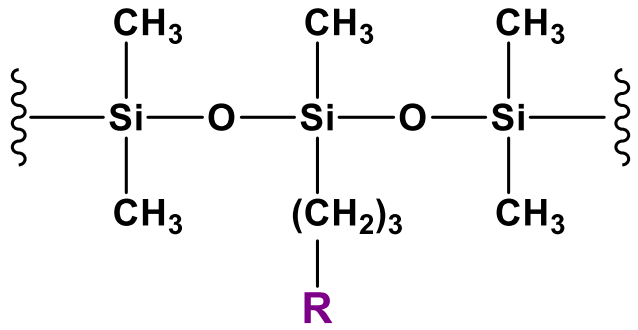
1st step

Building the Siloxane backbone by equilibration of monomers



2nd step

Attaching the organic modifications e. g. by hydrosilylation



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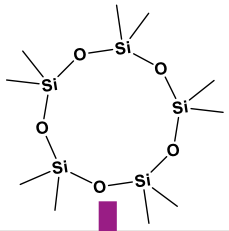
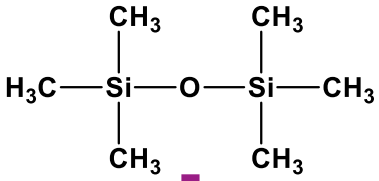
Organo Modified Siloxanes (OMS)
Equilibration

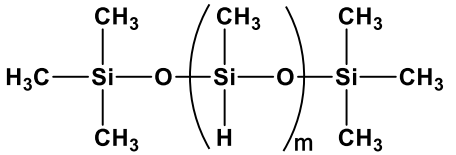
- Equilibration of typical monomers leads to the SiH-functional siloxane backbone
- To build up the siloxane backbone D5, PTF1 and M2 are normally used



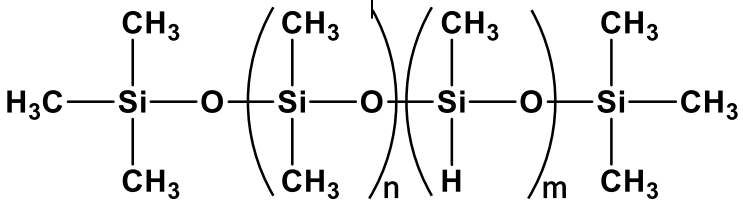
D5: D – units to build up the siloxane backbone



M2: Hexamethyldisiloxane, end blocker to adjust the chain length

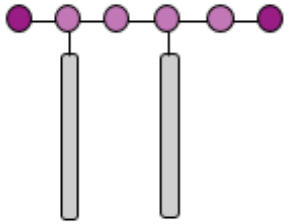


PTF1: Hydrogenated Oligomere, to incorporate SiH-groups into the siloxane backbone

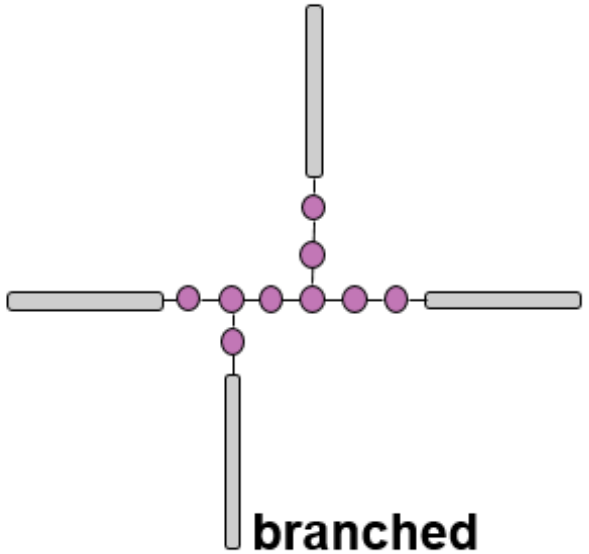


Structures of Organo Modified Siloxanes

block



comb-like



branched

By variation of

- length of siloxane backbone
- number, kind and length of organic modification

it is possible to design Organo Modified Siloxanes with tailor-made properties

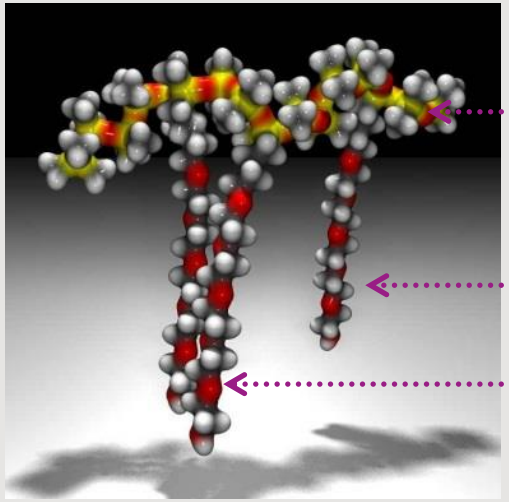
= **silicone backbone**

= **polyether**

Substituents:

- Polyether groups
- Alkyl groups
- Aryl groups
- Epoxy groups
- Acrylate groups
- Hydroxyalkyl groups
- Aminoalkyl groups
- Carboxyalkyl groups
- Betaine groups
- Quat groups

No Fear of Additives based on Organo Modified Siloxanes



Silicone backbone provides high surface activity

Organic side groups provide compatibility with the matrix

Water solubility

Silicone oil in water

OMS (polyether-modified) in water

Paintability

Use of additives based on …

… Silicone Oils (PDMS)

… Organo Modified Siloxanes (OMS)

OMS are not known to show any detrimental effects on finished parts

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