PERP Program – New Report Alert

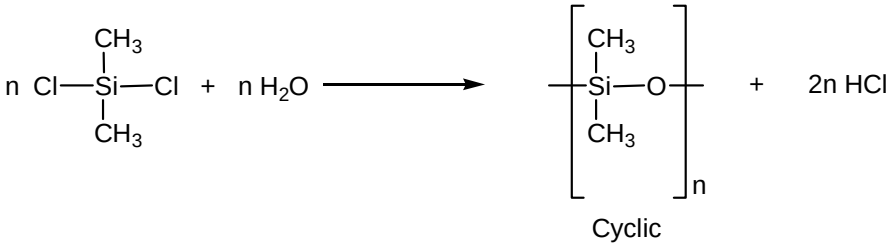
June 2002

Chem Systems' Process Evaluation/Research Planning program has published a new report, ***Silicones (00/01S5)***.

Silicone chemistry is based on the tetra-functionality of silicon, which is similar to carbon in that it sets out four bonds to a variety of other atoms. Thus, the ability to form bonds with carbon, halogens, oxygen, and other silicon atoms, among others, provides the basis for a host of unusual products and applications.

Certain terms used in silicon chemistry are derived from organic chemical terminology. For example, the term "silane", used for the compound SiH_4, is derived from the carbon analog CH_4, "methane". The term "silicone" was coined by Kipping, a fundamental investigator in the field, working in the period 1910 to 1940 at the University of Nottingham, England. Based on his pioneering synthetic route, Kipping mistakenly believed that "silicones" were the silicon analogs of "ketones".

The products derived from the hydrolysis or alcoholysis of dichlorosilanes are generally known as "silicones" and more accurately known as "polysiloxanes". The highest volume, commercially important products, silicone fluids and elastomers, are both derived mostly from dimethyldichlorosilane. The hydrolysis reactions, illustrated below, lead to mixtures of cyclic dimethylsiloxane oligomers (with n = 3,4 and 5) and linear hydroxy terminated oligomers (disilanols):



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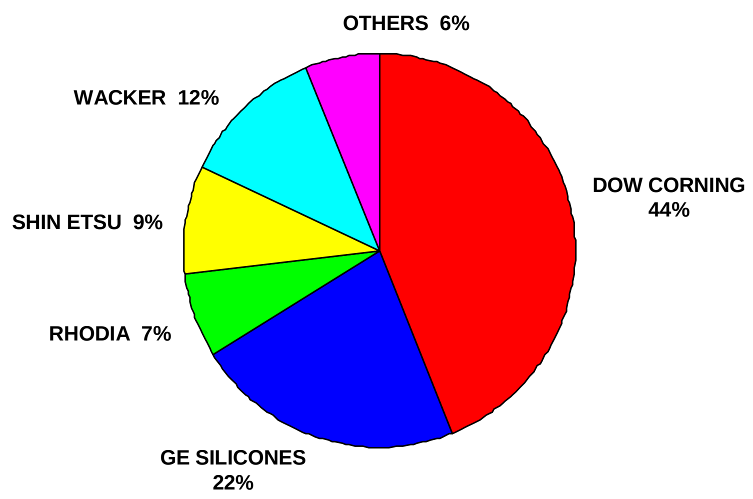
Silicone chemistry itself is not overly complex, but there are significant engineering complexities and entry barriers in commercial production. Normally chlorosilane operations are large scale, comprised of multi-train fluidized bed reactors, abrasive silicon metal particulates, and highly corrosive chemicals. Thus, few organizations have the resources and technical capabilities to engage in the commercial production complexities of silane

monomers. The major producers are all located in the developed world regions. Three producers, Dow Corning, General Electric and Wacker hold about two-thirds of the world's silicone capacity as shown below.

SILICONE PRODUCTION CAPACITY SHARE, 2002



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This new report by Nexant Chem Systems describes the chemistry, process technology, production economics, and markets for:

- Methyl chloride
- Methyl chlorosilanes
- Octamethylcyclotetrasiloxane
- Hexamethyldisiloxane
- SiH fluid
- MDD'M silicone
- Silicone surfactant

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