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REPORT XYZ-004

FTIR; TGA AND SEM/EDS ANALYSIS OF AN EPDM HOSE

Submitted to:

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Background

An EPDM hose marked “Avon 9737” was submitted for comprehensive analysis. The hose was supposed to be manufactured in accordance with the requirements of GM Worldwide Engineering Standard GMW15024 for **Type G** of material.

Test Procedure

Fourier transform infrared spectroscopy (FTIR); Thermogravimetric analysis (TGA) and Scanning Electron Microscopy (SEM) combined with Energy Dispersive X-ray Microanalysis (EDS) were used to characterize the hose.

Small pieces of the inner tube were cut out from the hose and analyzed with: a Bruker Tensor 27 FTIR spectrometer using a diamond ATR accessory and a Thermal Instruments TGA Q50. In turn, SEM/EDS analysis was run on the ashes of the hose collected upon completion of the TGA tests. A Hitachi Field Emission SEM S-4000, equipped with an IXRF EDS system was employed.

The TGA test was run in accordance with the requirements of ASTM D6370 - Standard Test Method for Rubber-Compositional Analysis by Thermogravimetry (TGA)

Results

Typical results of the analysis are shown in Figures 1 through 3 below.

FTIR Analysis

A typical spectrum is shown in Figure 1. A library search was conducted on the collected spectrum but it did not return any reasonable matches.

TGA Analysis

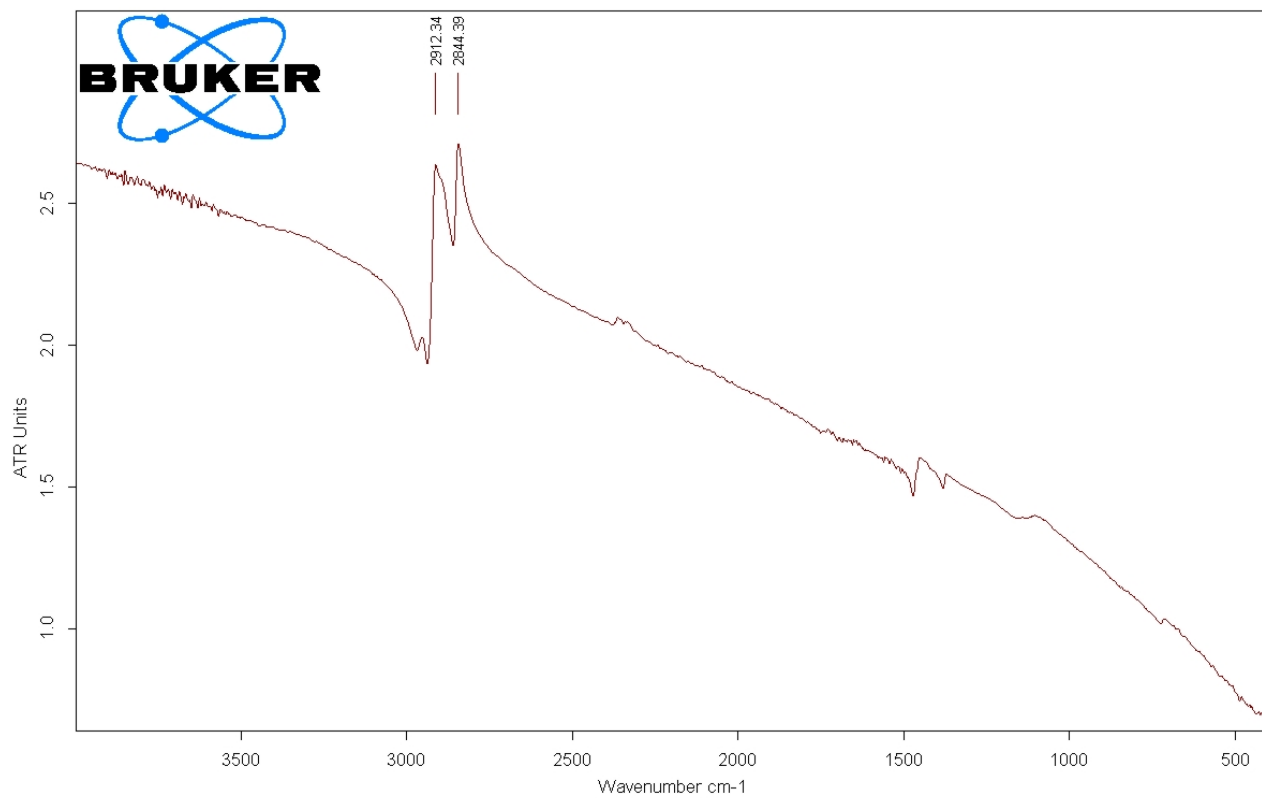
Figure 2 and Table 1 summarize the findings.

Table 1 - TGA Data

Sample ID	Derivatives of the Analysis				
	Temperature of Decomposition, °C	Volatile, wt. %	Organics (EPDM), wt. %	Carbon Black, wt. %	Ash Content, wt. %
Avon 9737	474	8.5	58.9	38.5	2.5

SEM/EDS Analysis

Typical results are shown in Figure 3. As can be seen from the EDS data, zinc oxide was the main constituent of inorganic filler. Such elements as Ca, S and Si were also present in the elemental composition of the filler.



C:\OPUS_7.0.129\MEAS\Avon 9737.3

Avon 9737

Tensor 27/Diamond ATR

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Page 1/1

Figure 1. Typical FTIR spectrum collected from the hose.

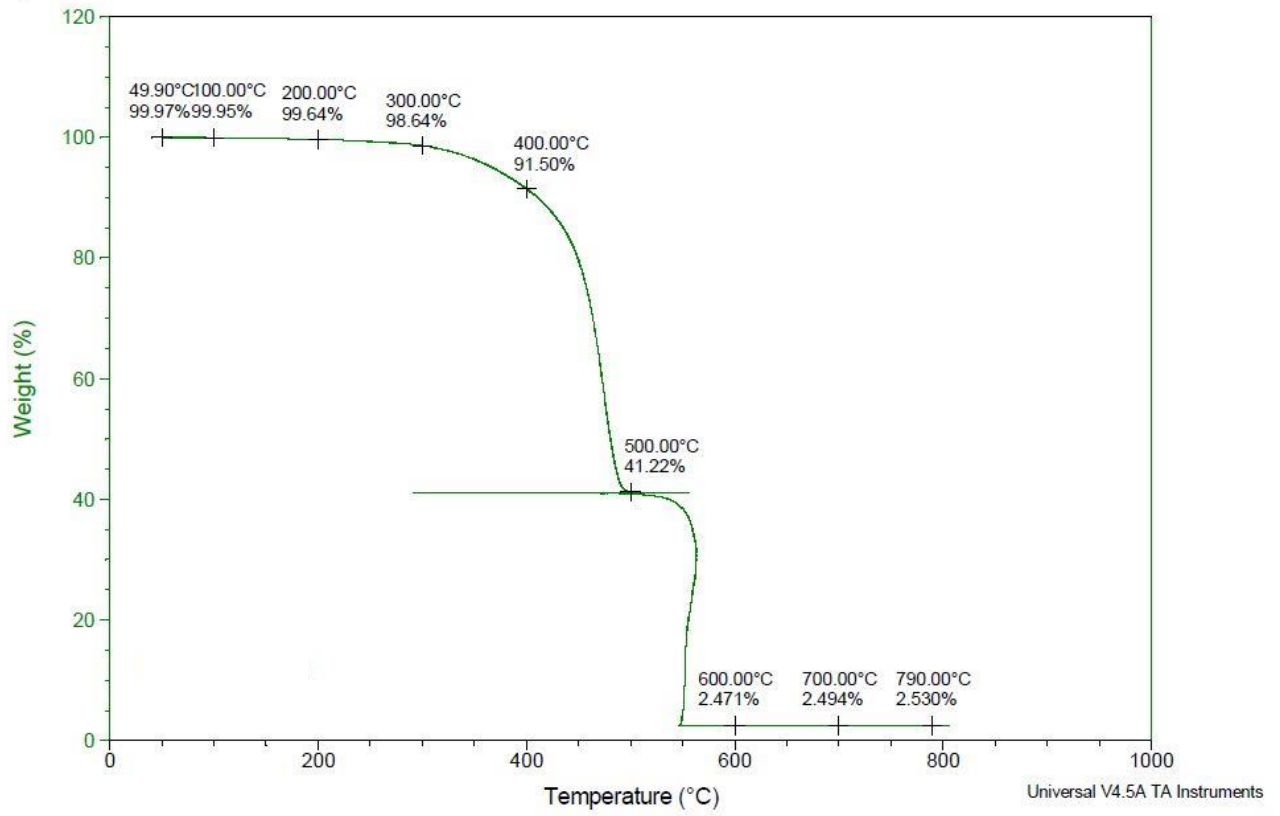


Figure 2.TGA analysis of the hose.

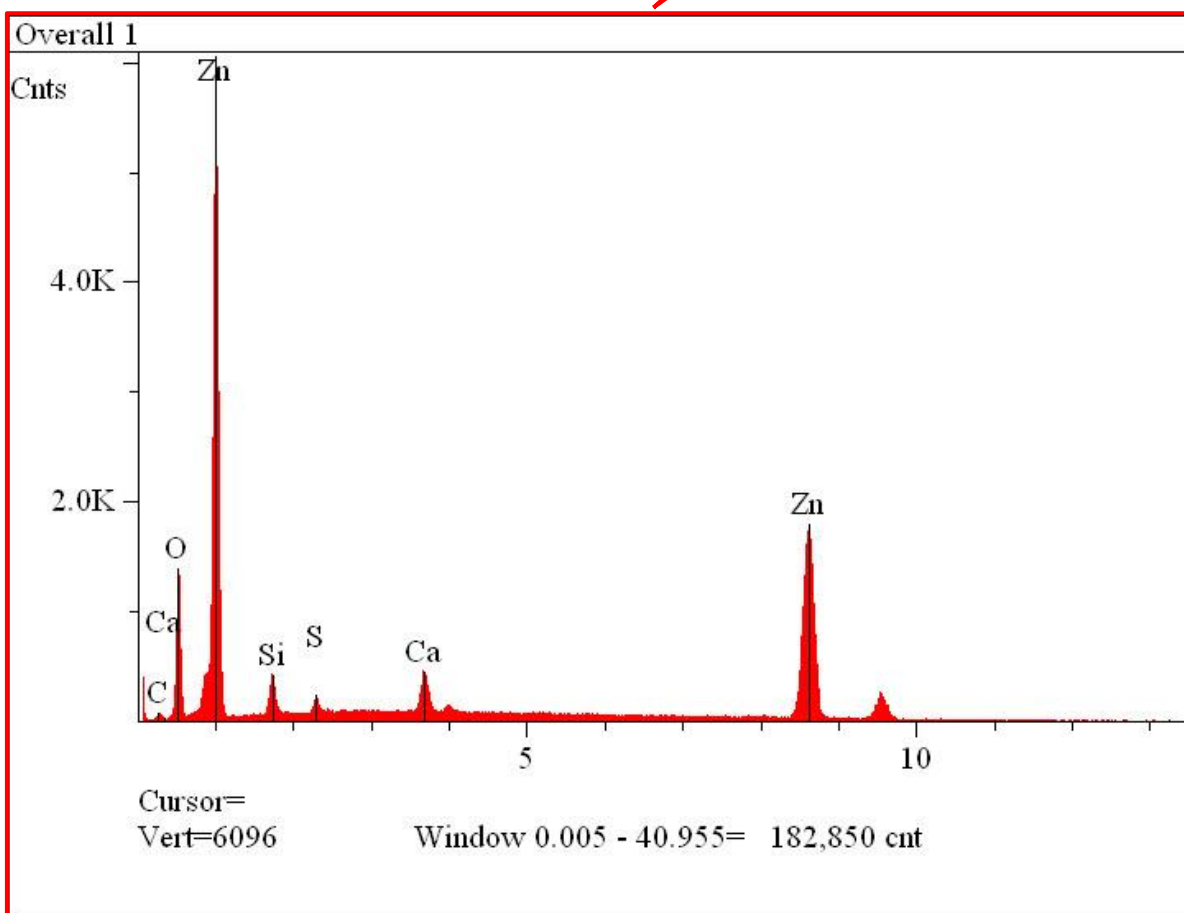
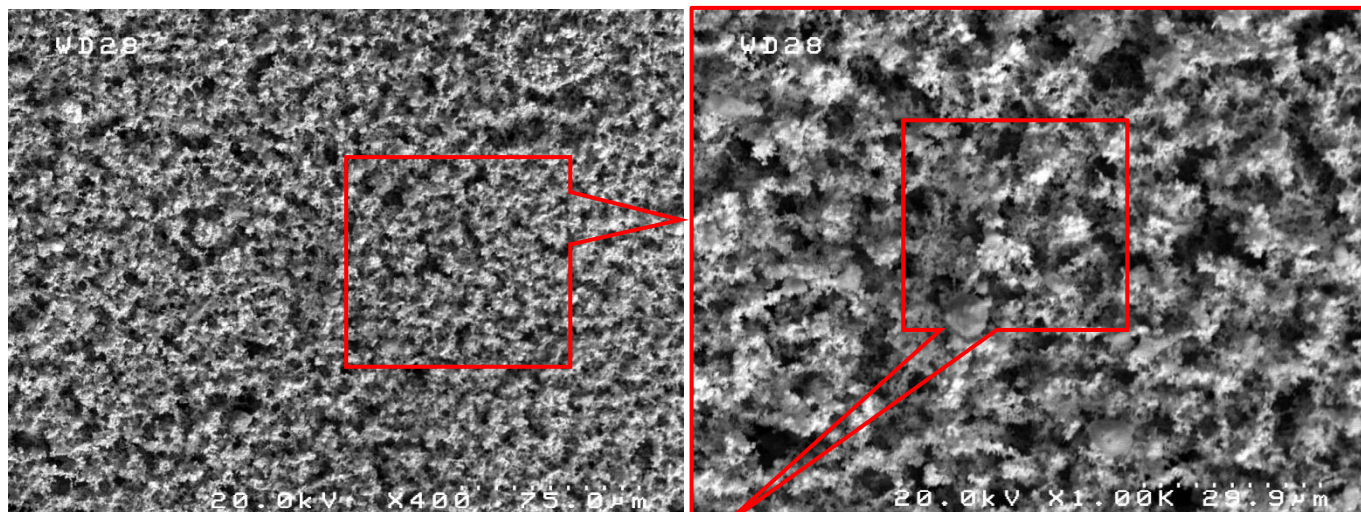


Figure 3.SEM/EDS analysis of ash of the hose.