Application Brief

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TA NO.18 MAR.1985 Thermal Analysis of Silicone Rubber

1. Introduction

Silicon rubber's superior high temperature stability, excellent electrical insulation properties, and general resistance to chemicals, oil and water make it useful in various industrial applications. Uses include electrical and mechanical parts, household articles, food processing and medical applications.

The characteristics of a silicone rubber depend upon the type and amount of fillers/additives used and upon mixing and vulcanizing conditions. Various thermal characteristics of silicone rubbers can be determined utilizing thermal analysis. This brief presents DSC and TG/DTA measurement examples.

2. DSC Experiment and Results

Figure 1 shows a DSC curve for silicone rubber measured in the temperature range between -150℃ and 0℃. The sample was quenched to below -150℃ before the measurement began. This curve shows a glass transition occurring at about -127℃, an exothermic crystallizing peak at about -102℃, and an endothermic melting peak at approximately -43℃.

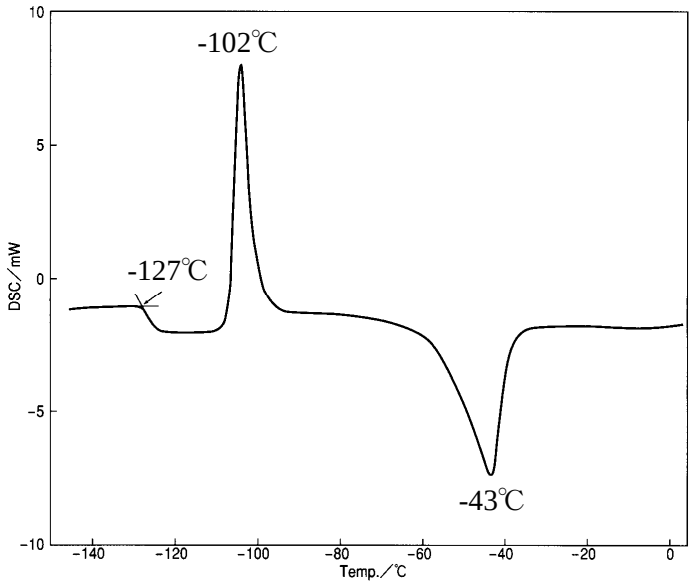

Figure 1 DSC curve for silicone rubber
Sample weight : 10mg
Heating rate : 10℃/min

3. TG/DTA Experiment and Results

The simultaneous TG/DTA measurement can be used to analyze the heat resistance and thermal stability of a silicone rubber. Figure 2 illustrates the results obtained from TG/DTA measurement of silicone rubber. As the sample decomposes, there is a weight loss (TG Curve) at the same time an exothermic peak appears (DTA Curve). As shown in this figure, sample weight reduction starts at around 300℃ and 49% of the sample decomposes before the temperature reaches 600℃.

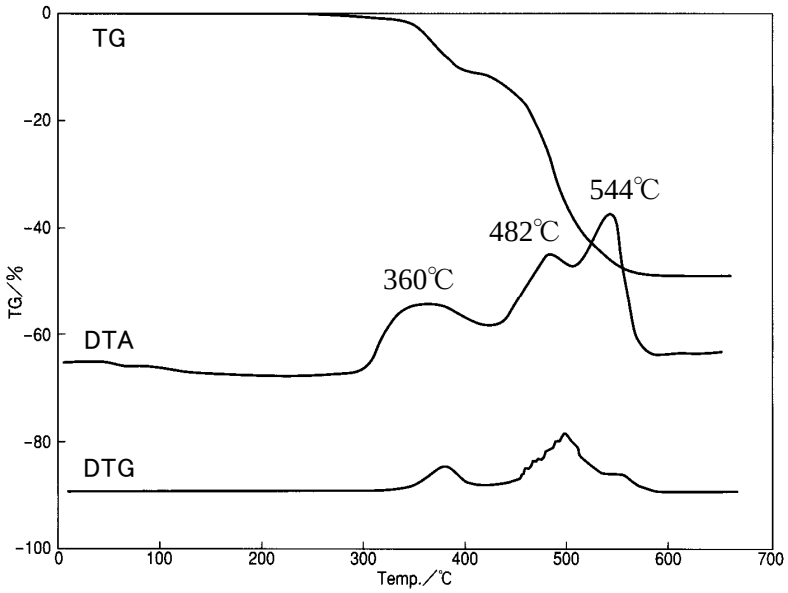

Figure 2 TG/DTA analysis of silicone rubber
Sample weight : 10mg
Heating rate : 10℃/min
Atmosphere : Air, 200ml/min