Silanol Fluids

Condensation Cure
• Solvent-borne silicone resins, reactive (silanol) fluids, and most RTV elastomers cure (crosslink) by condensation processes. A simple silanol condensation gives water as byproduct:

\[
\text{CH}_3 \quad \begin{array}{c}
\text{HO} - (\text{SiO})_n - H \\
\text{CH}_3
\end{array}
\quad \rightarrow \quad \begin{array}{c}
\text{HO} - (\text{SiO})_n - (\text{SiO})_m - H \\
\text{CH}_3 \quad \text{catalyst} \quad \text{CH}_3
\end{array}
\quad \rightarrow \quad \begin{array}{c}
\text{HO} - (\text{SiO})_n - (\text{SiO})_m - H + \text{HOH} \\
\text{CH}_3 \quad \text{CH}_3
\end{array}
\]

• Other common reactions include:

\[
\begin{align*}
\text{SiH} + \text{HOSi} \rightarrow & \quad \text{SiOSi} + \text{H}_2 \\
\text{SiONR}_2 + \text{HOSi} \rightarrow & \quad \text{SiOSi} + \text{R}_2\text{NOH} \\
\text{Si-Cl} + \text{HOSi} \rightarrow & \quad \text{SiOSi} + \text{HCl} \\
\text{SiOOCCH}_3 + \text{HOSi} \rightarrow & \quad \text{SiOSi} + \text{CH}_3\text{COOH} \\
\text{SiOH} + \text{HOSi} \rightarrow & \quad \text{SiOSi} + \text{H}_2\text{O} \\
\text{Si-OR} + \text{HOSi} \rightarrow & \quad \text{SiOSi} + \text{ROH}
\end{align*}
\]

• A variety of catalysts initiate and accelerate condensation cure. Amines, including aminopropylsilane derivatives, and carboxylic acid salts of lead, tin, and zinc are commonly employed. Organic salts of iron, cadmium, barium, antimony, and zirconium have been investigated. Tin (II) octoates, laureates, and oleates, as well as the salts of dibutyl tin, are particularly useful. The key requirement, besides catalytic activity, is solubility of the catalyst in the silicone polymer matrix. Strong acids (Bønsted and Lewis types) and bases effect condensation, but the reaction is difficult to control.

Product Information
A complete list of XIAMETER® brand fluids is available at www.xiameter.com.