Waters Lab Highlights
An Internal Communication of Applications and Techniques
LAH 0093 2/83
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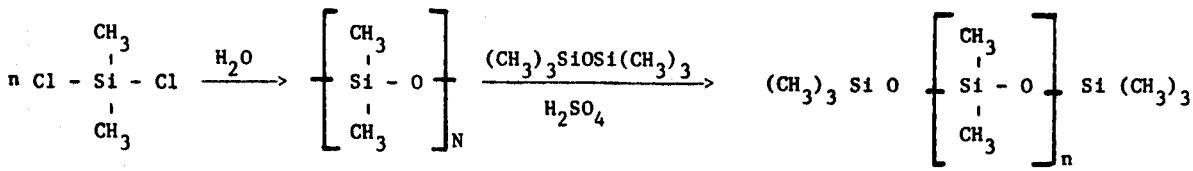
GA/PP,/QC,PM/PL/OT

POLYSILOXANE OILS (SILICONES)

Polysiloxane oils are very popular lubricants due primarily to their thermal stability and small viscosity variance over a large temperature range. For example, over a range in temperature of 0-100°C the viscosity of a petroleum oil will differ 30-40 times that of a silicone oil. Polydimethylsiloxane oils (most common) are primarily polymerized via hydrolysis of dimethyldichlorosilane (Reaction A) with the further addition of hexamethyldisiloxane to control the molecular weight of the polymer (Reaction B).



REACTION A REACTION B

Obtaining the molecular weight distribution of a silicone oil can be very important to the silicone oil manufacturer and user. The molecular weight distribution of a silicone oil can be related to important properties such as thermal stability and viscosity. For example, if the molecular weight distribution of a silicone oil increases then this will result in an increase in viscosity. Figure #1 illustrates the analysis of three silicone oils by gel permeation chromatography (GPC). It is evident from the molecular weight distributions that Polymer C is higher in molecular weight than Polymer B which is higher in molecular weight than Polymer A. Table #1 lists the viscosity values obtained for the above analyzed silicone oils.

TABLE #1

POLYMERS	VISCOSITY (CENTIPOISES)
A	10
B	20
C	100

As expected, the viscosity of the silicone oils increased as the molecular weight distribution of the polymer increased.

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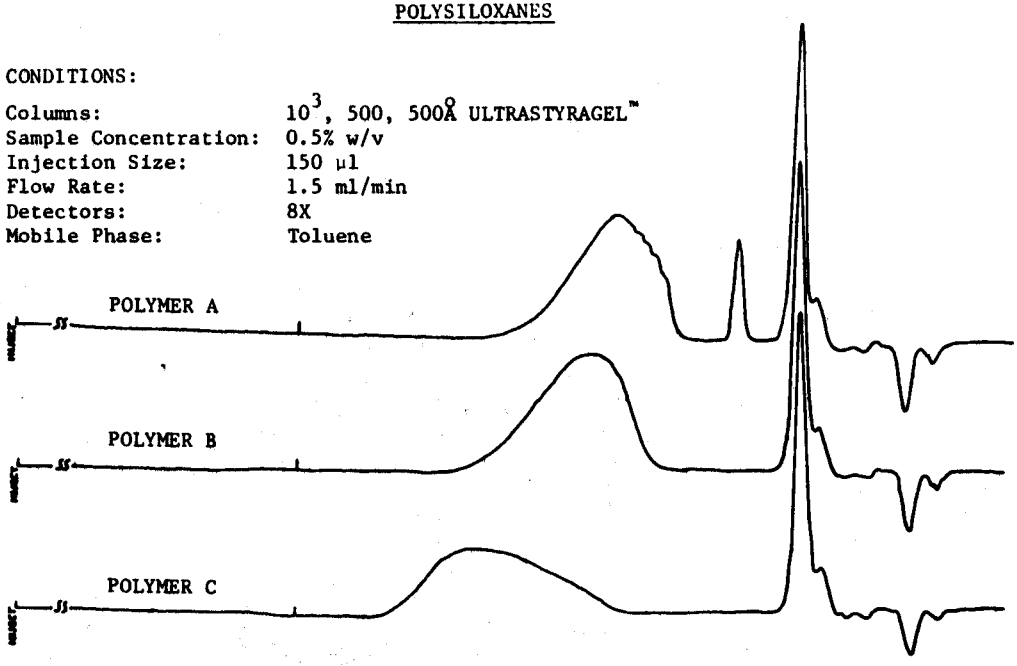
FIGURE #1

POLYSILOXANES

CONDITIONS:

Columns:	10^3, 500, 500Å ULTRASTYRAGEL™
Sample Concentration:	0.5% w/v
Injection Size:	150 µl
Flow Rate:	1.5 ml/min
Detectors:	8X
Mobile Phase:	Toluene



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