

Silicone MQ Resins: Synthesis and Applications of Industrial Nanoparticles

Brendan O'Keefe
Momentive Performance Materials

Silicones are a class of polymers with a wide range of properties, hence their use in many applications such as Automotive & Transportation, Electronics, Healthcare, Construction, Energy, Consumer Goods & Personal Care, and Industrial Processes. The global silicone market was estimated to be ~\$16.5B in 2021. Silicone MQ resins are a unique class of highly branched polymers that are soluble in silicones and organic solvents. They are made by sol-gel processes and have functional groups such as hydroxyl, vinyl, hydride and alkoxy. The key properties of molecular weight and functional group concentration can be controlled to give the desired performance in downstream products for applications such as Pressure Sensitive Adhesives, Personal Care, Healthcare and Electronics.

An introduction to silicone chemistry will be given and the synthesis and applications of Silicone MQ resins will be discussed.



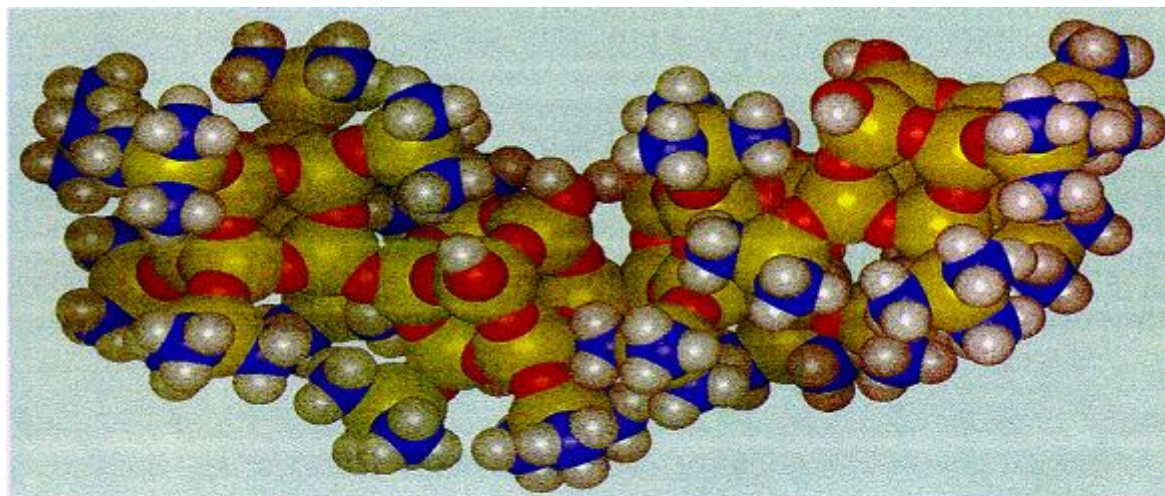
Silica



Silicon



Silicone



Molecular Model of a Silicone MQ Resin

Biography

Brendan O'Keefe is an Expert Process Chemist at Momentive Performance Materials in Waterford, NY. He received a B.Sc. (Hons.) degree in Chemistry and a Ph.D. in Inorganic Chemistry from the University of Canterbury in Christchurch, New Zealand. He completed post-doctoral research at the University of Minnesota developing organometallic catalysts for the polymerization of cyclic esters. He began his industrial career in 2002 with Crompton, OSi Specialties (a predecessor of Momentive) in Sistersville, WV and moved to Waterford in 2008. As a process chemist he develops new chemical processes in the laboratory and transfers them into manufacturing at multi-ton scales, and he also improves and troubleshoots existing manufacturing processes. His areas of expertise include silicone resins, silylated polyurethane resins, small molecule alkoxysilanes and hydrosilylation. His latest research involves developing more sustainable products for use in Personal Care utilizing the principles of Green Chemistry. He is the holder of eight patents and the author of 14 peer-reviewed publications.

