

APPLICATION SHEET

Polymers · Polymer Manufacturing
TG 209 **F1 Libra**® – FT-IR

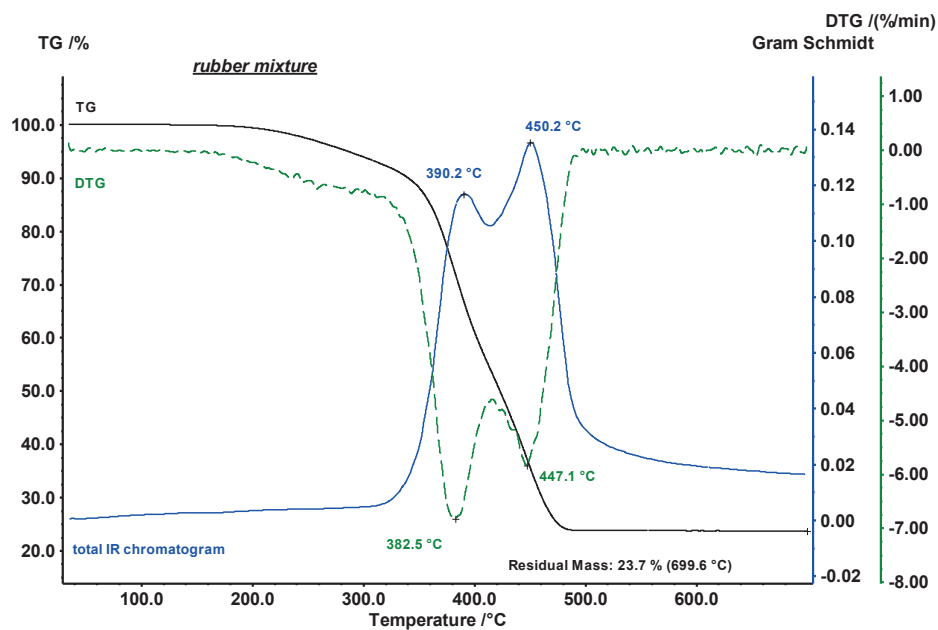
Decomposition Behavior of an NR/SBR Mixture

Introduction

Aside from a few natural product impurities, natural rubber (NR) is essentially a polymer of isoprene units, a hydrocarbon diene monomer. Synthetic rubber can be made as a polymer of isoprene or various other monomers. Styrene-butadiene (SBR) is an elastomeric copolymer consisting of styrene and butadiene. It features good abrasion resistance and aging stability. SBR is stable in mineral oils, fats, aliphatic, aromatic and chlorinated hydrocarbons.

Test Conditions

Temperature range:	RT ... 700°C
Heating/cooling rates:	10 K/min
Atmosphere:	Nitrogen
Sample mass:	10.81 mg
Crucible:	Aluminum oxide
Purge gas flow:	40 ml/min



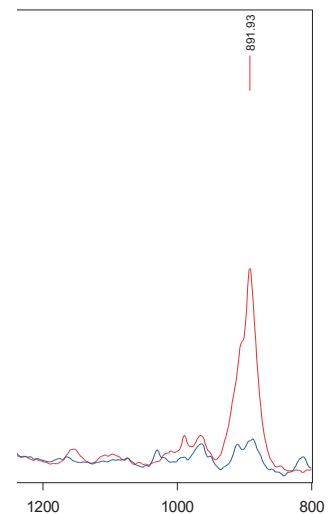
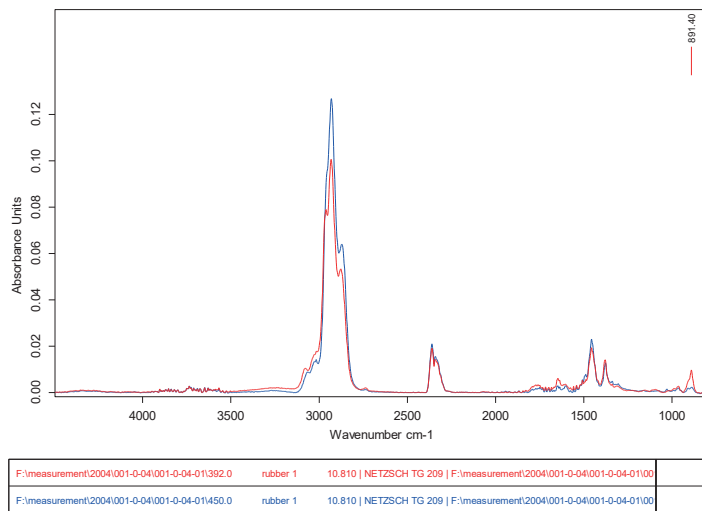
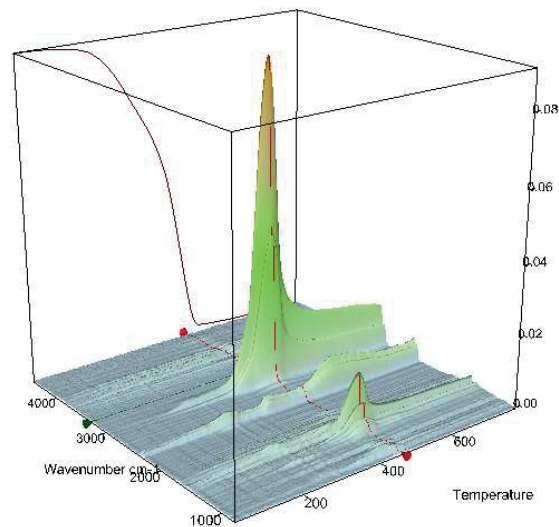
Test Results

The decomposition behavior of a rubber mixture is depicted in figure 1. The relative mass loss is shown as a black closed line (TGA), its first derivative (DTG, green

dashed line) and the total IR chromatogram (Gram-Schmidt). The latter indicates changes in the absorbance intensities of the decomposition gases with in the IR beam. It can be seen that the IR absorbance intensities increase as soon as a mass loss is detected.

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A three-dimensional view of all detected IR spectra is shown in figure 2. For further analysis, single spectra are extracted at 390°C and 450°C (figure 3a). The zoom of figure 3 shows the most significant difference of absorbance

(wave number at 892 1/cm). At 390°C, decomposition products are detected that are related to NR while at 450°C, SBR decomposition products are observed which are due to the pyrolysis of SBR.