



**MICROVISION**  
LABORATORIES, INC.

# 2019 SPECTRUM & EMISSIVITY TESTING

July 19<sup>th</sup>, 2019

187 Billerica Road, Chelmsford, MA

[www.MicroVisionLabs.com](http://www.MicroVisionLabs.com)



HybridHeat™



**Good Health Saunas**



# 2019 Emissivity and Infrared Radiation Testing for Good Health Saunas®

## Microvision Laboratories, inc.

Microvision Laboratories Inc. was commissioned by Good Health Saunas to perform testing on their hybrid infrared heating system. The testing as performed on both the carbon and ceramic heating elements that are used in this hybrid heating system. The equipment used to do this testing was a Bruker EM 27 Open Path Fourier Transform infrared (FTIR) spectrometer and a hand held infrared thermometer (Version:900-EN-00).



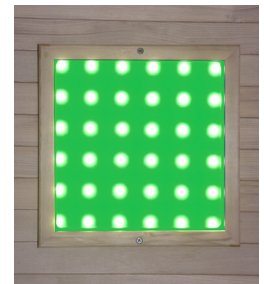
The testing was run at the Bruker applications lab in Billerica, MA. Dr. Tom Tague, from Bruker, ran the EM 27 recording wavelength data at 1 minute intervals while John Knowles, from MicroVision Labs, ran the IR thermometer and recorded the temperature at the same intervals. The maximum temperature of each heating element was reached at around a 14 minute mark. The information was gathered and put in the charts and graphs in this report for Carbon and Ceramic heating elements.

## Results:

Page 2 of 27 in the microvisions lab Report analysis is a chart showing time intervals (1-14min) And specific surface temperature of each heating element. Wien's displacement law was used to covert this data into microns. A micron is a unit of length equal to one millionth of a meter. This type of measurement is typically used in technological and scientific fields. The human body absorbs infrared energy from 3 to 50 Microns while it emits infrared heat near 9  $\mu\text{m}$ . The hybrid heating system used by Good Health Saunas concentrates far infrared heat on the bodies core at wavelengths between 8.5 $\mu\text{m}$  and 9.8  $\mu\text{m}$ .

## Light Therapy:

Light therapy is often referred to as chromotherapy, photobiomodulation or near infrared. This type of lighting utilizes LED bulbs to produce short wavelengths that are in the near infrared range. Near infrared therapy is typically used for cellular health and tissue repair.



## Emissivity:

Emissivity, or radiating efficiency of materials is a function of surface condition, temperature, and the wavelength of measurement. Most infrared sauna companies claim to have high emissivity with no current testing or testing that's done without the heaters actually operating. Good Health Saunas hybrid heating system produces has an emissivity between .98 and 1 while the heating elements are at their peak temperature.



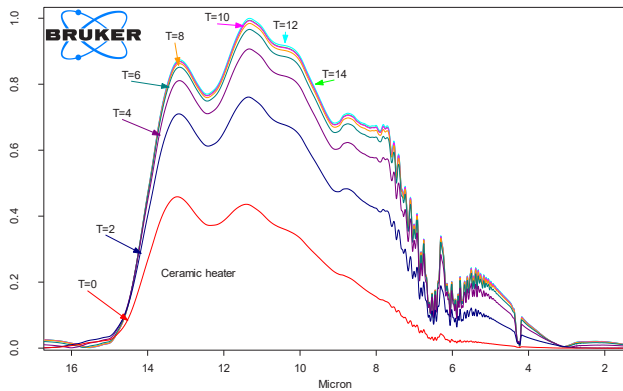
# 2019 Emissivity and Infrared Radiation Testing for Good Health Saunas®

## Ceramic Heater:

The ceramic heating elements tested at a surface temperature of 72°F to a maximum temperature of 480°F. When converted to microns, the ceramic heater produced infrared between 5 and 10 microns(μm). This range provides wavelengths in both the mid and far infrared spectrum.



Ceramic Heater – all temperatures

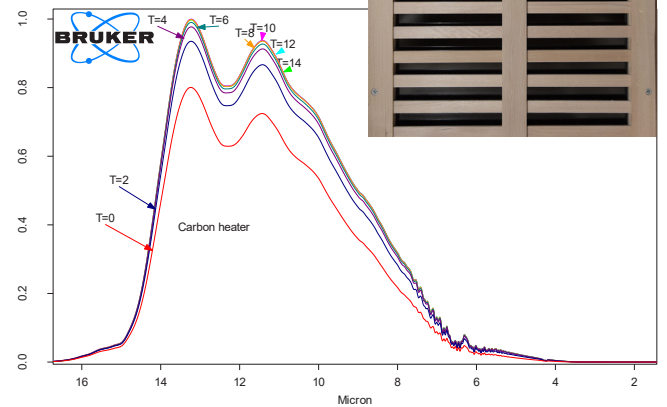


## Carbon Heater:

The carbon heating elements tested at a surface temperature of 72°F up to 147°F. When converted to microns(μm), the carbon heater produced Infrared between 8.5 μm and 9.8 μm. All of the heat being produced by the carbon heaters is in the far infrared spectrum.



Carbon Heater, all temperatures.



## Conclusion:

Good Health Saunas hybrid heating system is producing mid and far infrared heat which is proving to be vital to human health, healing, and wellness. The LED lighting system is producing a near infrared wavelength, near infrared is beneficial for cellular health and energy production. The transfer of heat from the elements to the body is also very efficient and effective with the average emissivity between .98 and 1.





July 22, 2019

# Good Health Saunas

## FTIR Results

*MVL Project #: 12915*

*Report Analyst: J Knowles and H. Knowles*

*Method: FTIR*

*Version 3 – Every other time interval shown and labeled on conglomerate plots (see pages 25-26).*

### **Scope of Work:**

This data report covers the analysis that was conducted on the ceramic heater sample and the carbon heater sample submitted by Good Health Saunas for emissivity testing.

### **Equipment:**

Bruker EM 27 Open Path Fourier Transform infrared (FTIR) spectrometer and a hand held infrared thermometer (Version:900-EN-00).

### **Method:**

The client submitted the samples along with a power supply, control board and the necessary cables to run the heating elements. The analysis was run at the Bruker applications lab in Billerica, MA. Dr. Tom Tague, from Bruker, ran the EM 27 recording wavelength data at 1 minute intervals while John Knowles, from MicroVision Labs, ran the IR thermometer and recorded the temperature at the same intervals.

The ceramic heater flooded the detector on the EM 27 when initially run so a neutral density filter was added to reduce the signal. A background was taken and subtracted from the corresponding sample measurements.

### **Findings:**

The following table lists the time intervals and the corresponding element temperature at that time.

<u>Time Interval (Minutes)</u>	<u>Ceramic Heater (Temp, F°)</u>	<u>Carbon Heater (Temp, F°)</u>
0	72 (9.810 microns)	72 (9.810 microns)
1	95 (9.403 microns)	75 (9.755 microns)
2	290 (6.957 microns)	81 (9.647 microns)
3	388 (6.153 microns)	98 (9.353 microns)
4	430 (5.862 microns)	114 (9.092 microns)
5	450 (5.733 microns)	125 (8.921 microns)
6	460 (5.675 microns)	130 (8.845 microns)
7	480 (5.550 microns)	136 (8.756 microns)
8	470 (5.610 microns)	137 (8.741 microns)
9	470 (5.610 microns)	140 (8.698 microns)
10	476 (5.574 microns)	143 (8.654 microns)
11	450 (5.733 microns)	145 (8.626 microns)
12	460 (5.671 microns)	146 (8.611 microns)
13	470 (5.610 microns)	147 (8.597 microns)
14	460 (5.671 microns)	147 (8.597 microns)

## What is emissivity and why is it important?

All objects at temperatures above -459.67°F emit thermal radiation. (Yes, that means YOU do too.)

However, for any particular wavelength and temperature, the amount of thermal radiation emitted depends on the **emissivity** of the object's surface. Emissivity is specifically the ratio of the energy radiated from a material's surface to the energy radiated from a perfect emitter, known as a "blackbody", at the same temperature and wavelength and under the same viewing conditions. It is a random figure between 0 (for a perfect reflector) and 1 (for a perfect emitter).

The emissivity of a surface depends not only on the material but also on the nature of the surface. For example, a clean and polished metal surface will have a low emissivity, whereas a roughened and oxidised metal surface will have a high emissivity. The emissivity also depends on angle, wavelength, and temperature of the surface.

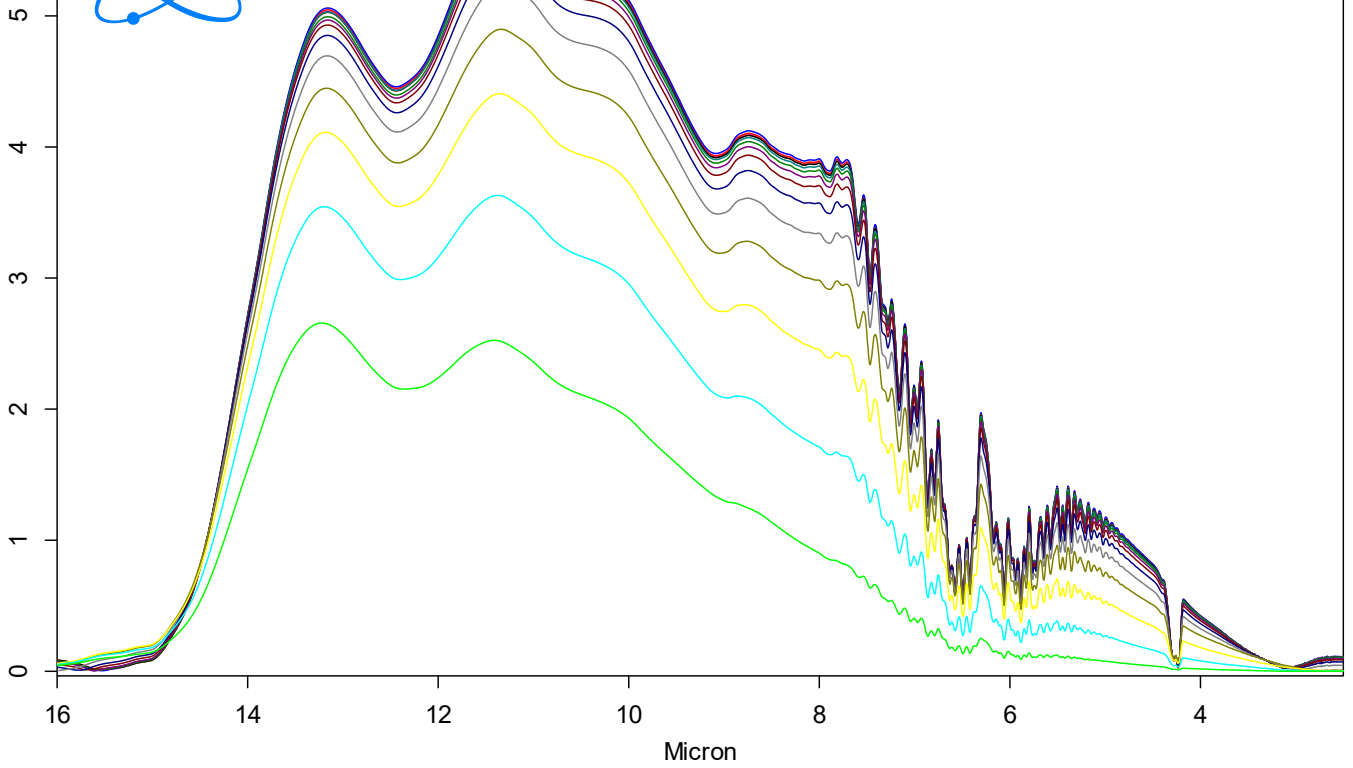
**In a Good Health Sauna, your body receives the infrared rays from 360°, with our proprietary HybridHeat™ heating system.**

The human body emits thermal radiation within the range of our infrared heating system, thereby allowing the body to maximize the benefits of the IR rays.

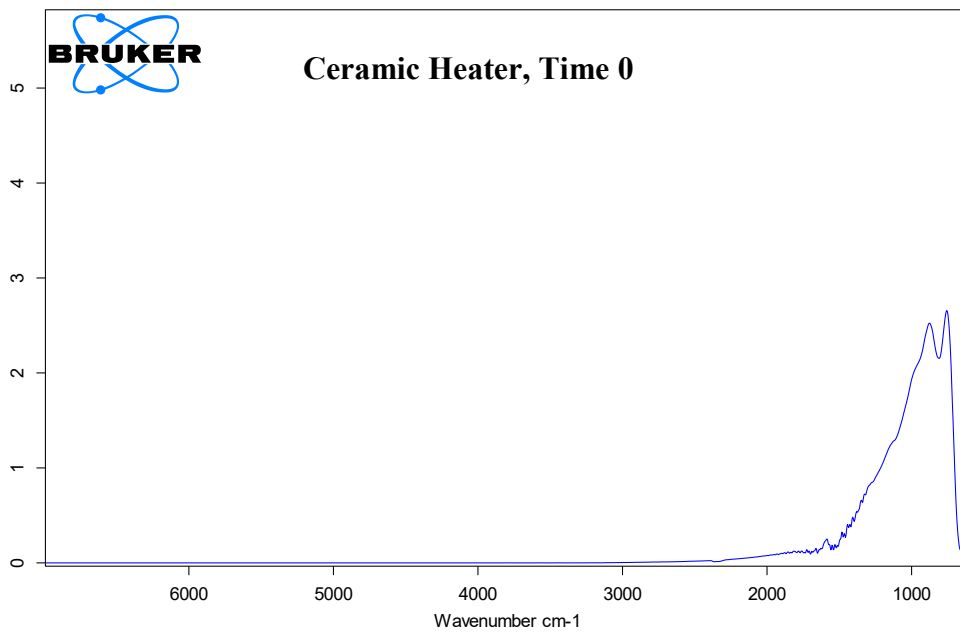
**Good Health Saunas is currently the ONLY manufacturer in the industry that invests in ANNUAL 3rd party testing to assure the consistent safety and effectiveness of our saunas. The following is our most recent emissivity report.**



Ceramic Heater, All Times

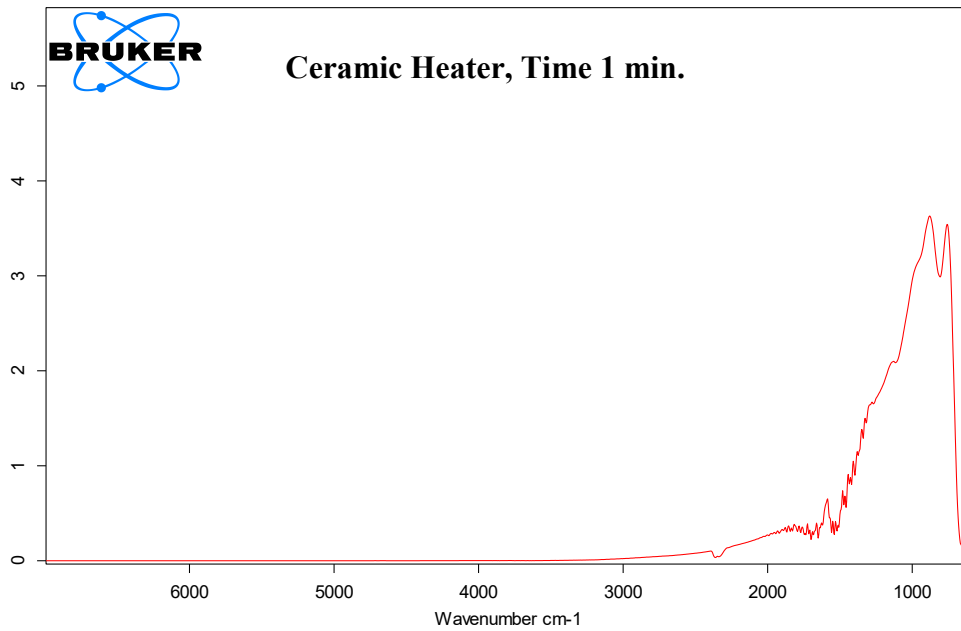


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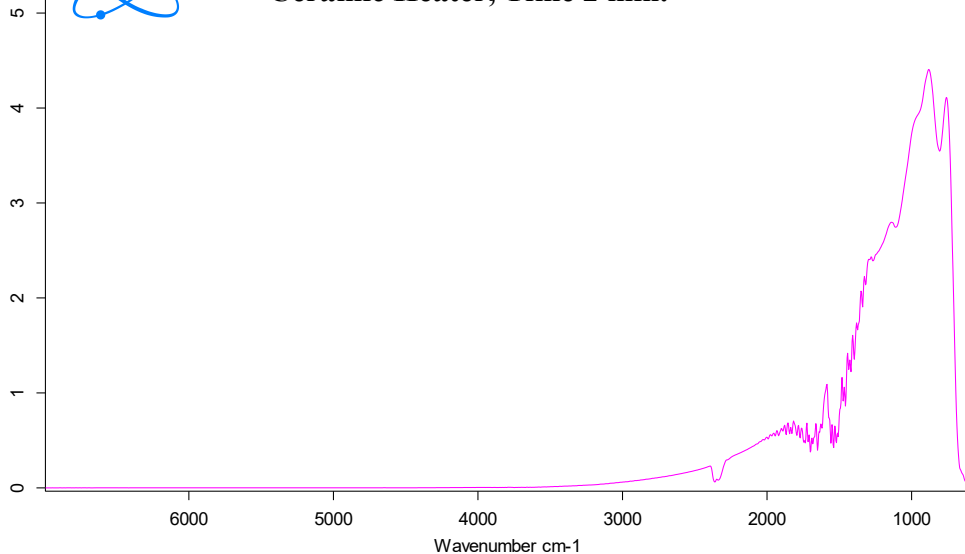


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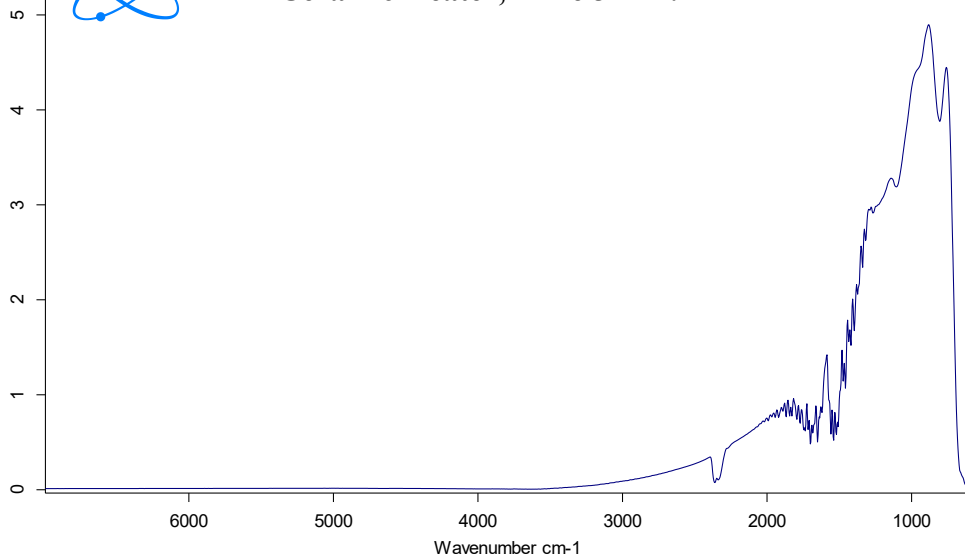
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### Ceramic Heater, Time 3 min.

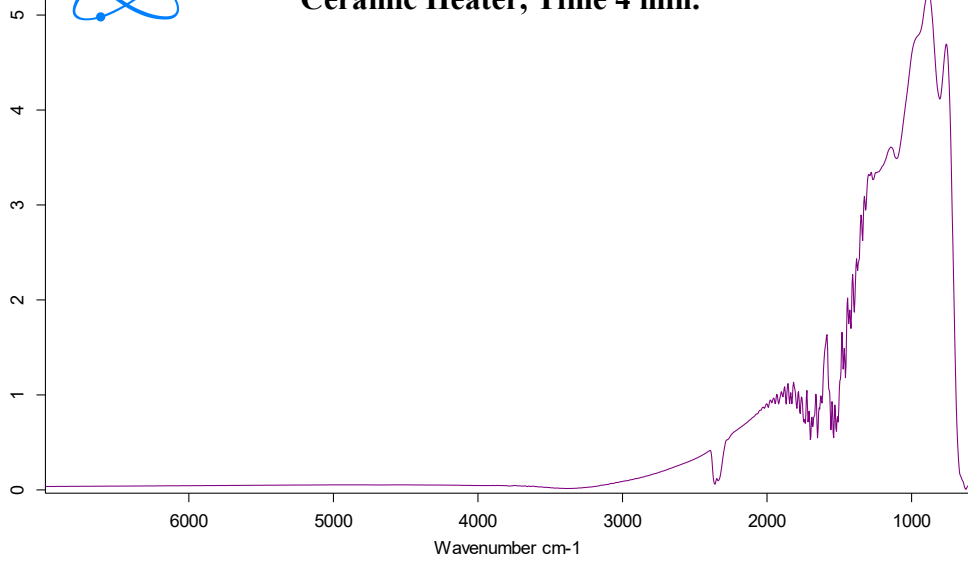


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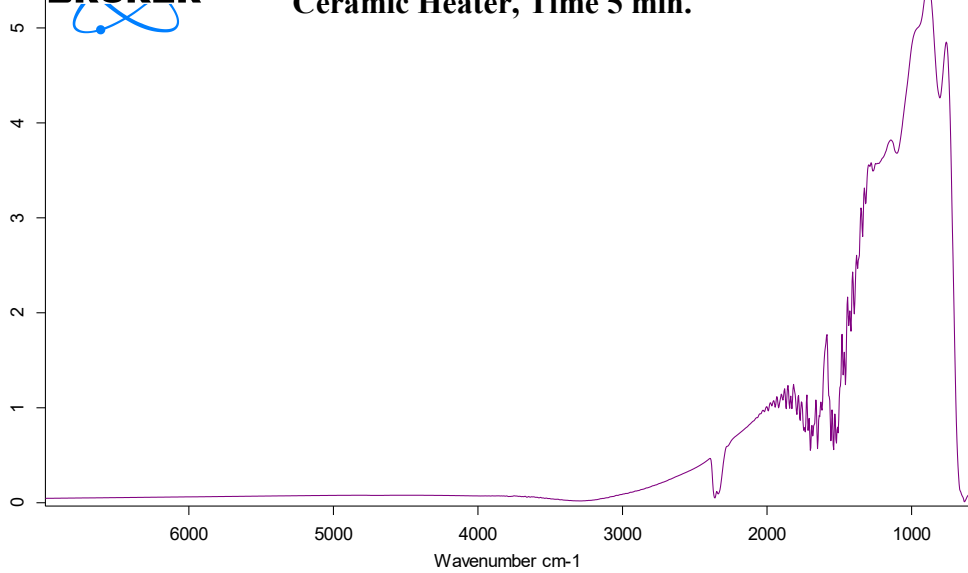
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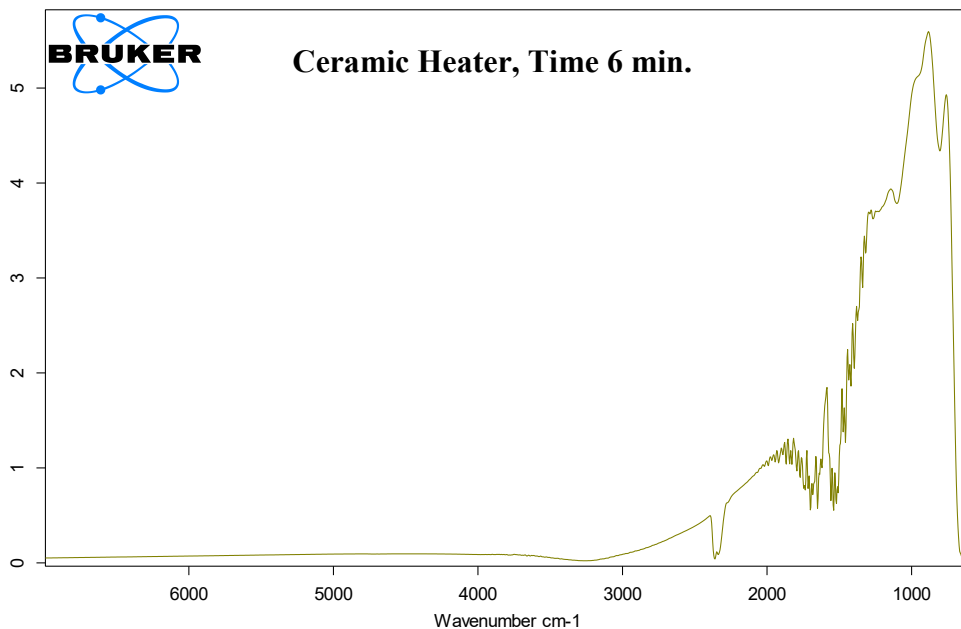
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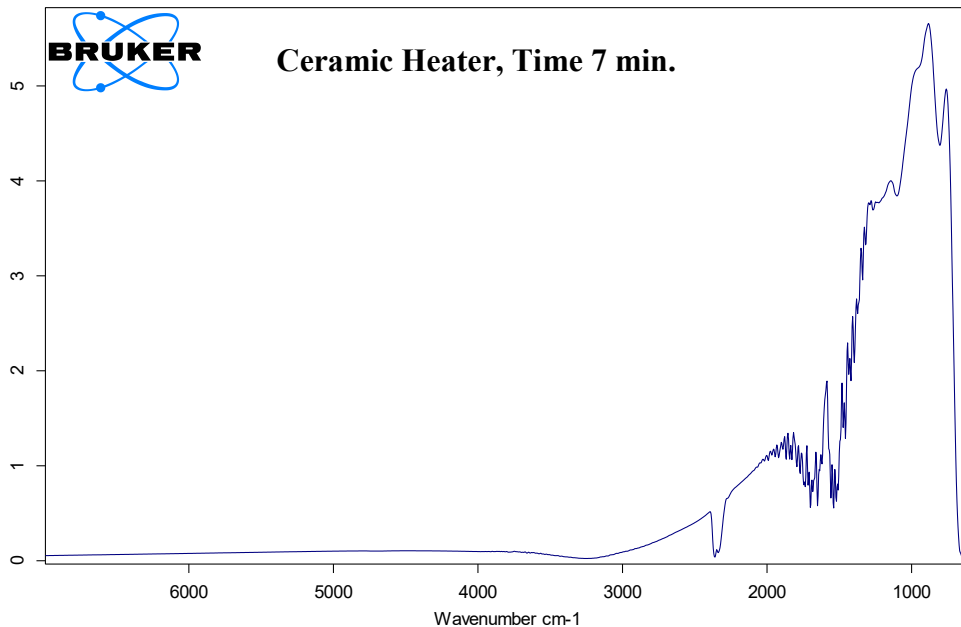
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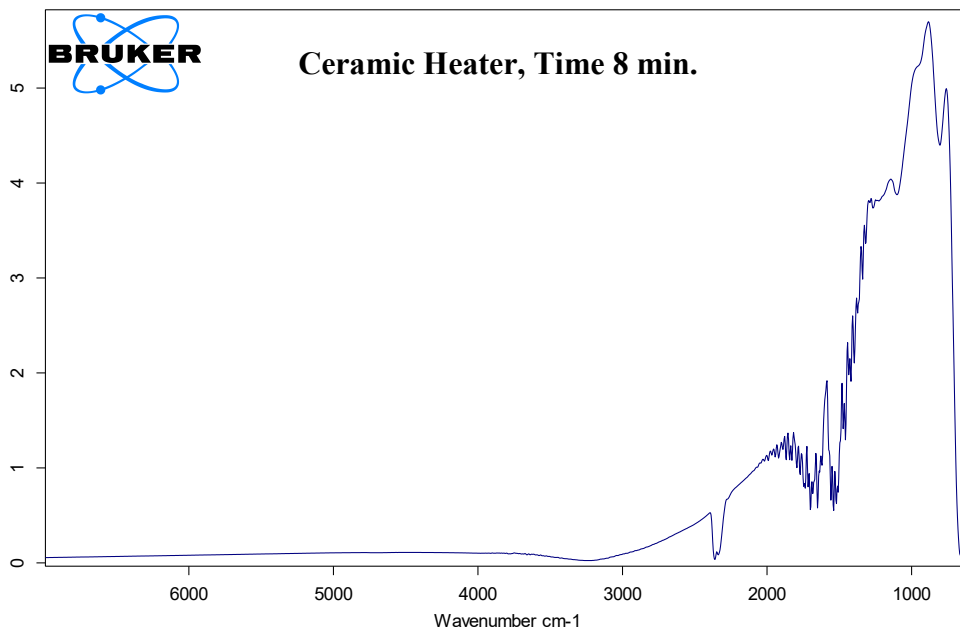
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### Ceramic Heater, Time 7 min.

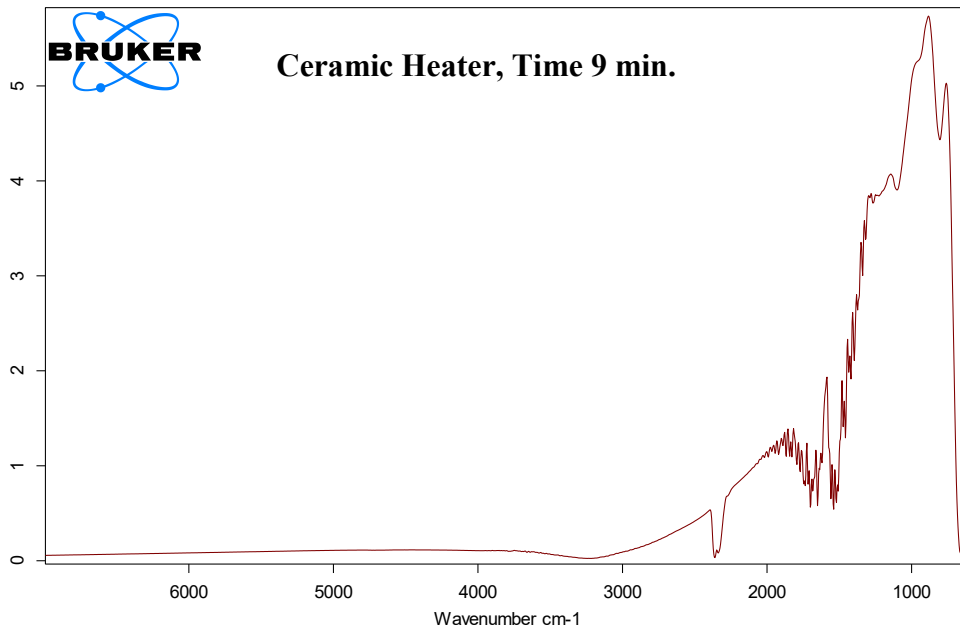


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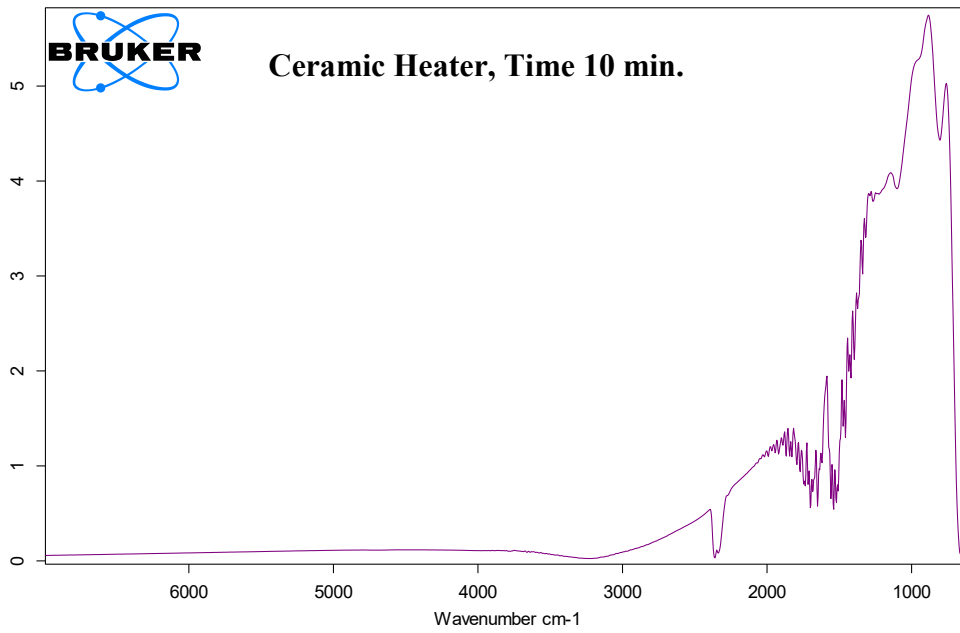
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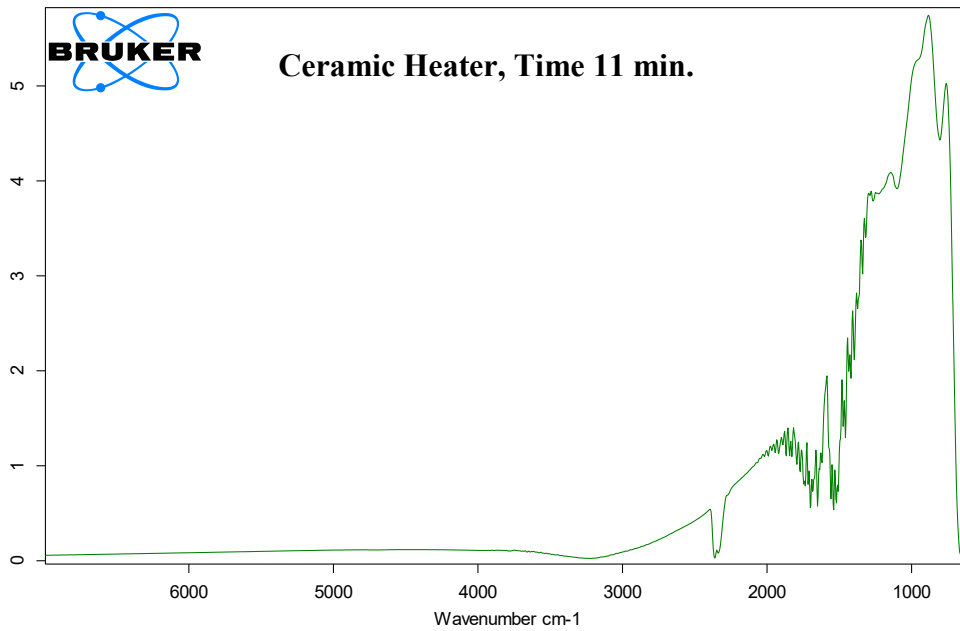
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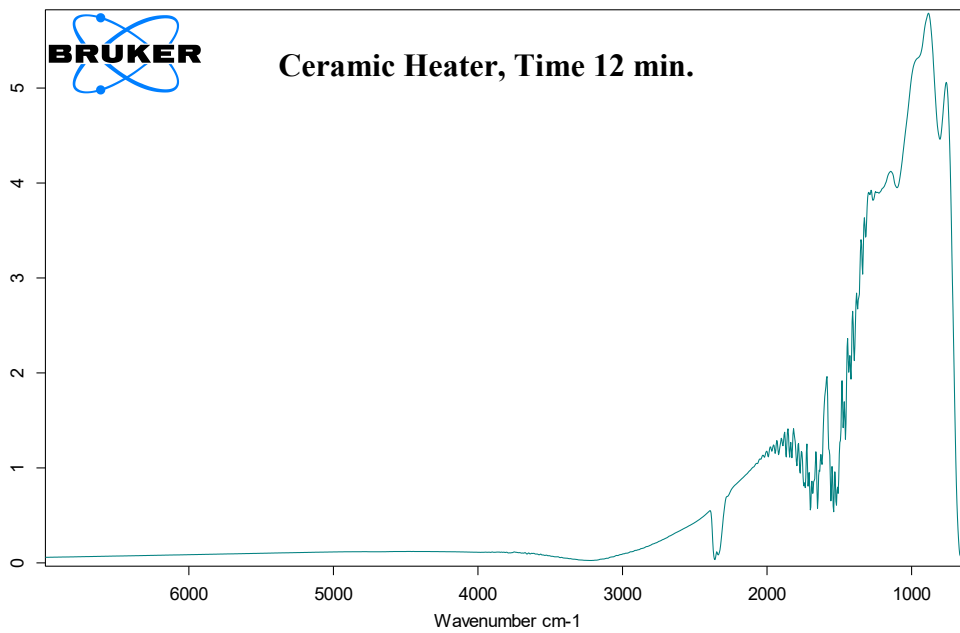
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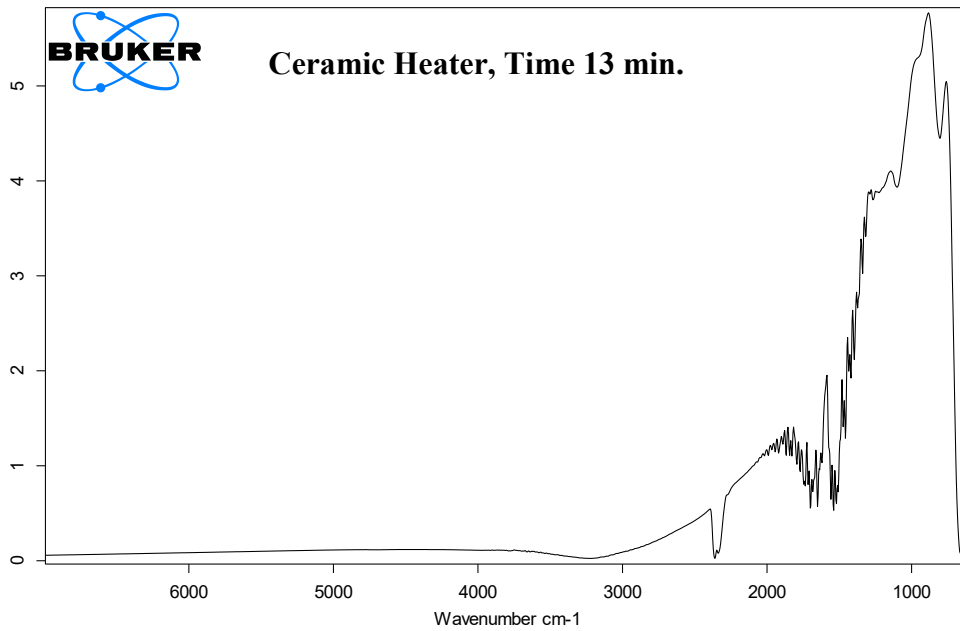
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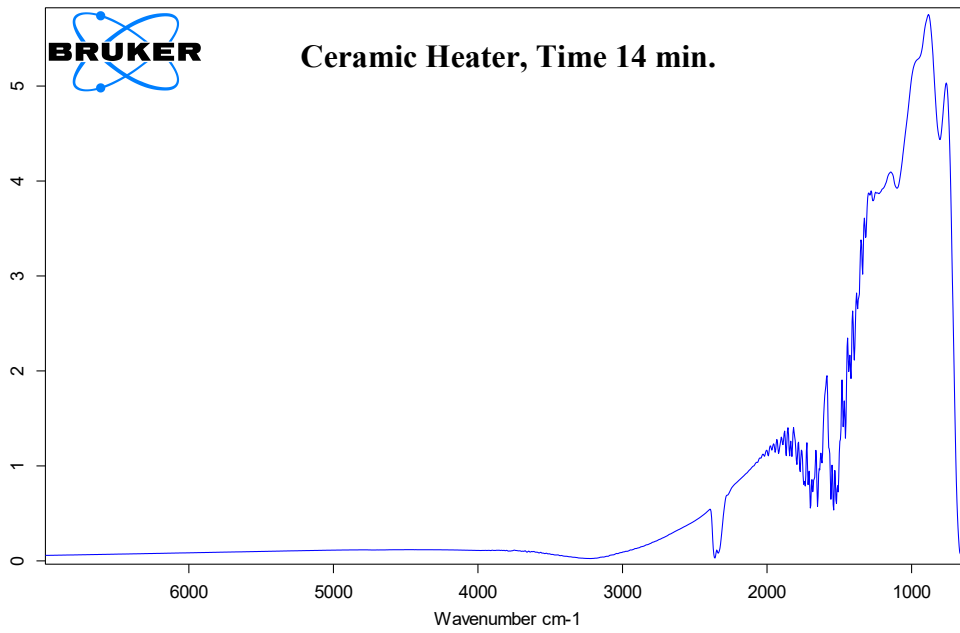


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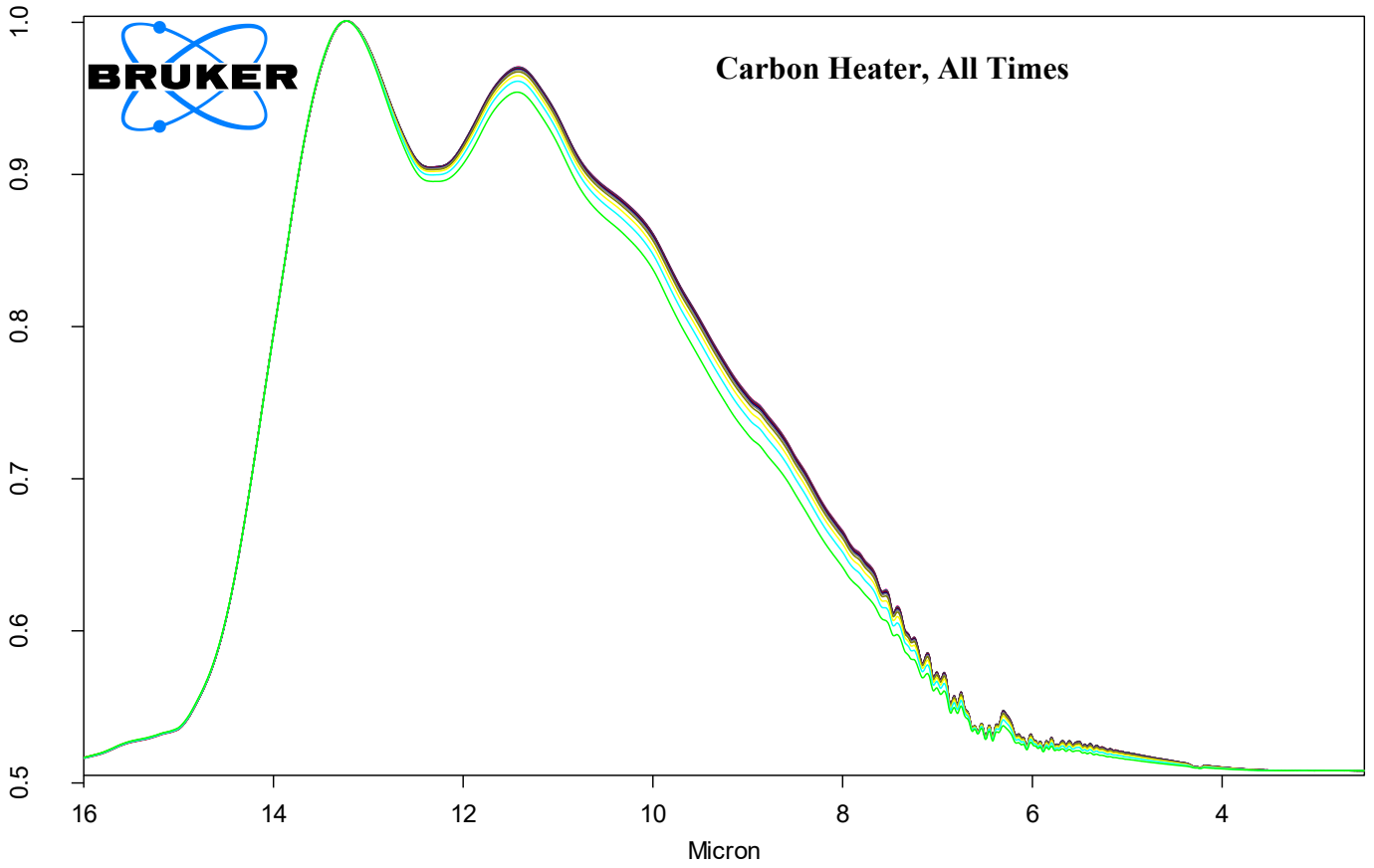
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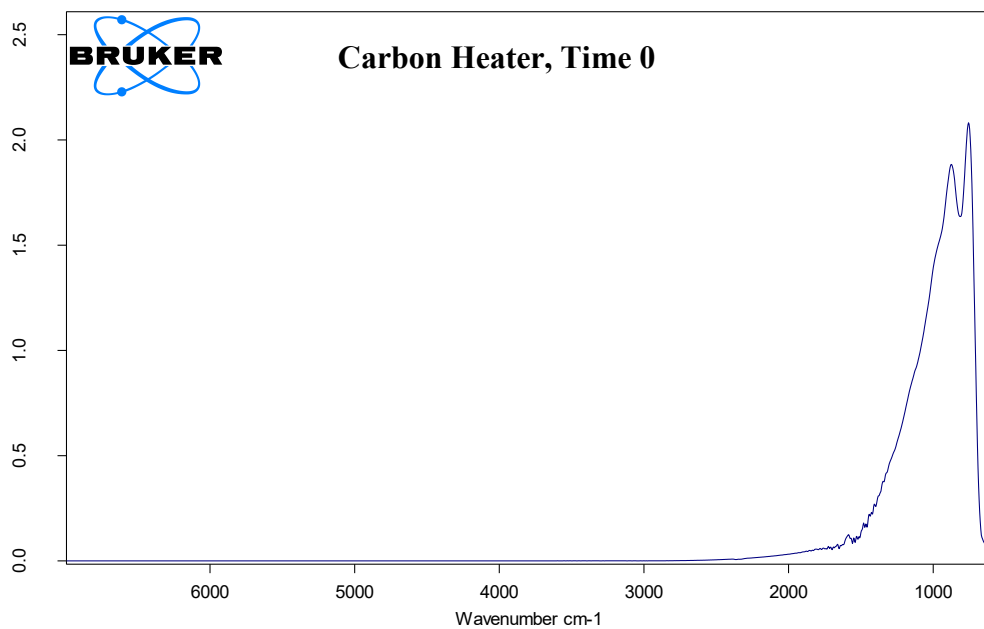
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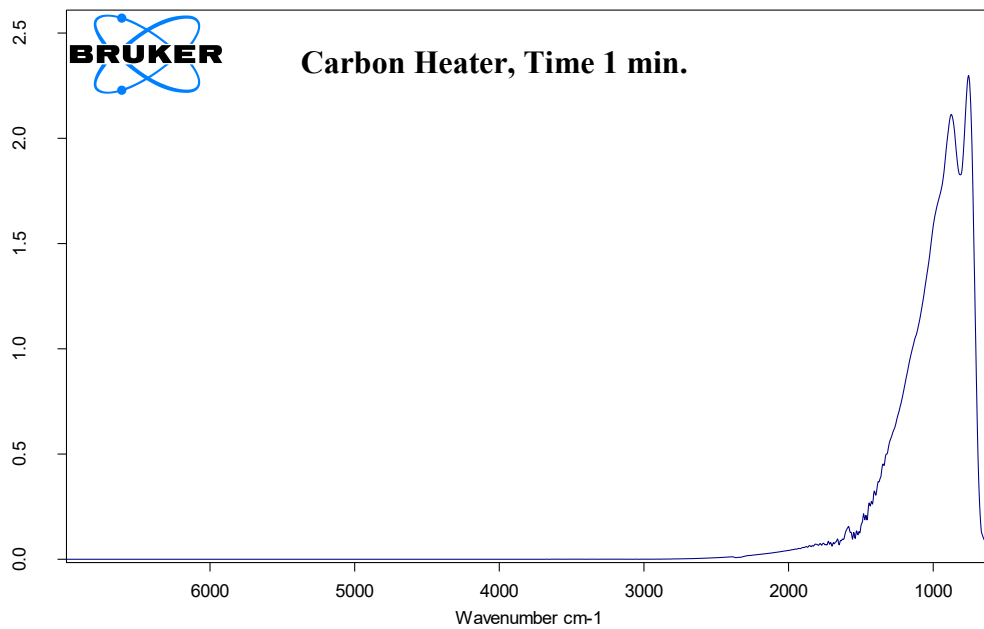


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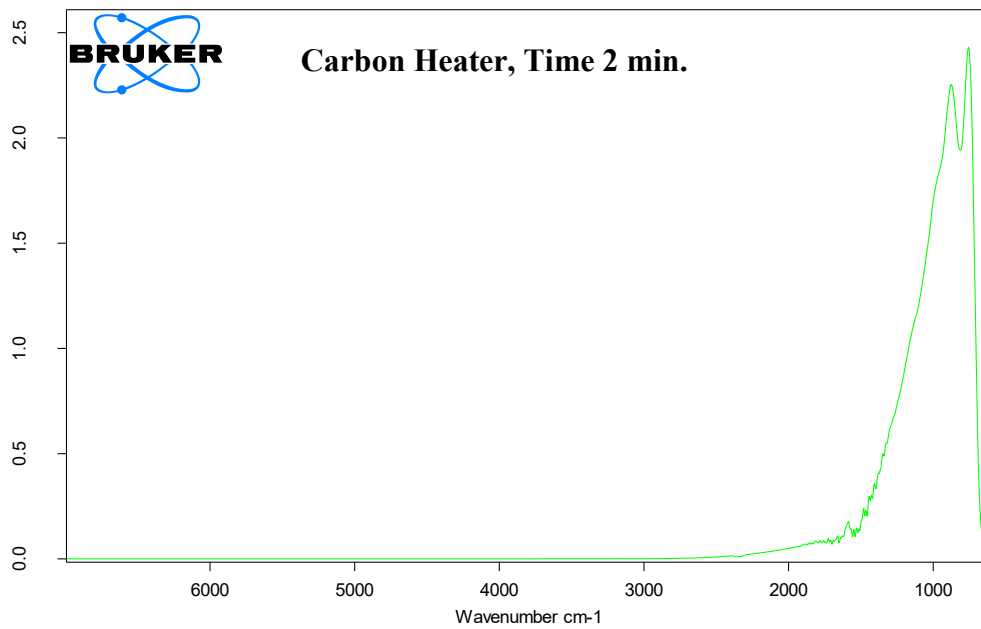
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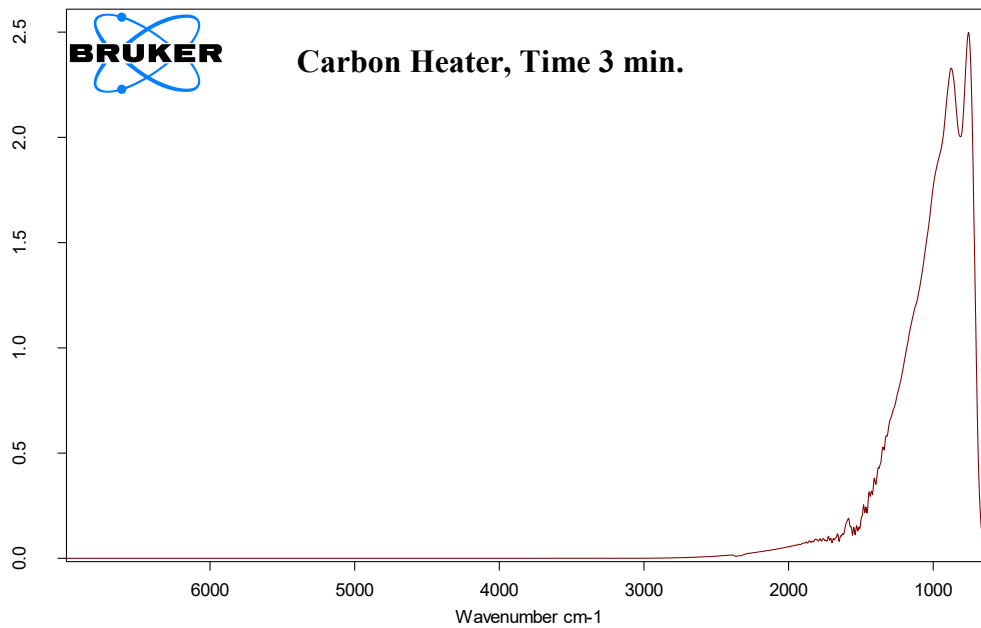
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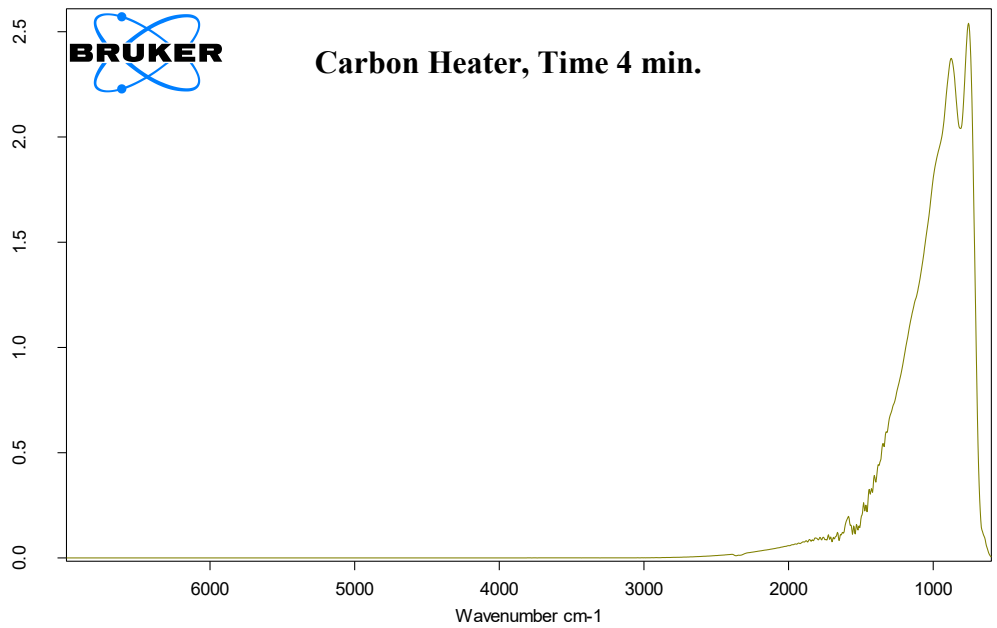




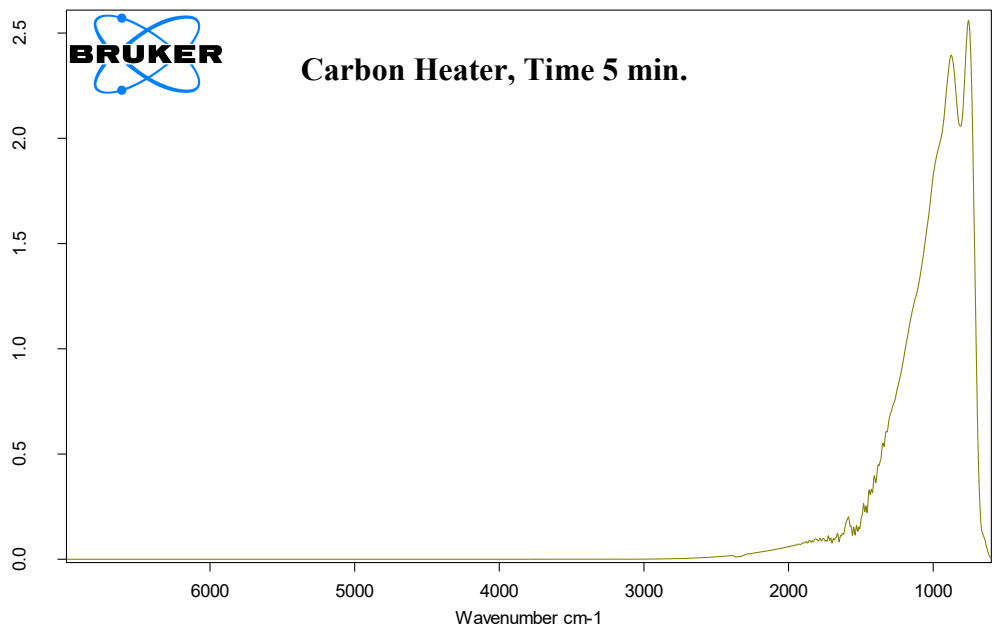
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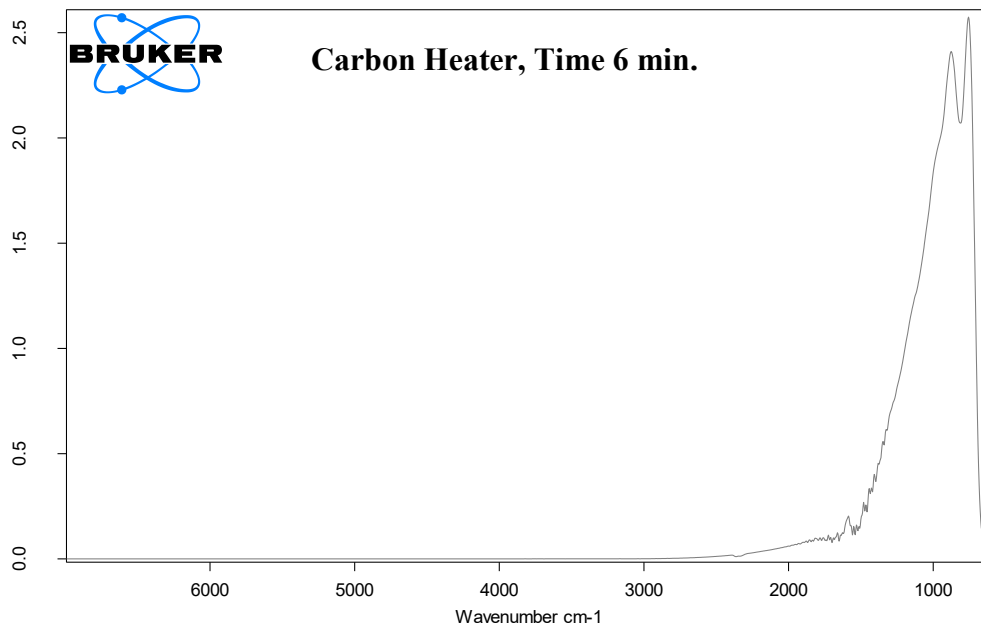
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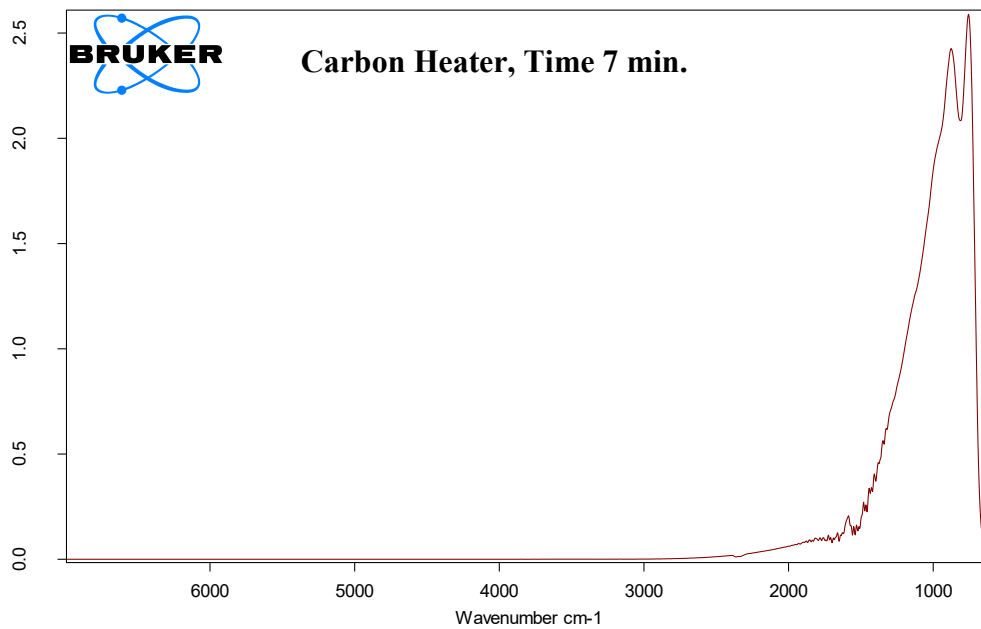
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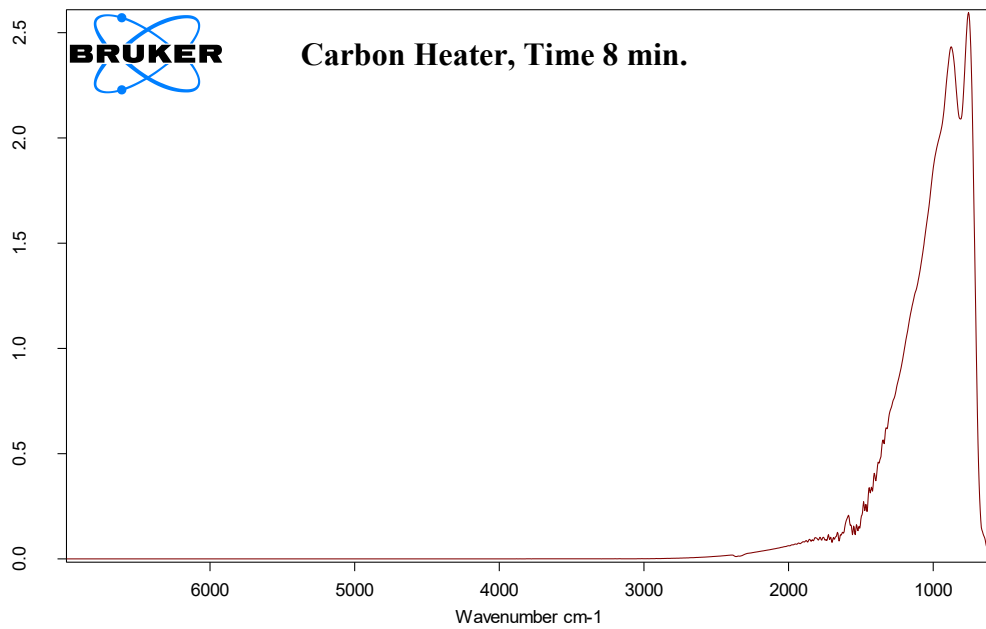
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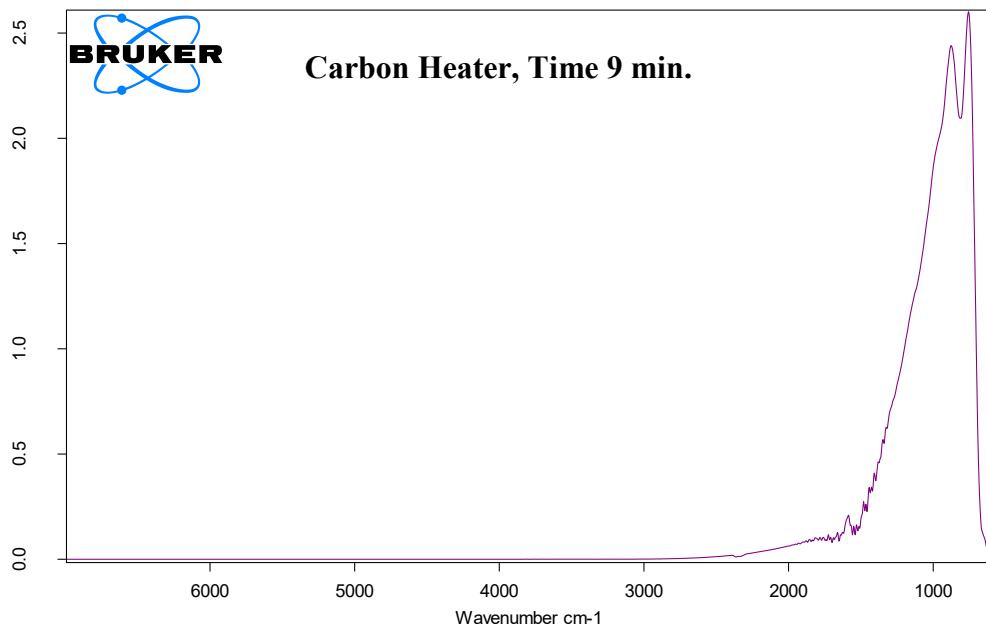
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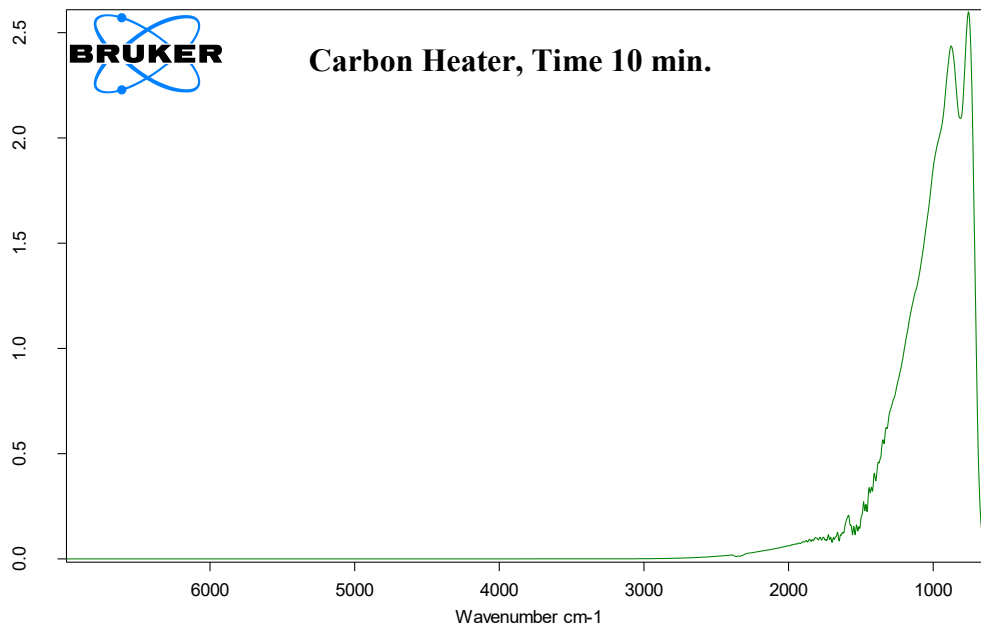
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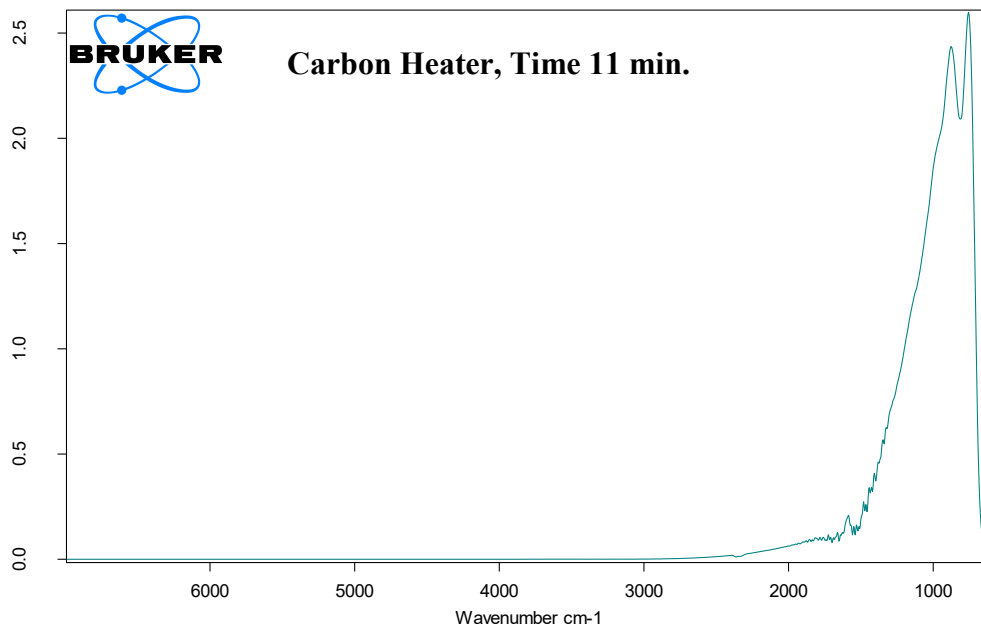
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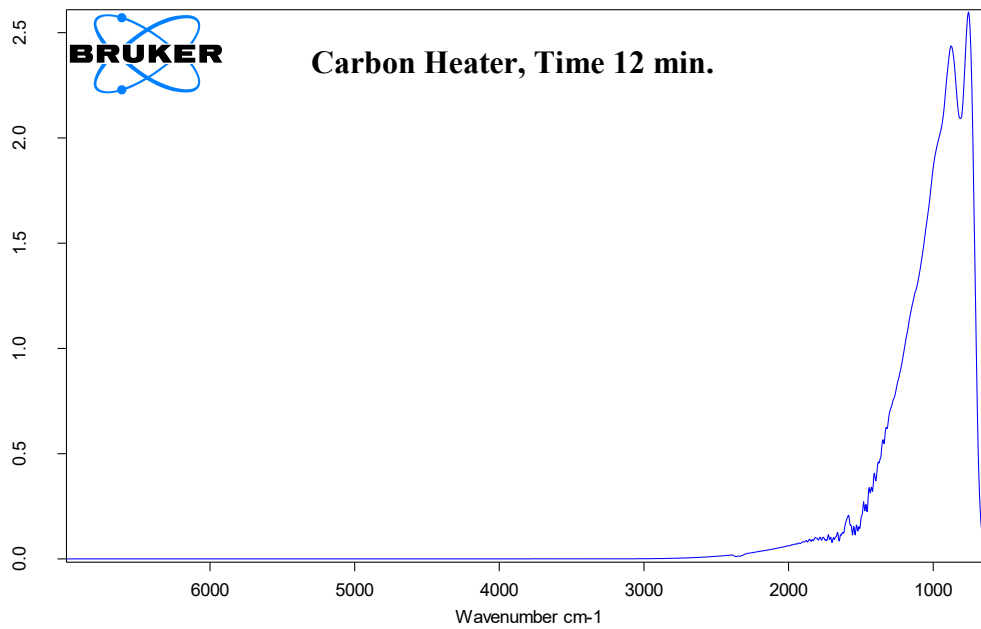
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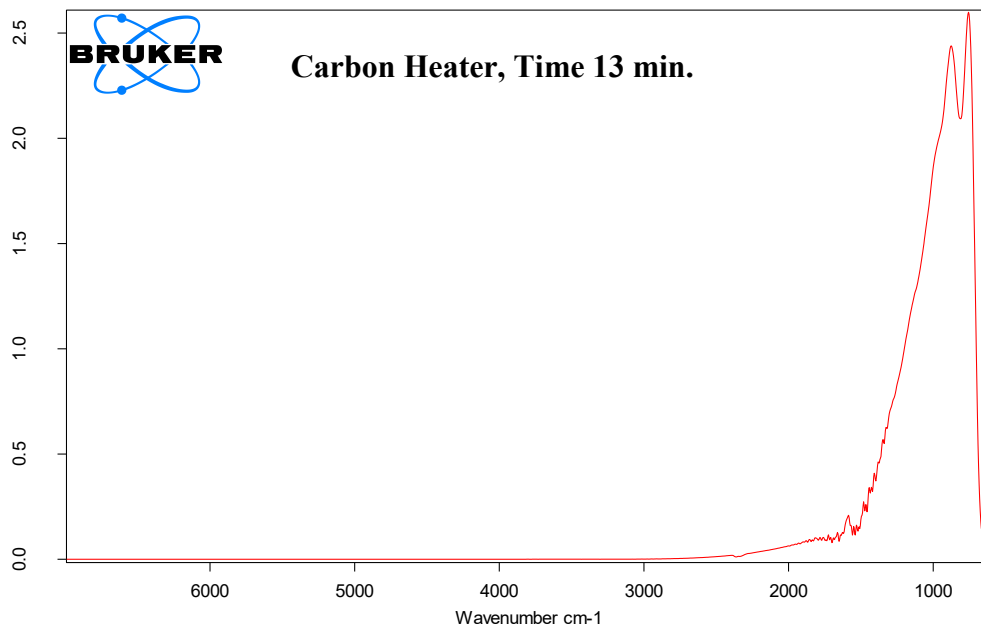
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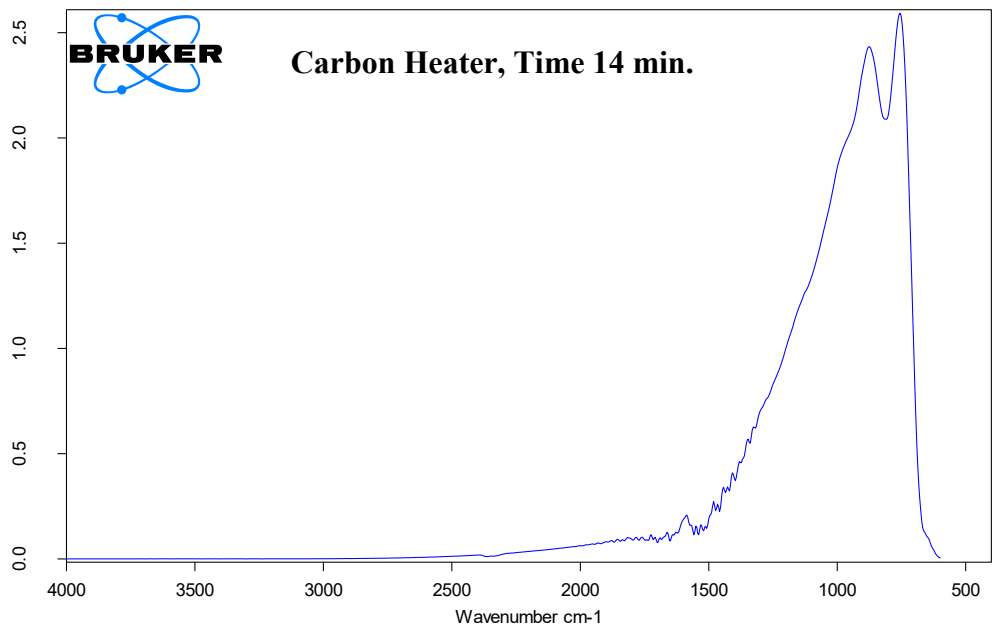
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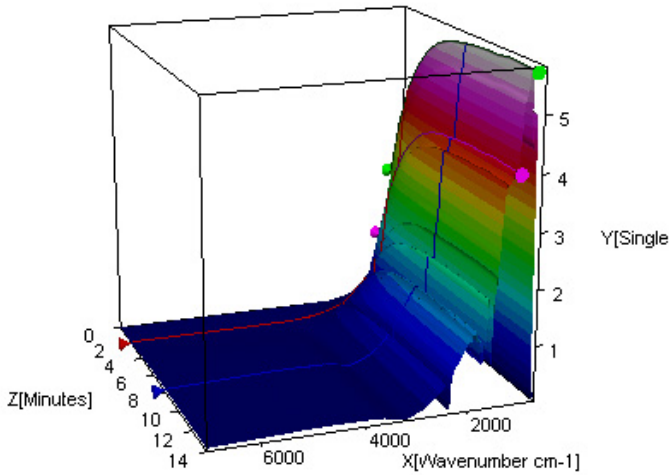
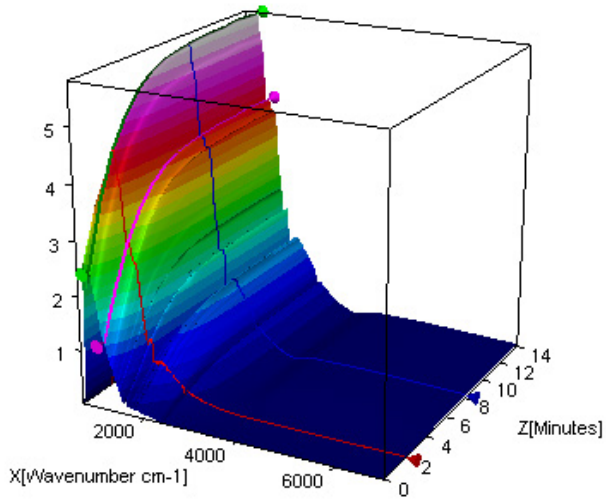


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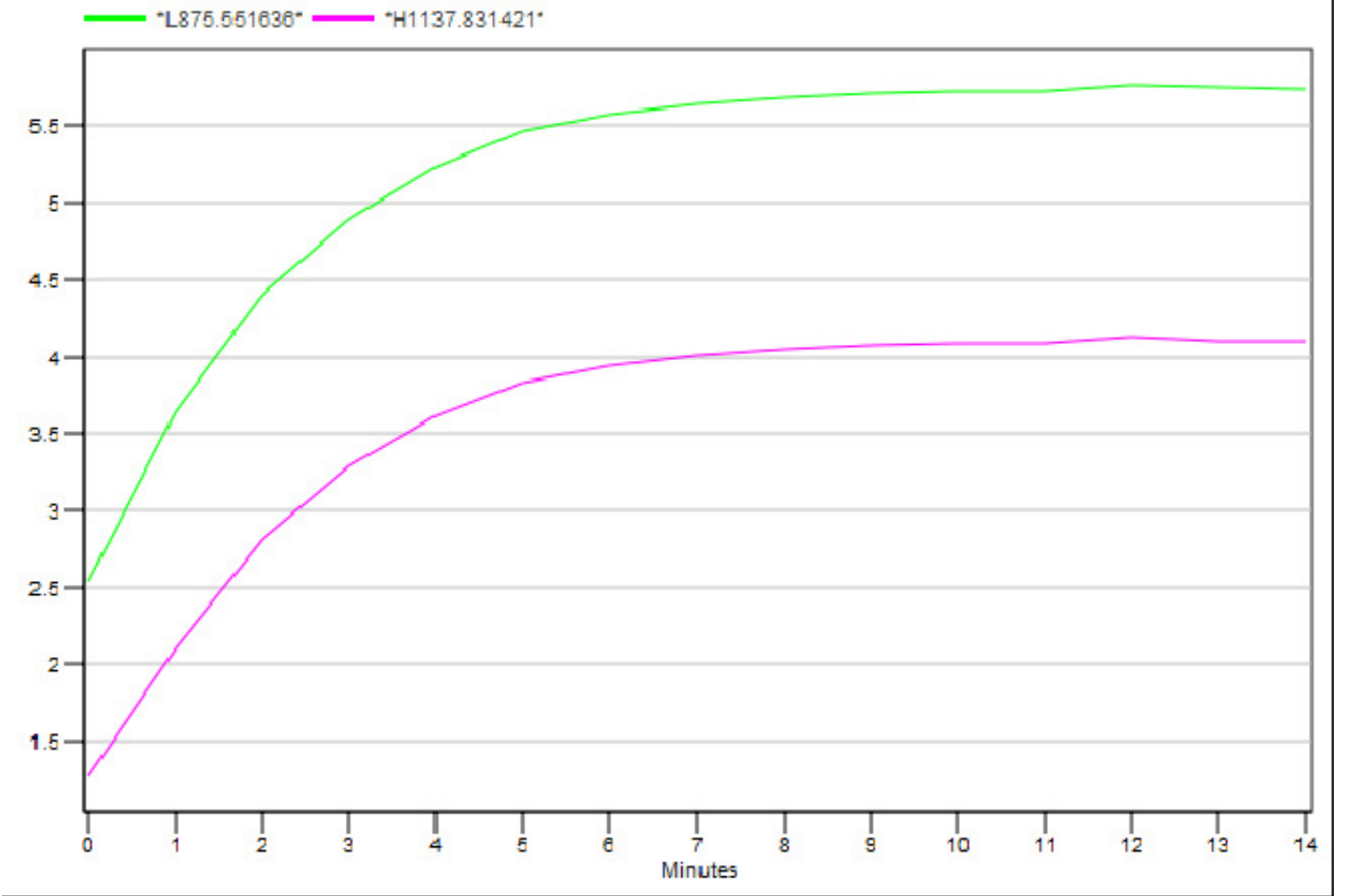


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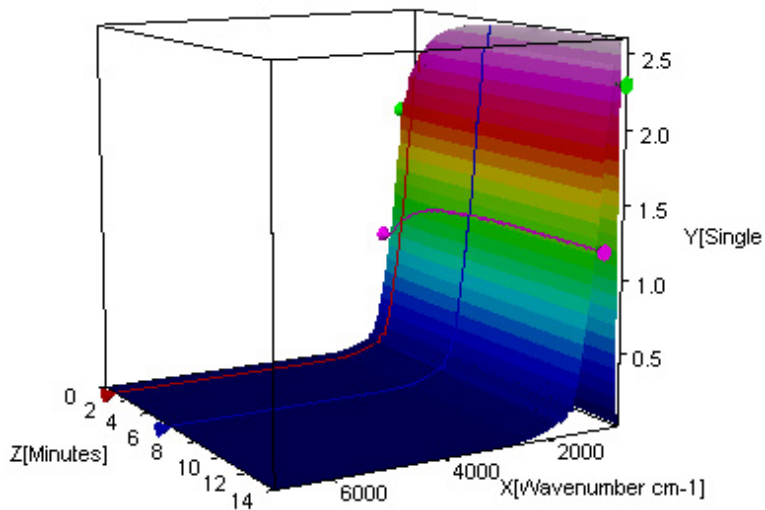
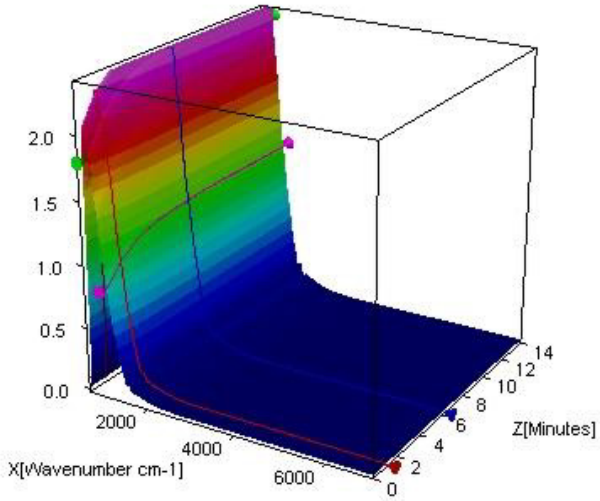
## Ceramic Heater 3D Graphs

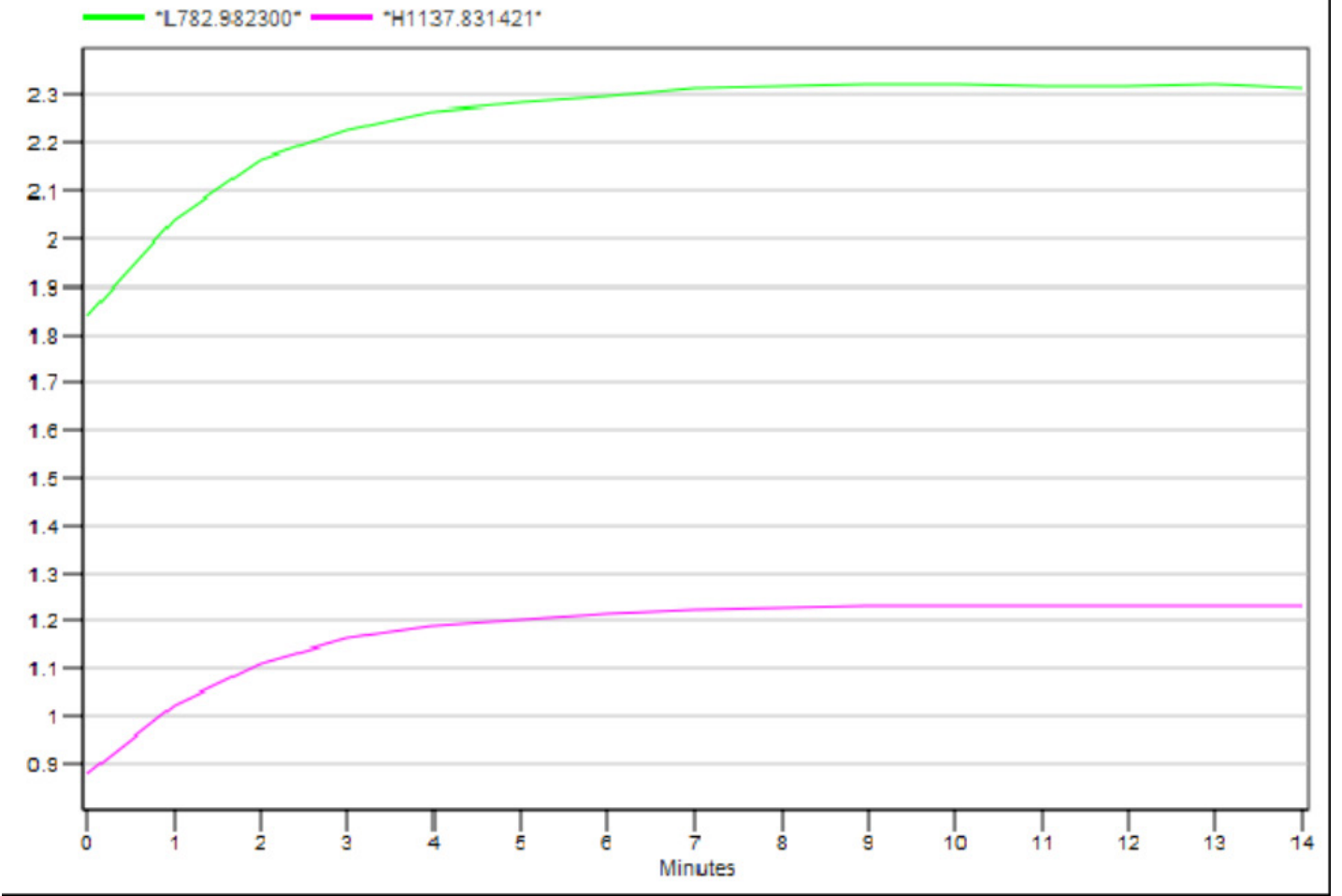






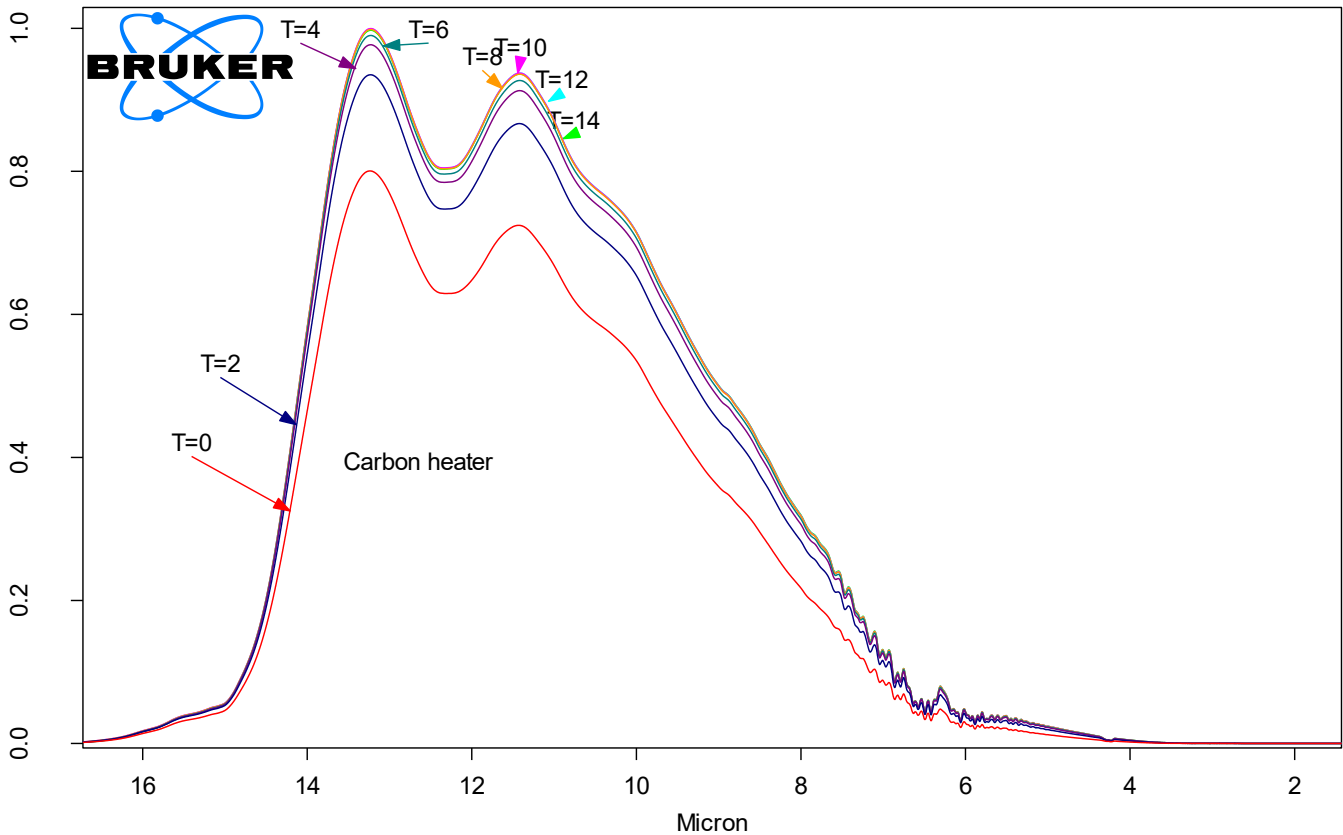
## Carbon Heater 3D Graph





The data collected is a relative quantification of the emission at each frequency, as a function of temperature. It shows how the output varies in relative intensity across the frequency range. As requested, the data for all temperatures for both the carbon and ceramic heaters was normalized to a maximum of 1 and the x axis is shown in microns.

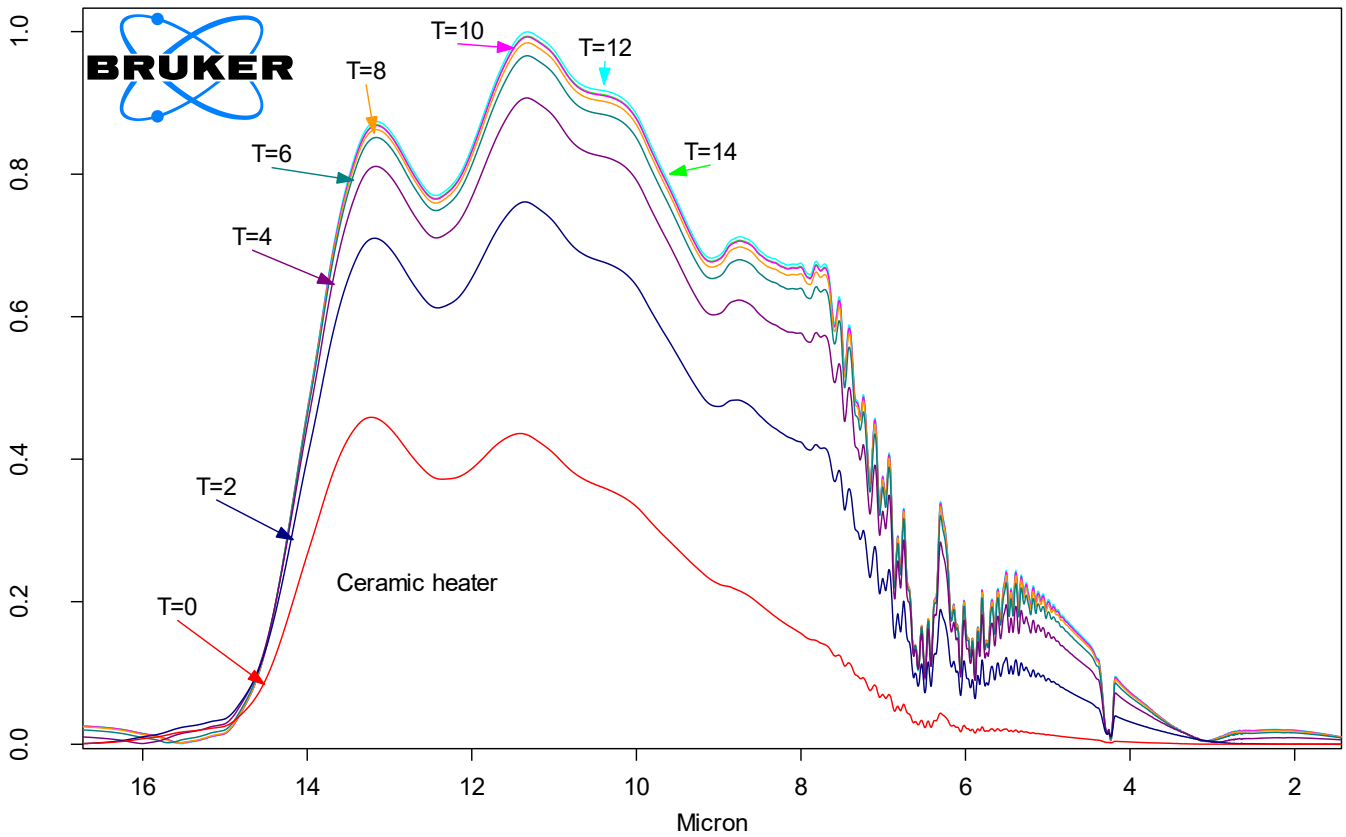
Carbon Heater, all temperatures.



\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0000	Ceramic	Instrument type and / or accession	6/25/2019
\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0002	Ceramic	Instrument type and / or accession	6/25/2019
\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0004	Ceramic	Instrument type and / or accession	6/25/2019
\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0006	Ceramic	Instrument type and / or accession	6/25/2019
\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0008	Ceramic	Instrument type and / or accession	6/25/2019
\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0010	Ceramic	Instrument type and / or accession	6/25/2019
\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0012	Ceramic	Instrument type and / or accession	6/25/2019
\\MV_SVR\Clients\Good Health Saunas\12015\EM27 Ceramic emitters\Carbon heater 0014	Ceramic	Instrument type and / or accession	6/25/2019

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Ceramic Heater – all temperatures



\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0000	Ceramic	Instrument type and / or	6/25/2019
\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0002	Ceramic	Instrument type and / or	6/25/2019
\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0004	Ceramic	Instrument type and / or	6/25/2019
\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0006	Ceramic	Instrument type and / or	6/25/2019
\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0008	Ceramic	Instrument type and / or	6/25/2019
\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0010	Ceramic	Instrument type and / or	6/25/2019
\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0012	Ceramic	Instrument type and / or	6/25/2019
\\MV\SVP\Clients\Good Health Saunas\12015\EM27_Ceramic emitters\Ceramic heater 95 run 2 0014	Ceramic	Instrument type and / or	6/25/2019

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Please let us know if you need any further assistance.

Sincerely,

John Knowles  
 President  
 MicroVision Labs, Inc.