

January 9, 2020

Dear Brian,

Please find enclosed the test results for your samples described as:

1. *Silicon carbide crucible*
2. *Thermal Quartz*

The following test was performed:

1. Thermogravimetric Analysis (TGA)

## Objective

Two (2) samples were submitted for analysis. It was noted that the samples are used to make high temperature crucibles and one sample is quartz while the second is silicon carbide. ***The goal of this analysis was to determine if anything off-gasses from the samples at high temperature via TGA.***

## Summary of Results

The samples were analyzed by TGA to determine if they off-gas. No weight loss detected during TGA. This is consistent with no gasses being evolved from the samples at a level detectable by TGA.

## Recommended Next Steps

If analysis with more sensitivity is of interest the samples could be analyze via evolved gas analysis (EGA).

## Individual Test Results

A summary of the individual test results is provided below. All accompanying data, including spectra, has been included in the data section of this report.

### TGA

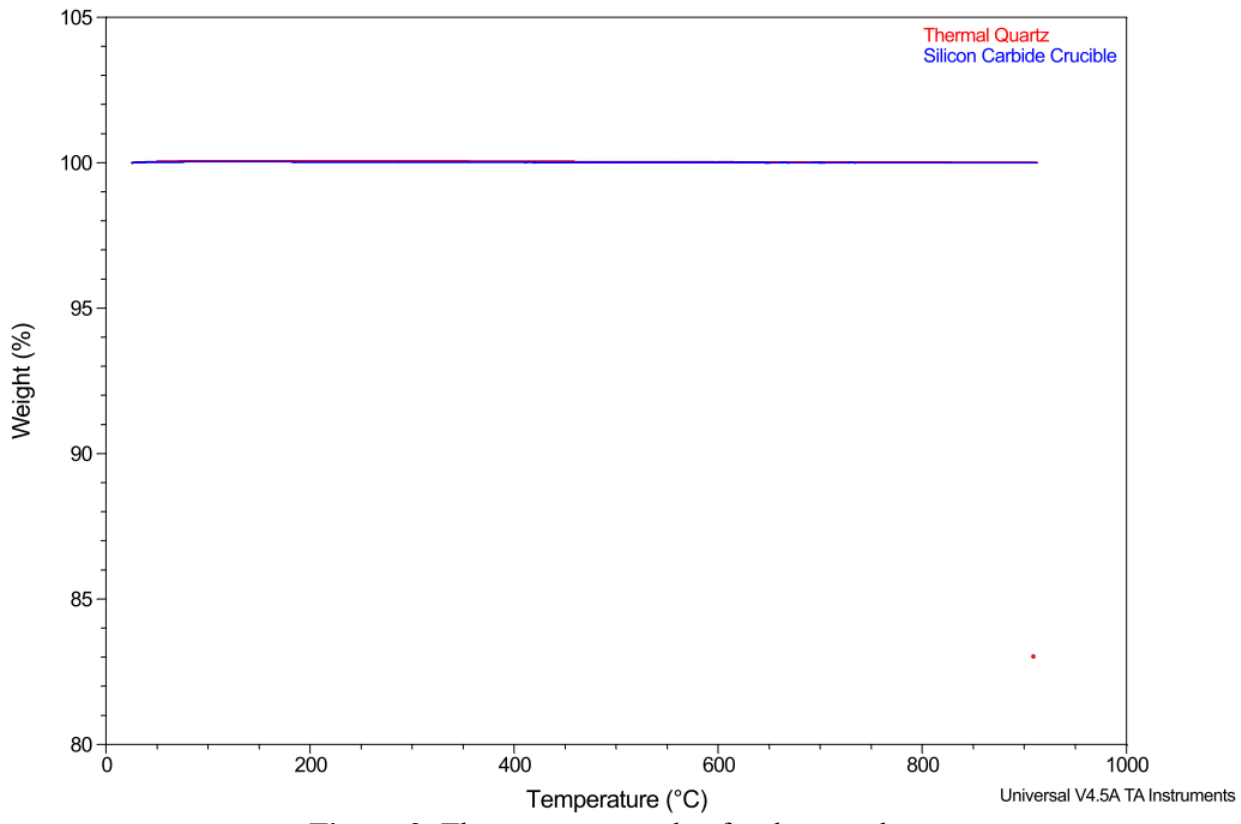
The samples were revived as seen in **Figure 1**.



**Figure 1.** Image of *Thermal Quartz* (top) and *Silicon Carbide Crucible* (bottom)

At least 17 mg of the samples was subjected to TGA over the temperature range of ambient to 1000 °C, at a rate of 50 °C/min under a nitrogen atmosphere. Analysis was performed in duplicate. An overlay of the thermograms for the samples can be seen in **Figure 2**. Analysis results are shown **Table 1**. No weight loss detected during TGA. This is consistent with no gasses being evolved from the samples at a level detectable by TGA. It should be noted that under ideal circumstances the TGA instrument used as sensitivity to as low as 0.1 µg.

Table 1 <i>TGA Weight Loss</i>			
Sample Name	Run	Weight Loss (%)	Average Weight Loss (%)
<i>Silicon Carbide Crucible</i>	1	N.D	N.D
	2	N.D	
<i>Thermal Quartz</i>	1	N.D	N.D
	2	N.D	N.D
N.D = Not detected			



**Figure 2.** Thermogram overlay for the samples

## **Analysis Conditions**

### **TGA**

Analysis of samples was accomplished using a TA 500 Thermogravimetric Analyzer in combination with TA Universal Analysis software.

## **Closing Comments**

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Jordi Labs specializes in polymer analysis and has more than 35 years' experience performing regulatory, quality control and failure testing. We are one of the few labs in the United States specialized in this type of testing. We will work closely with you to help explain your test results and complete your project goals. We appreciate your business and are looking forward to speaking with you concerning these results.

Sincerely,

*Adam Eason*

Adam Eason, M.S  
Senior Chemist  
Jordi Labs LLC

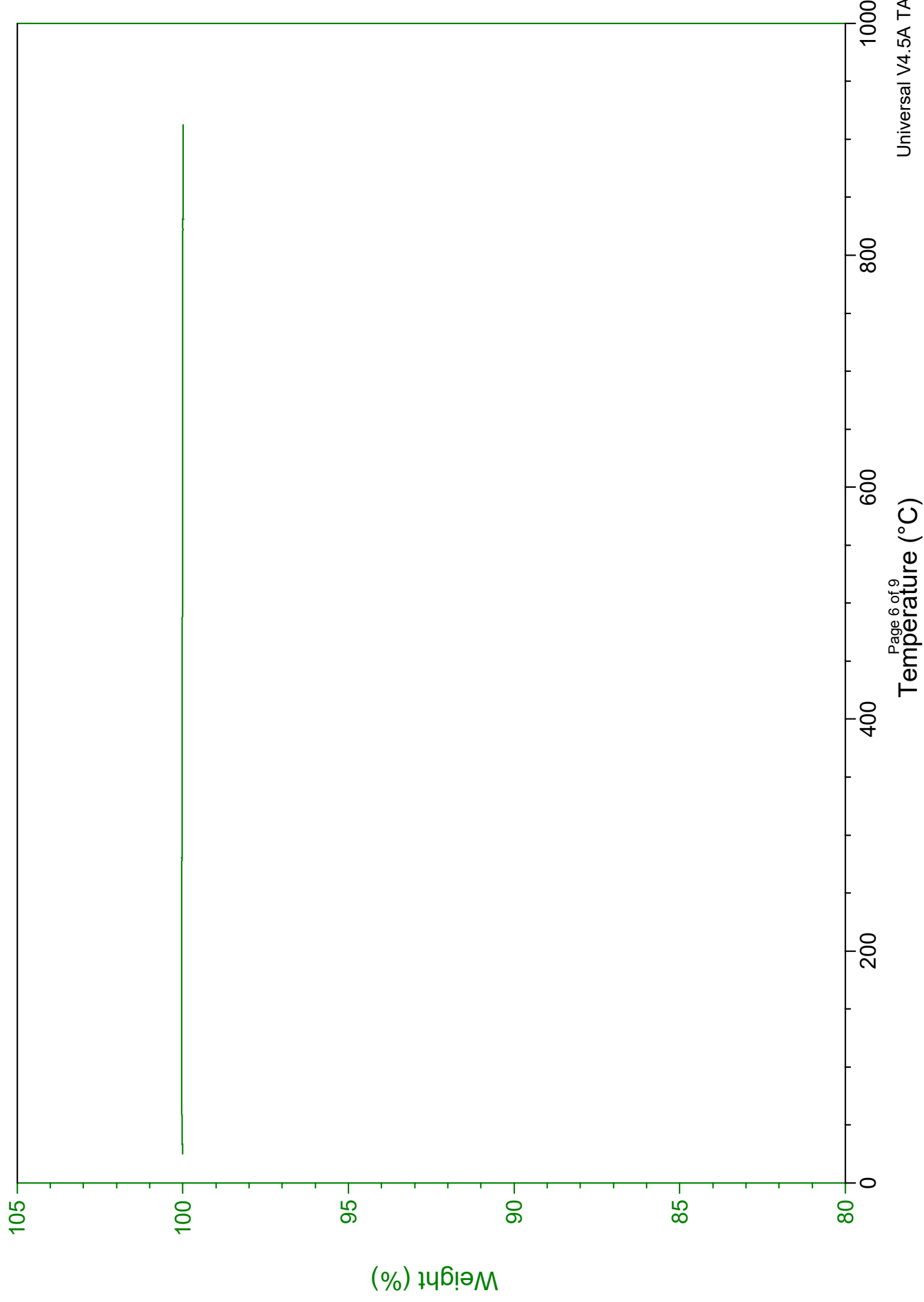
*Anthony Grice*

Anthony Grice, Ph.D.  
Senior Chemist  
Jordi Labs LLC

Sample: Silicon Carbide  
Size: 49.7410 mg  
Method: Ramp

# TGA

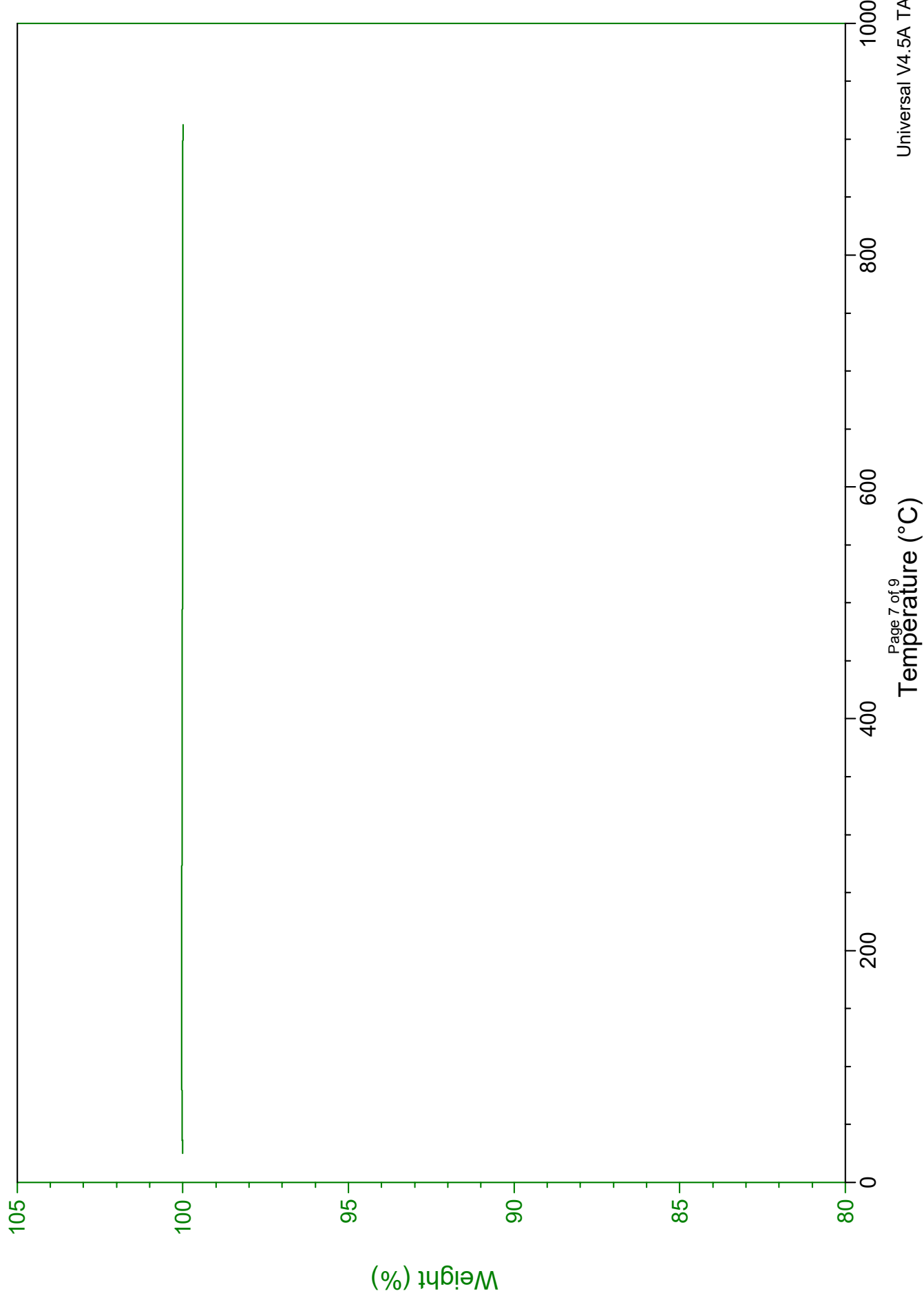
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Run Date: 09-Jan-2020 11:41  
Instrument: TGA Q500 V20.13 Build 39



Sample: Silicon Carbide  
Size: 58.5480 mg  
Method: Ramp

# TGA

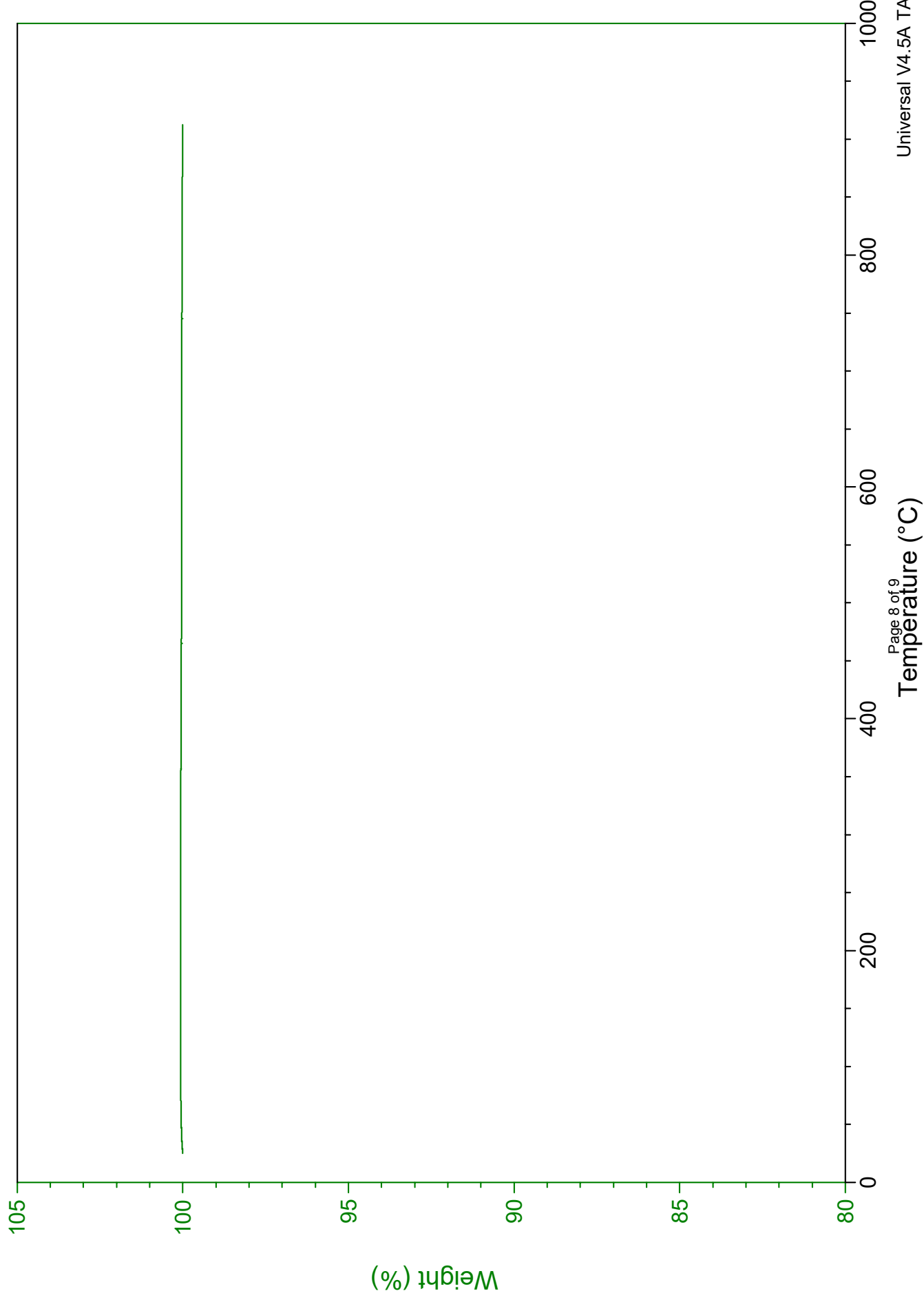
File: R:\...\TGA\Silicon Carbide.002  
Run Date: 09-Jan-2020 12:59  
Instrument: TGA Q500 V20.13 Build 39



Sample: Thermal Quartz  
Size: 25.0420 mg  
Method: Ramp

# TGA

File: R:\...\TGA\Thermal Quartz.001  
Run Date: 09-Jan-2020 14:17  
Instrument: TGA Q500 V20.13 Build 39



Sample: Thermal Quartz  
Size: 17.2930 mg  
Method: Ramp

# TGA

File: R:\...\TGA\Thermal Quartz.002  
Run Date: 09-Jan-2020 15:35  
Instrument: TGA Q500 V20.13 Build 39

