

**FTIRPros LLC**

# Polystyrene Standard Evaluation and Spectrometer Performance Validation and Qualification

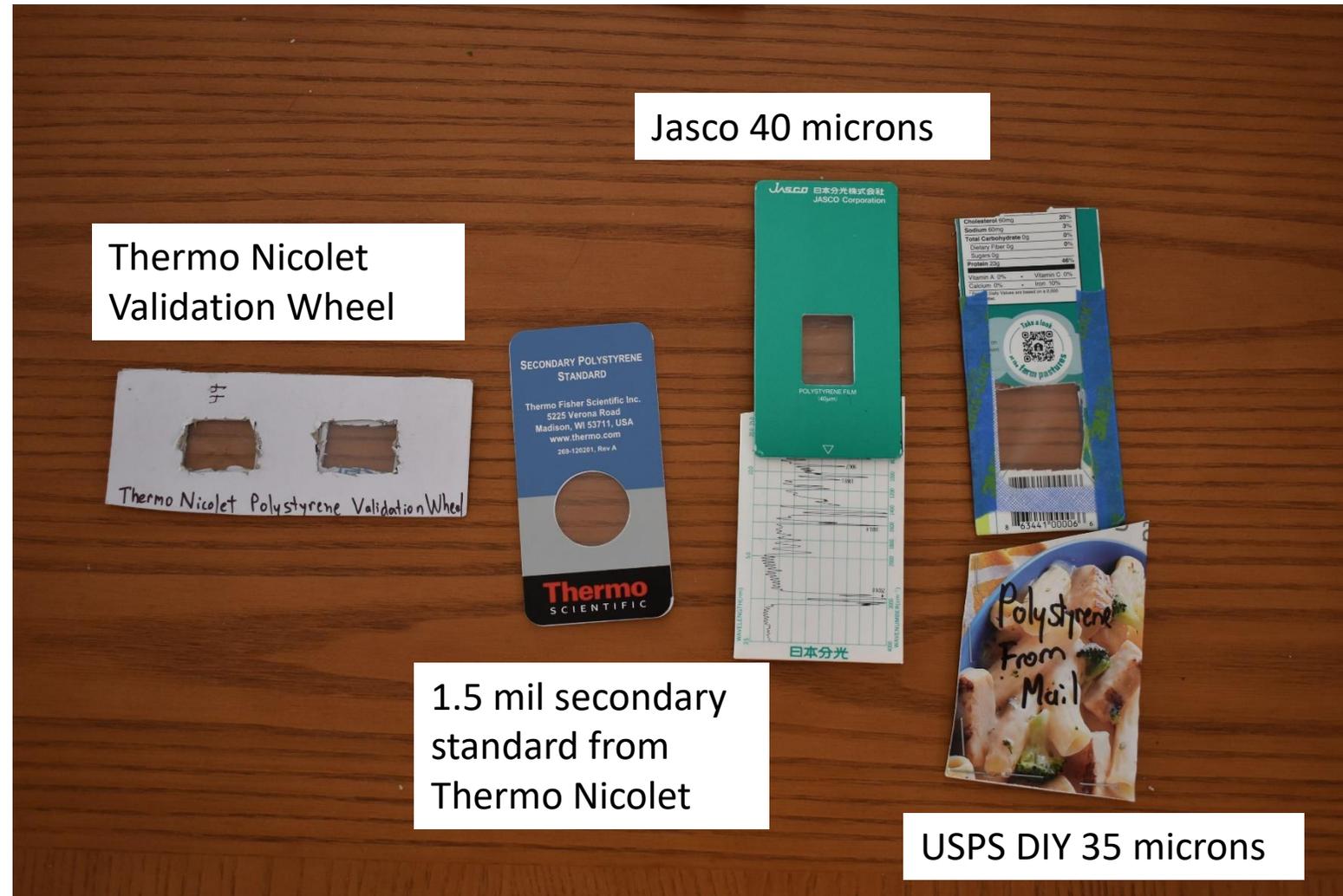
# Polystyrene Film Standards

4 Polystyrene standards were used to test spectral accuracy and resolution by gathering all accepted methods. 5 replicates were taken in succession for each type.

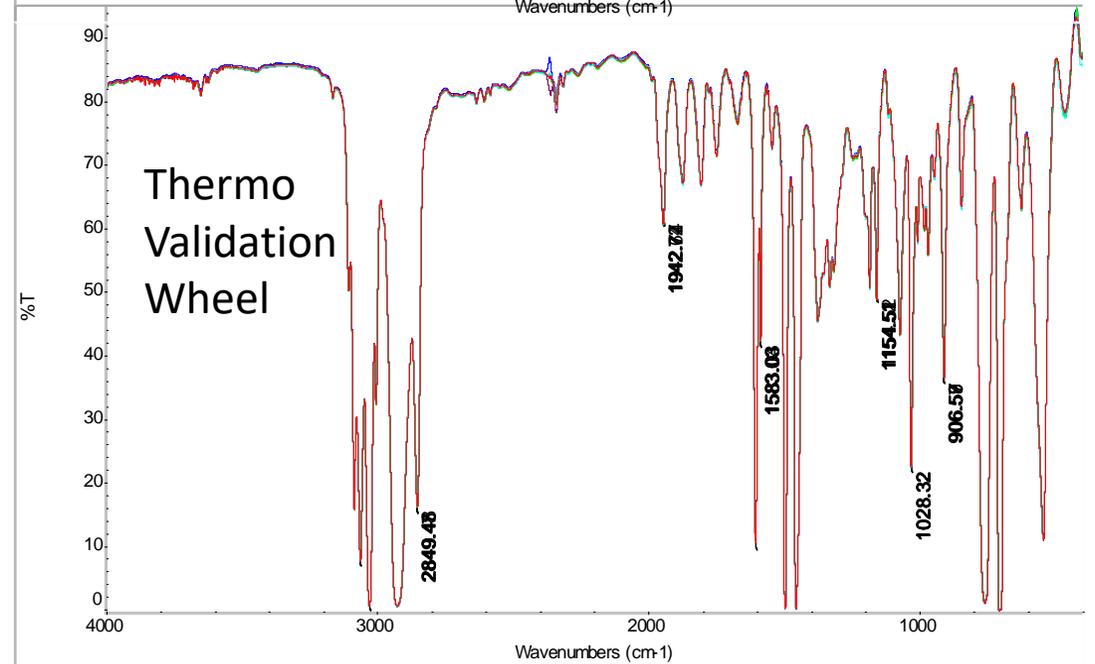
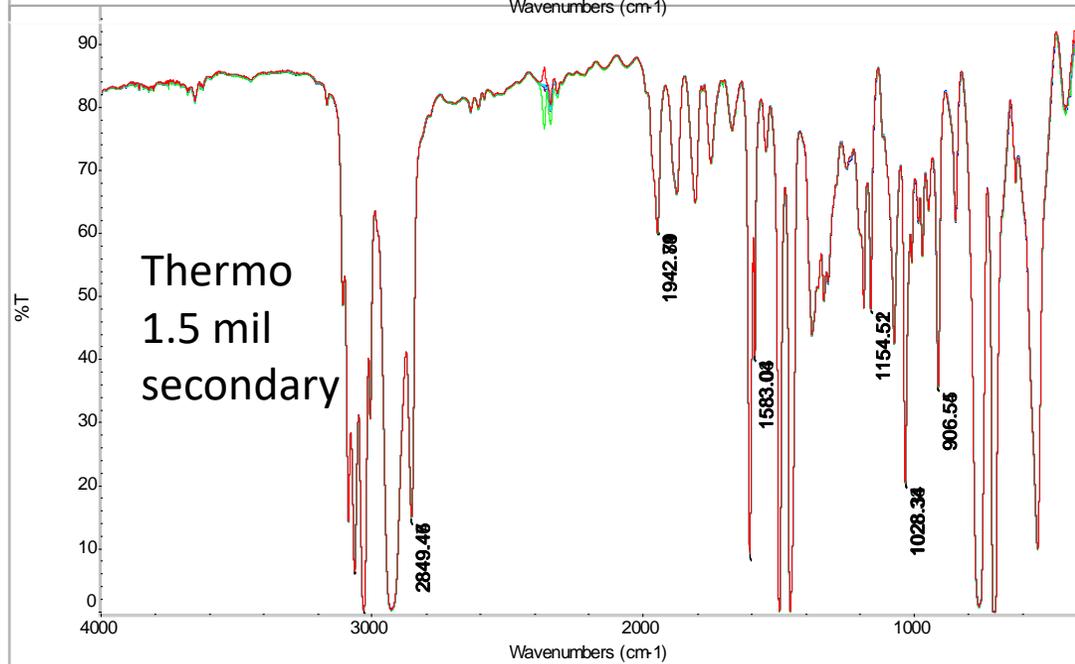
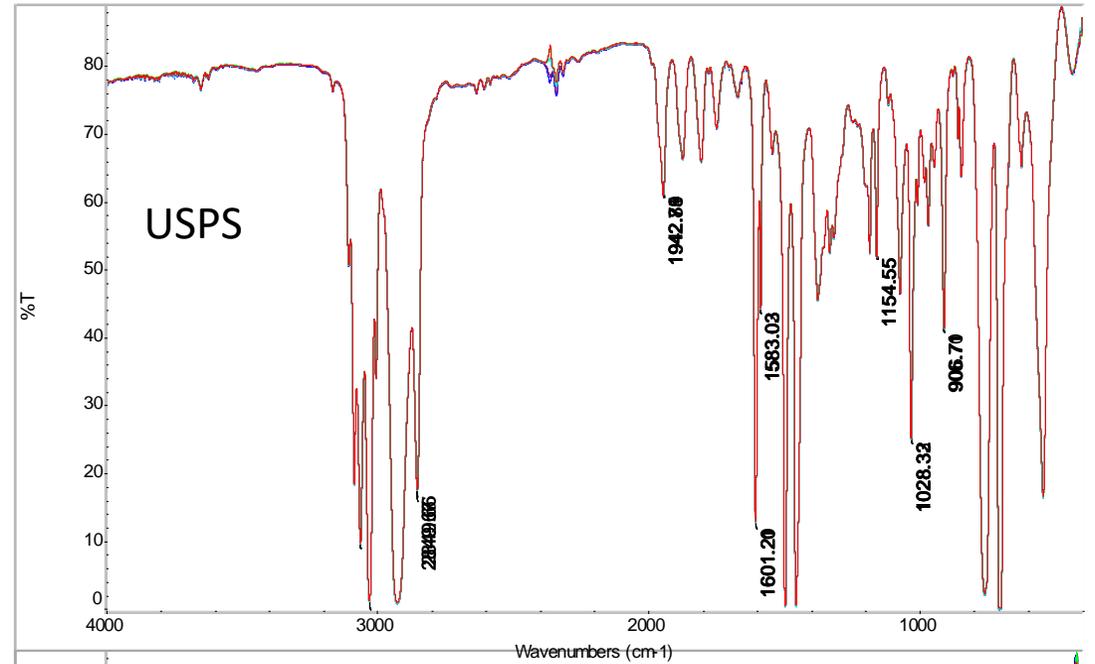
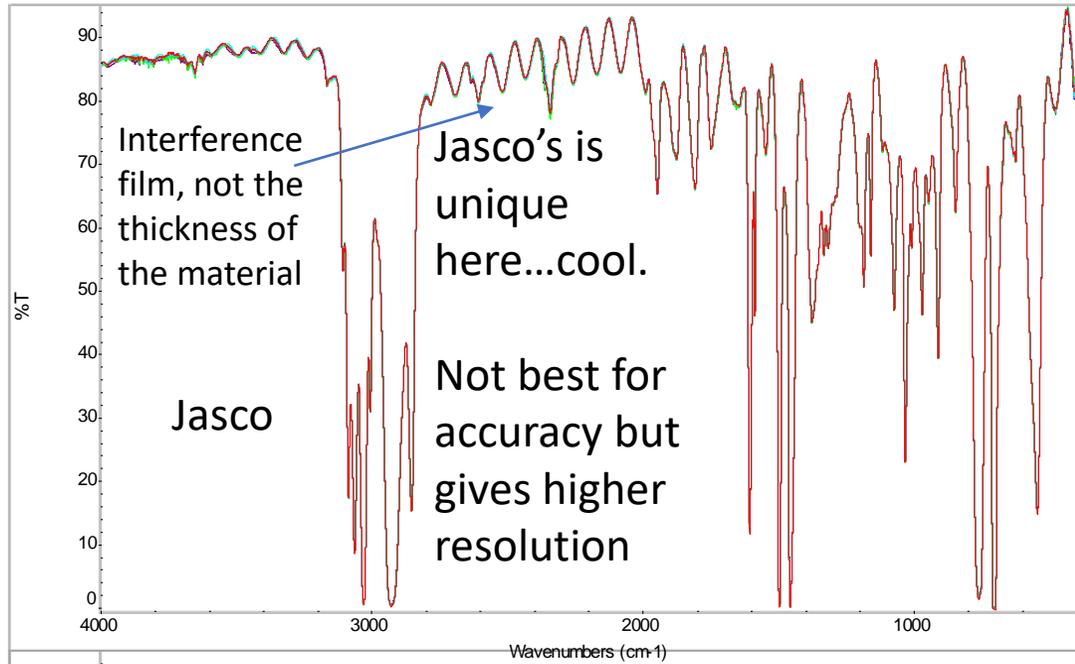
Wavelength accuracy is  $< \pm 0.5 \text{ cm}^{-1}$  vs. the specification of  $\pm 1.0 \text{ cm}^{-1}$ . Repeatability is .4%, beating the .5% specification.

We ranked the standards from best to worst using sum of squares...

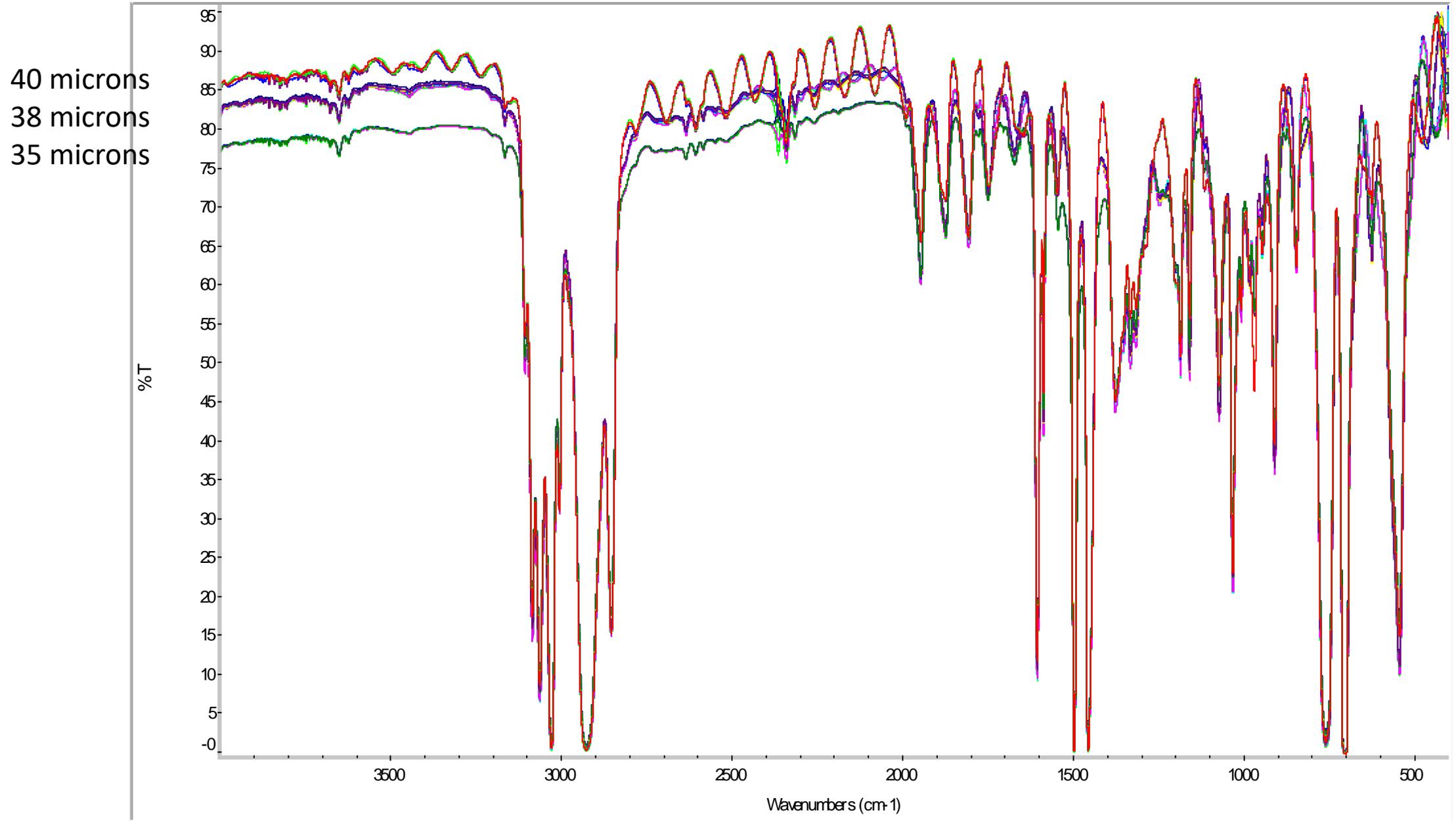
- 1) Thermo 1.5 mil secondary standard
- 2) ThermoValWheel
- 3) USPS
- 4) Jasco



The Jasco standard has an interference film on this that makes it uniquely not-great. It does have slightly improved resolution.



All spectra on a common scale showing effect of film thickness on overall transmissivity



38 microns : Both Thermo samples overlap here, so obviously what I thought was 44 microns is likely 38 microns.

# Principle Component Scores...

## How different are these from one another?

Best performer wrt wavelength and resolution

Thermo  
1.5 mil secondary

+++

Very similar to the other Thermo standard that comes in second place wrt wavelength

Thermo  
Validation Wheel

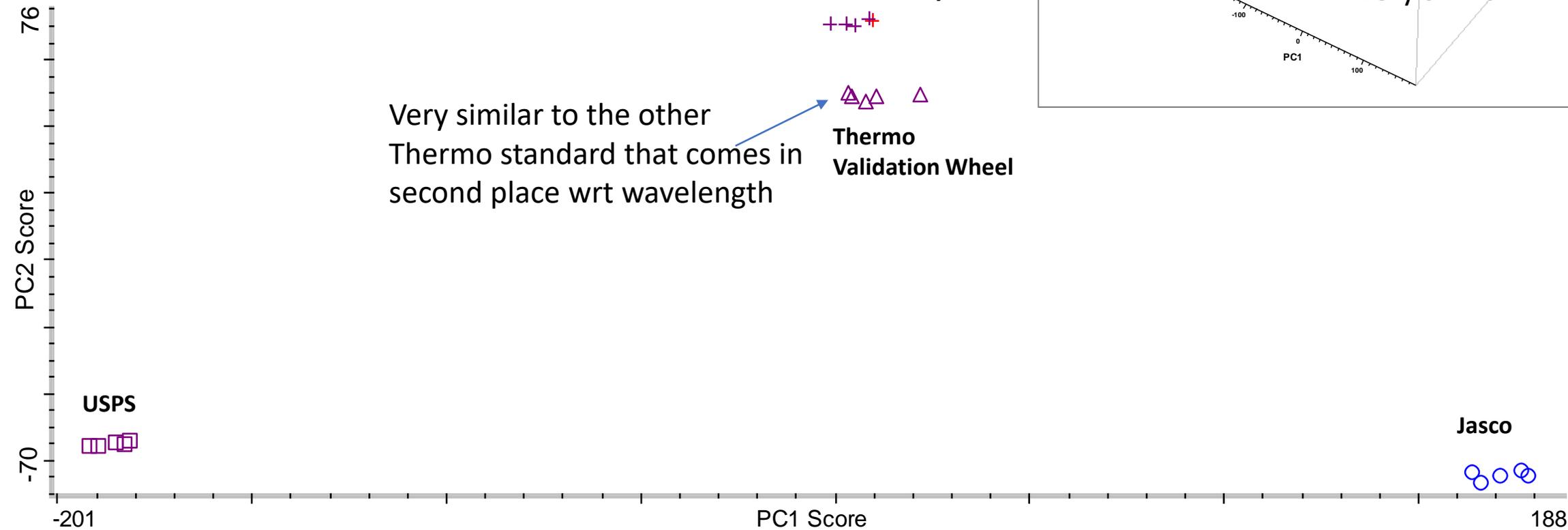
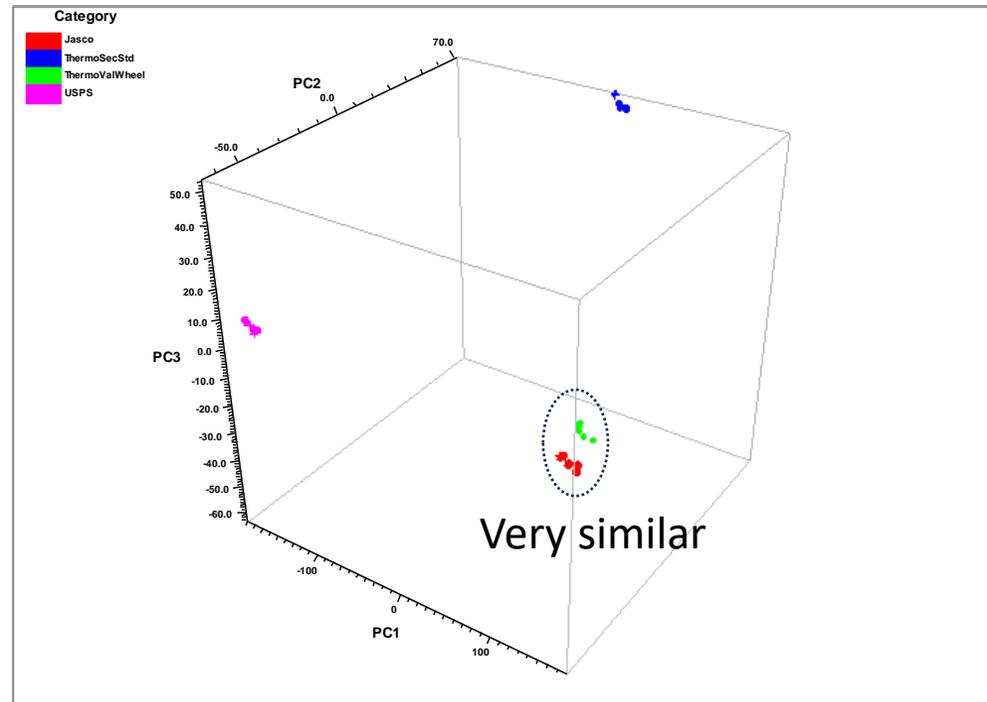
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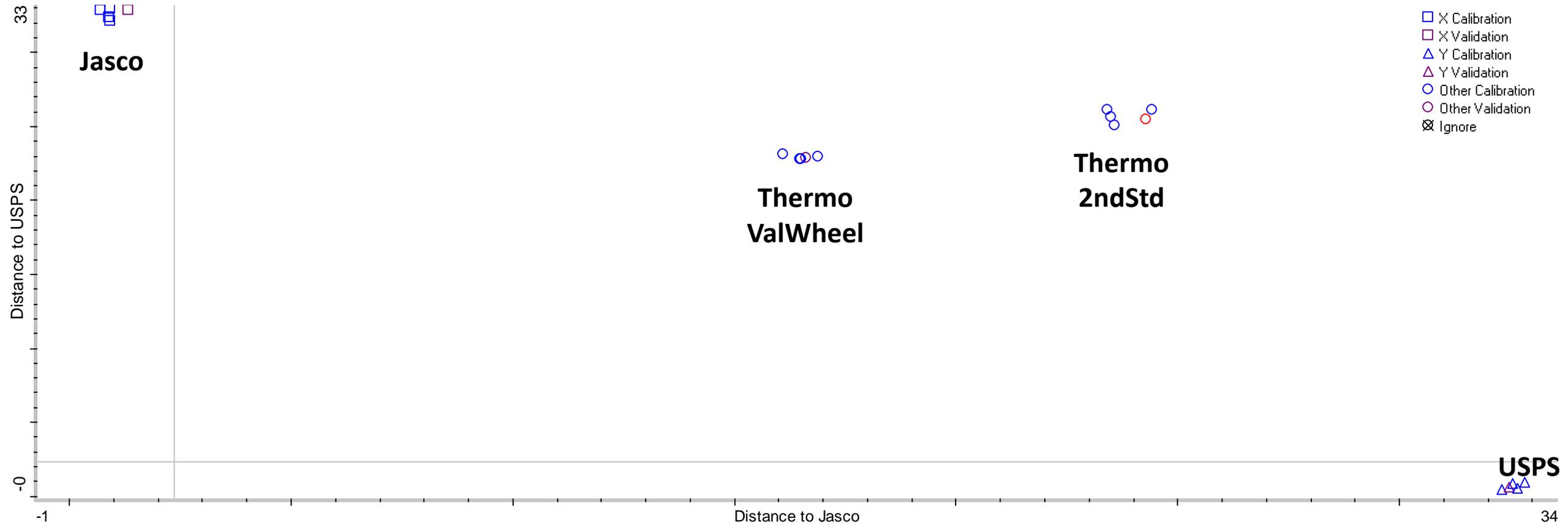
USPS

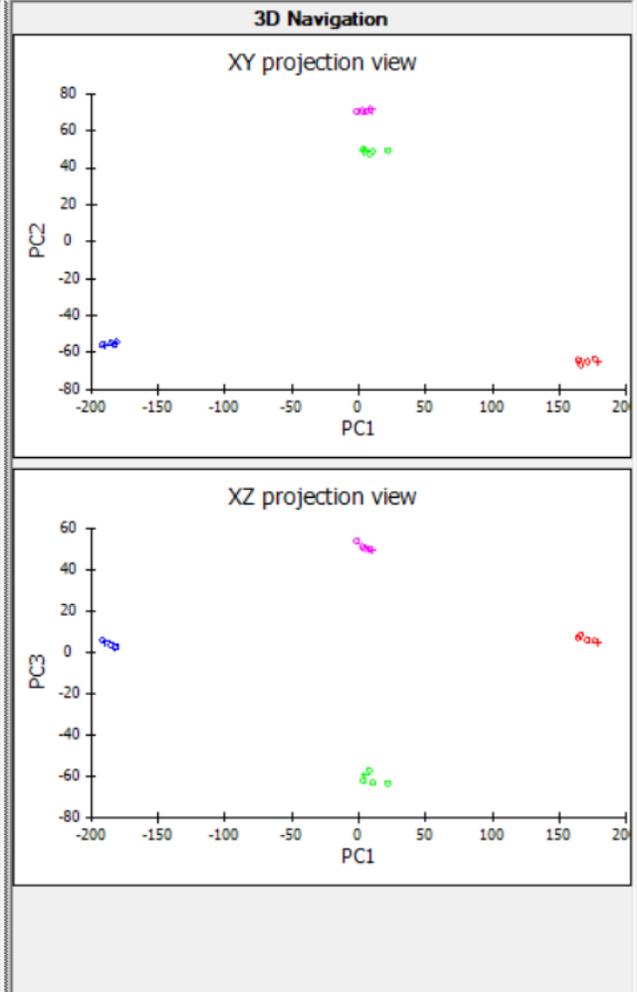
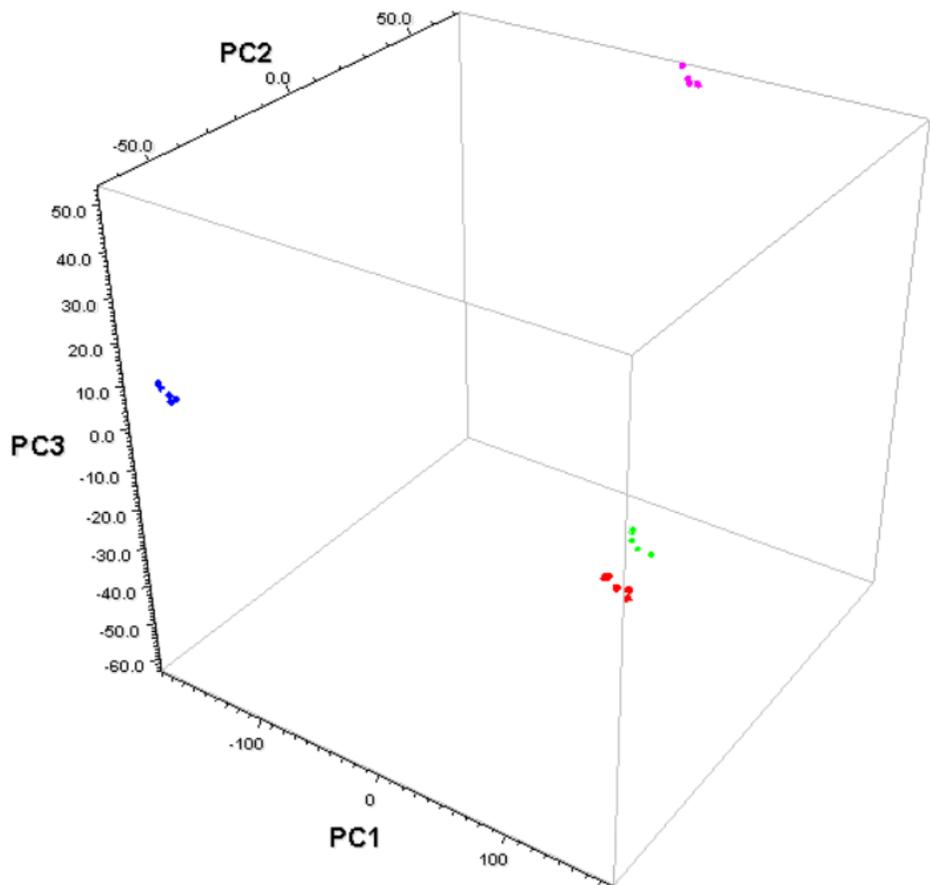
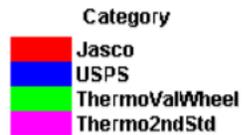
□□□

Jasco

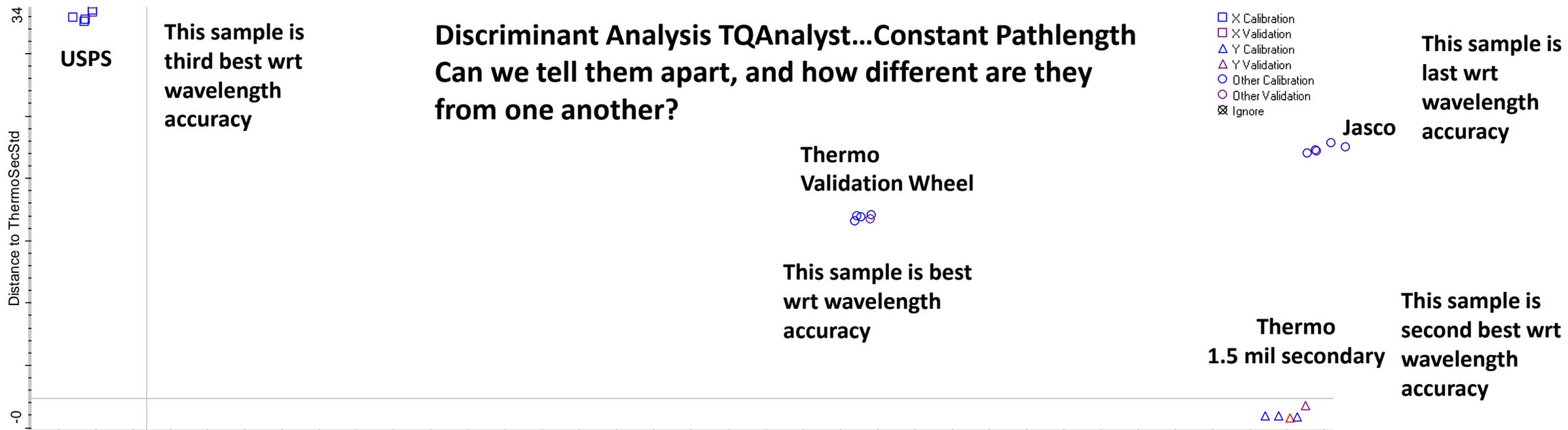
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The Thermo samples are very well matched, but distinguishable.



Index	Title	Usage	Actual class	Distance to USPS	Mismatch	Calculated class	Calculated distance	Next class	Next distance
2	Thermo 1.5 mil secondary PS 5	Calibration	ThermoSecStd			ThermoSecStd	0.8274	ThermoValWheel	17.3291
3	Thermo 1.5 mil secondary PS 4	Calibration	ThermoSecStd			ThermoSecStd	0.8717	ThermoValWheel	16.9772
4	Thermo 1.5 mil secondary PS 3	Validation	ThermoSecStd			ThermoSecStd	1.8032	ThermoValWheel	17.1935
5	Thermo 1.5 mil secondary S 2	Calibration	ThermoSecStd			ThermoSecStd	0.9151	ThermoValWheel	16.423
6	Thermo 1.5 mil secondary PS	Calibration	ThermoSecStd			ThermoSecStd	0.9421	ThermoValWheel	16.707
7	Thermo Validation Wheel PS 44 microns 5	Calibration	ThermoValWheel			ThermoValWheel	0.911	ThermoSecStd	17.074
8	Thermo Validation Wheel PS 44 microns 4	Validation	ThermoValWheel			ThermoValWheel	1.0196	ThermoSecStd	16.7106
9	Thermo Validation Wheel PS 44 microns 3	Calibration	ThermoValWheel			ThermoValWheel	0.9478	ThermoSecStd	16.8715
10	Thermo Validation Wheel PS 44 micros 2	Calibration	ThermoValWheel			ThermoValWheel	0.9424	ThermoSecStd	16.5807
11	Thermo Validation Wheel PS 44 micros	Calibration	ThermoValWheel			ThermoValWheel	0.933	ThermoSecStd	16.9289
12	USPS 35 micron 5	Calibration	USPS			USPS	0.6977	ThermoValWheel	21.357
13	USPS 35 micron 4	Calibration	USPS			USPS	0.7299	ThermoValWheel	21.3428
14	USPS 35 micron 3	Calibration	USPS			USPS	0.3975	ThermoValWheel	21.5367
15	USPS 35 micron 2	Validation	USPS			USPS	0.9117	ThermoValWheel	21.8329
16	USPS 35 micron 1	Calibration	USPS			USPS	0.9165	ThermoValWheel	22.0032
17	Jasco PS 40 microns 5	Calibration	Jasco			Jasco	0.8663	ThermoValWheel	18.3727
18	Jasco PS 40 microns 4	Calibration	Jasco			Jasco	0.9052	ThermoValWheel	17.6678
19	Jasco PS 40 microns 3	Validation	Jasco			Jasco	1.1797	ThermoValWheel	17.9141
20	Jasco PS 40 microns 2	Calibration	Jasco			Jasco	0.9288	ThermoValWheel	17.9525
21	Jasco PS 40 microns 2	Calibration	Jasco			Jasco	0.9452	ThermoValWheel	18.6219

Sorting by calc distance and next distance...Thermo samples are more similar to one another than either the Jasco or USPS samples. Jasco and USPS are closer to ThermoValWheel than the Thermo2ndStd.

Index	Title	Usage	Actual class	Mismatch	Calculated class	Calculated distance	Next class	Next distance
5	Thermo 1.5 mil secondary PS 2	Calibration	ThermoSecStd		ThermoSecStd	0.9151	ThermoValWhe	16.423
10	Thermo Validation Wheel PS 44 micros 2	Calibration	ThermoValWheel		ThermoValWheel	0.9424	ThermoSecStd	16.5807
6	Thermo 1.5 mil secondary PS	Calibration	ThermoSecStd		ThermoSecStd	0.9421	ThermoValWhe	16.707
8	Thermo Validation Wheel PS 44 microns 4	Validation	ThermoValWheel		ThermoValWheel	1.0196	ThermoSecStd	16.7106
9	Thermo Validation Wheel PS 44 microns 3	Calibration	ThermoValWheel		ThermoValWheel	0.9478	ThermoSecStd	16.8715
11	Thermo Validation Wheel PS 44 micros	Calibration	ThermoValWheel		ThermoValWheel	0.933	ThermoSecStd	16.9289
3	Thermo 1.5 mil secondary PS 4	Calibration	ThermoSecStd		ThermoSecStd	0.8717	ThermoValWhe	16.9772
7	Thermo Validation Wheel PS 44 microns 5	Calibration	ThermoValWheel		ThermoValWheel	0.911	ThermoSecStd	17.074
4	Thermo 1.5 mil secondary PS 3	Validation	ThermoSecStd		ThermoSecStd	1.8032	ThermoValWhe	17.1935
2	Thermo 1.5 mil secondary PS 5	Calibration	ThermoSecStd		ThermoSecStd	0.8274	ThermoValWhe	17.3291
18	Jasco PS 40 microns 4	Calibration	Jasco		Jasco	0.9052	ThermoValWhe	17.6678
19	Jasco PS 40 microns 3	Validation	Jasco		Jasco	1.1797	ThermoValWhe	17.9141
20	Jasco PS 40 microns 2	Calibration	Jasco		Jasco	0.9288	ThermoValWhe	17.9525
17	Jasco PS 40 microns 5	Calibration	Jasco		Jasco	0.8663	ThermoValWhe	18.3727
21	Jasco PS 40 microns 2	Calibration	Jasco		Jasco	0.9452	ThermoValWhe	18.6219
13	USPS 35 micron 4	Calibration	USPS		USPS	0.7299	ThermoValWhe	21.3428
12	USPS 35 micron 5	Calibration	USPS		USPS	0.6977	ThermoValWhe	21.357
14	USPS 35 micron 3	Calibration	USPS		USPS	0.3975	ThermoValWhe	21.5367
15	USPS 35 micron 2	Validation	USPS		USPS	0.9117	ThermoValWhe	21.8329
16	USPS 35 micron 1	Calibration	USPS		USPS	0.9165	ThermoValWhe	22.0032

The similarity matching is seeing thickness.

Constant pathlength is chosen in the analysis.

Index	Title	Usage	Actual class	Mismatch	Calculated class	Calculated distance	Next class	Next distance
14	USPS 35 micron 3	Calibration	USPS		USPS	0.3975	ThermoValWhe	21.5367
12	USPS 35 micron 5	Calibration	USPS		USPS	0.6977	ThermoValWhe	21.357
13	USPS 35 micron 4	Calibration	USPS		USPS	0.7299	ThermoValWhe	21.3428
2	Thermo 1.5 mil secondary PS 5	Calibration	ThermoSecStd		ThermoSecStd	0.8274	ThermoValWhe	17.3291
17	Jasco PS 40 microns 5	Calibration	Jasco		Jasco	0.8663	ThermoValWhe	18.3727
3	Thermo 1.5 mil secondary PS 4	Calibration	ThermoSecStd		ThermoSecStd	0.8717	ThermoValWhe	16.9772
18	Jasco PS 40 microns 4	Calibration	Jasco		Jasco	0.9052	ThermoValWhe	17.6678
7	Thermo Validation Wheel PS 44 microns 5	Calibration	ThermoValWheel		ThermoValWheel	0.911	ThermoSecStd	17.074
15	USPS 35 micron 2	Validation	USPS		USPS	0.9117	ThermoValWhe	21.8329
5	Thermo 1.5 mil secondary PS 2	Calibration	ThermoSecStd		ThermoSecStd	0.9151	ThermoValWhe	16.423
16	USPS 35 micron 1	Calibration	USPS		USPS	0.9165	ThermoValWhe	22.0032
20	Jasco PS 40 microns 2	Calibration	Jasco		Jasco	0.9288	ThermoValWhe	17.9525
11	Thermo Validation Wheel PS 44 micros	Calibration	ThermoValWheel		ThermoValWheel	0.933	ThermoSecStd	16.9289
6	Thermo 1.5 mil secondary PS	Calibration	ThermoSecStd		ThermoSecStd	0.9421	ThermoValWhe	16.707
10	Thermo Validation Wheel PS 44 micros 2	Calibration	ThermoValWheel		ThermoValWheel	0.9424	ThermoSecStd	16.5807
21	Jasco PS 40 microns 2	Calibration	Jasco		Jasco	0.9452	ThermoValWhe	18.6219
9	Thermo Validation Wheel PS 44 microns 3	Calibration	ThermoValWheel		ThermoValWheel	0.9478	ThermoSecStd	16.8715
8	Thermo Validation Wheel PS 44 microns 4	Validation	ThermoValWheel		ThermoValWheel	1.0196	ThermoSecStd	16.7106
19	Jasco PS 40 microns 3	Validation	Jasco		Jasco	1.1797	ThermoValWhe	17.9141
4	Thermo 1.5 mil secondary PS 3	Validation	ThermoSecStd		ThermoSecStd	1.8032	ThermoValWhe	17.1935

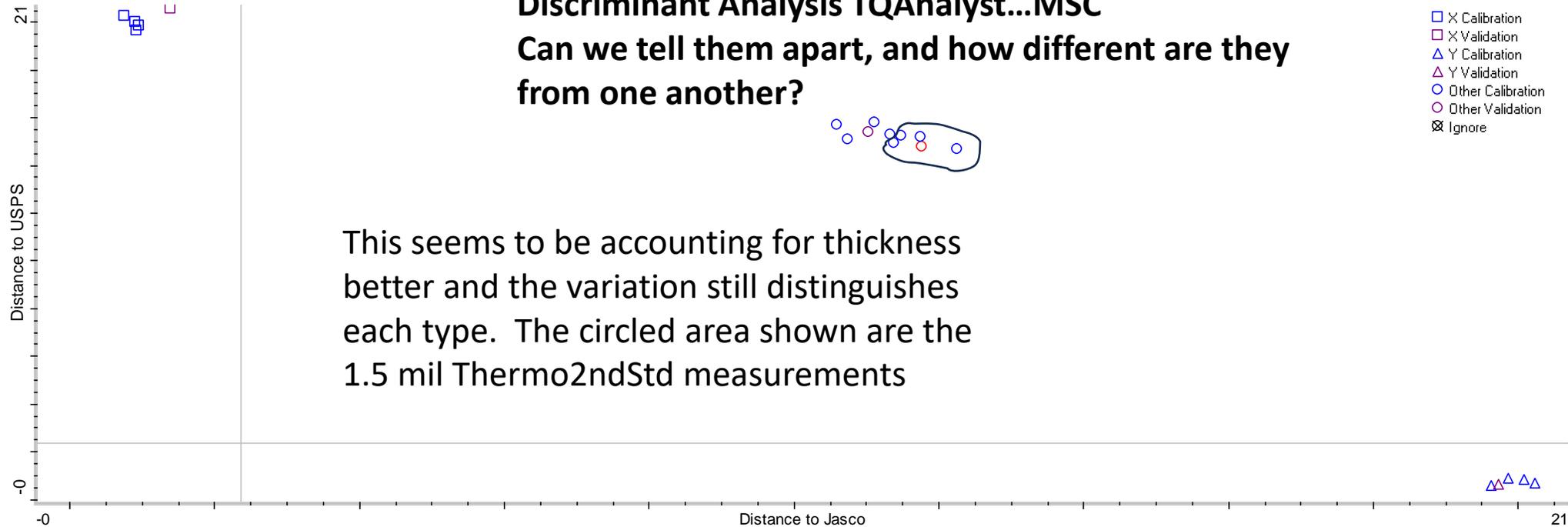
# Discriminant Analysis TQAnalyst...MSC

Can we tell them apart, and how different are they from one another?



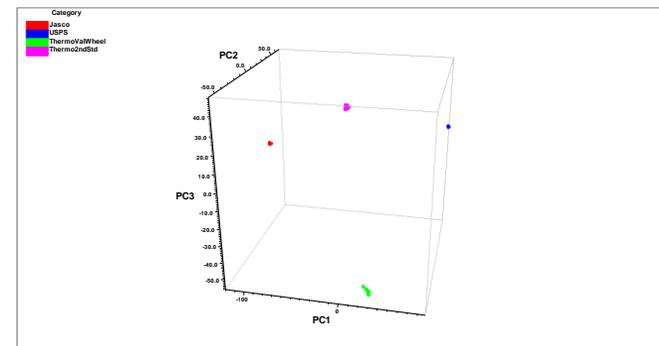
This seems to be accounting for thickness better and the variation still distinguishes each type. The circled area shown are the 1.5 mil Thermo2ndStd measurements

- × Calibration
- × Validation
- △ Y Calibration
- △ Y Validation
- Other Calibration
- Other Validation
- ⊗ Ignore



Index	Title	Usage	Actual class	Mismatch	Calculated class	Calculated distance	Next class	Next distance
1	Thermo 1.5 mil secondary PS 5	Validation	Thermo2ndStd		Thermo2ndStd	1.0855	ThermoValWheel	6.4618
2	Thermo 1.5 mil secondary PS 4	Calibration	Thermo2ndStd		Thermo2ndStd	0.7888	ThermoValWheel	6.4277
3	Thermo 1.5 mil secondary PS 3	Calibration	Thermo2ndStd		Thermo2ndStd	0.8269	ThermoValWheel	6.1963
4	Thermo 1.5 mil secondary PS 2	Calibration	Thermo2ndStd		Thermo2ndStd	0.9423	ThermoValWheel	6.3934
5	Thermo 1.5 mil secondary PS	Calibration	Thermo2ndStd		Thermo2ndStd	0.9423	ThermoValWheel	6.1904
6	Thermo Validation Wheel PS 44 microns 5	Calibration	ThermoValWheel		ThermoValWheel	0.8987	Thermo2ndStd	6.4068
7	Thermo Validation Wheel PS 44 microns 4	Validation	ThermoValWheel		ThermoValWheel	0.7915	Thermo2ndStd	6.4005
8	Thermo Validation Wheel PS 44 microns 3	Calibration	ThermoValWheel		ThermoValWheel	0.9431	Thermo2ndStd	6.2975
9	Thermo Validation Wheel PS 44 micros 2	Calibration	ThermoValWheel		ThermoValWheel	0.9263	Thermo2ndStd	5.7413
10	Thermo Validation Wheel PS 44 micros	Calibration	ThermoValWheel		ThermoValWheel	0.9433	Thermo2ndStd	6.7528
11	USPS 35 micron 5	Calibration	USPS		USPS	0.8505	Thermo2ndStd	15.1741
12	USPS 35 micron 4	Calibration	USPS		USPS	0.5872	Thermo2ndStd	14.6797
13	USPS 35 micron 3	Validation	USPS		USPS	0.6175	Thermo2ndStd	14.9438
14	USPS 35 micron 2	Calibration	USPS		USPS	0.6673	Thermo2ndStd	15.0253
15	USPS 35 micron 1	Calibration	USPS		USPS	0.9124	Thermo2ndStd	15.1876
16	Jasco PS 40 microns 5	Calibration	Jasco		Jasco	0.7547	ThermoValWheel	10.866
17	Jasco PS 40 microns 4	Calibration	Jasco		Jasco	0.9221	ThermoValWheel	10.7428
18	Jasco PS 40 microns 3	Calibration	Jasco		Jasco	0.9014	ThermoValWheel	11.345
19	Jasco PS 40 microns 2	Validation	Jasco		Jasco	1.3965	ThermoValWheel	11.6831
20	Jasco PS 40 microns 2	Calibration	Jasco		Jasco	0.9461	ThermoValWheel	10.8219

The principle components look well separated



Sorting by calc distance and next distance...Thermo samples are more similar to one another. The Jasco sample is closer to the ThermoValWheel as the USPS sample is closer to the Thermo2ndStd.

Index	Title	Usage	Actual class	Mismatch	Calculated class	Calculated distance	Next class	Next distance
9	Thermo Validation Wheel PS 44 micros 2	Calibration	ThermoValWheel		ThermoValWheel	0.9263	Thermo2ndStd	5.7413
5	Thermo 1.5 mil secondary PS	Calibration	Thermo2ndStd		Thermo2ndStd	0.9423	ThermoValWheel	6.1904
3	Thermo 1.5 mil secondary PS 3	Calibration	Thermo2ndStd		Thermo2ndStd	0.8269	ThermoValWheel	6.1963
8	Thermo Validation Wheel PS 44 microns 3	Calibration	ThermoValWheel		ThermoValWheel	0.9431	Thermo2ndStd	6.2975
4	Thermo 1.5 mil secondary PS 2	Calibration	Thermo2ndStd		Thermo2ndStd	0.9423	ThermoValWheel	6.3934
7	Thermo Validation Wheel PS 44 microns 4	Validation	ThermoValWheel		ThermoValWheel	0.7915	Thermo2ndStd	6.4005
6	Thermo Validation Wheel PS 44 microns 5	Calibration	ThermoValWheel		ThermoValWheel	0.8987	Thermo2ndStd	6.4068
2	Thermo 1.5 mil secondary PS 4	Calibration	Thermo2ndStd		Thermo2ndStd	0.7888	ThermoValWheel	6.4277
1	Thermo 1.5 mil secondary PS 5	Validation	Thermo2ndStd		Thermo2ndStd	1.0855	ThermoValWheel	6.4618
10	Thermo Validation Wheel PS 44 micros	Calibration	ThermoValWheel		ThermoValWheel	0.9433	Thermo2ndStd	6.7528
17	Jasco PS 40 microns 4	Calibration	Jasco		Jasco	0.9221	ThermoValWheel	10.7428
20	Jasco PS 40 microns 2	Calibration	Jasco		Jasco	0.9461	ThermoValWheel	10.8219
16	Jasco PS 40 microns 5	Calibration	Jasco		Jasco	0.7547	ThermoValWheel	10.866
18	Jasco PS 40 microns 3	Calibration	Jasco		Jasco	0.9014	ThermoValWheel	11.345
19	Jasco PS 40 microns 2	Validation	Jasco		Jasco	1.3965	ThermoValWheel	11.6831
12	USPS 35 micron 4	Calibration	USPS		USPS	0.5872	Thermo2ndStd	14.6797
13	USPS 35 micron 3	Validation	USPS		USPS	0.6175	Thermo2ndStd	14.9438
14	USPS 35 micron 2	Calibration	USPS		USPS	0.6673	Thermo2ndStd	15.0253
11	USPS 35 micron 5	Calibration	USPS		USPS	0.8505	Thermo2ndStd	15.1741
15	USPS 35 micron 1	Calibration	USPS		USPS	0.9124	Thermo2ndStd	15.1876

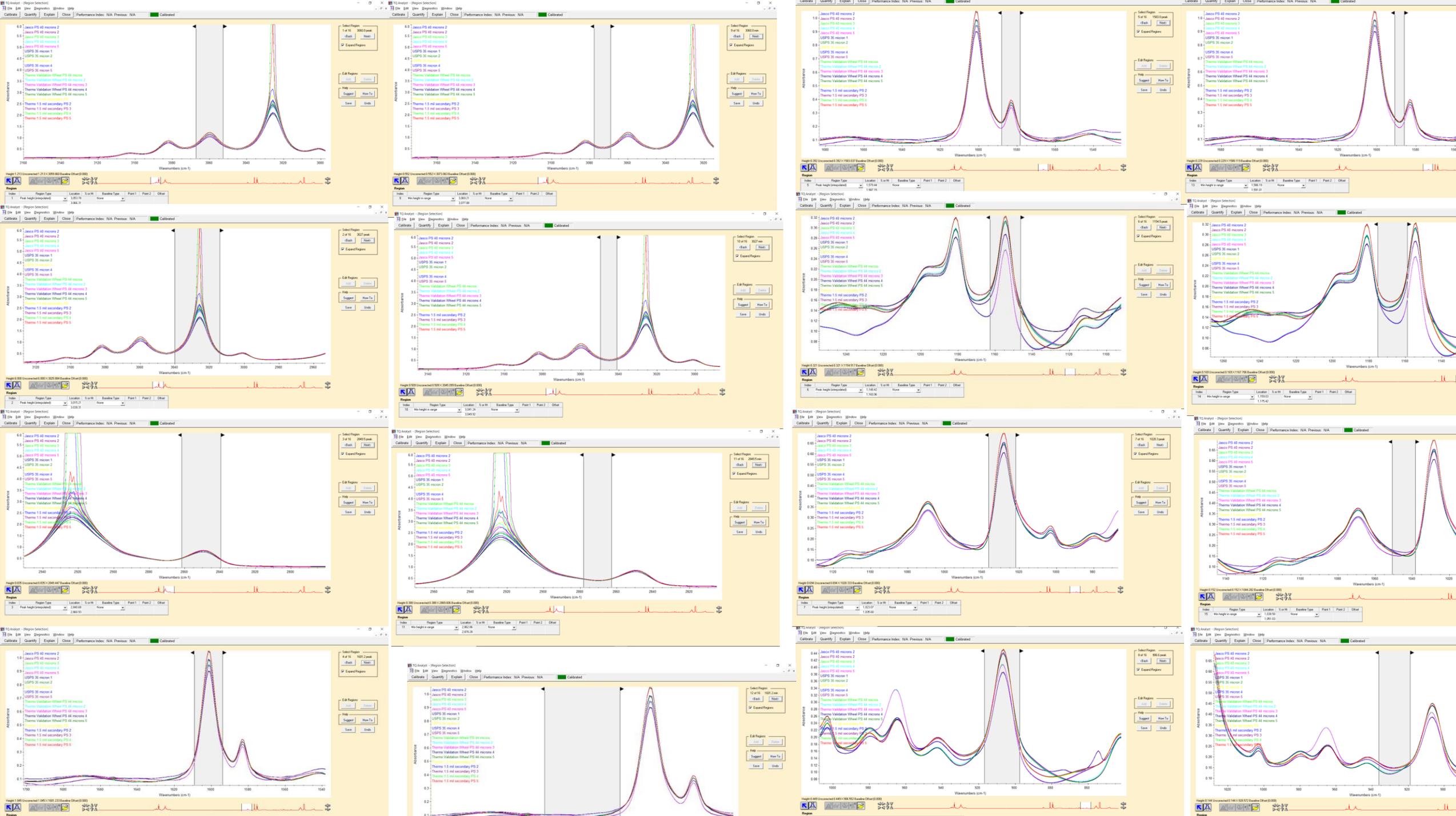
Multiplicative Signal Correction (MSC) was chosen in the analysis.

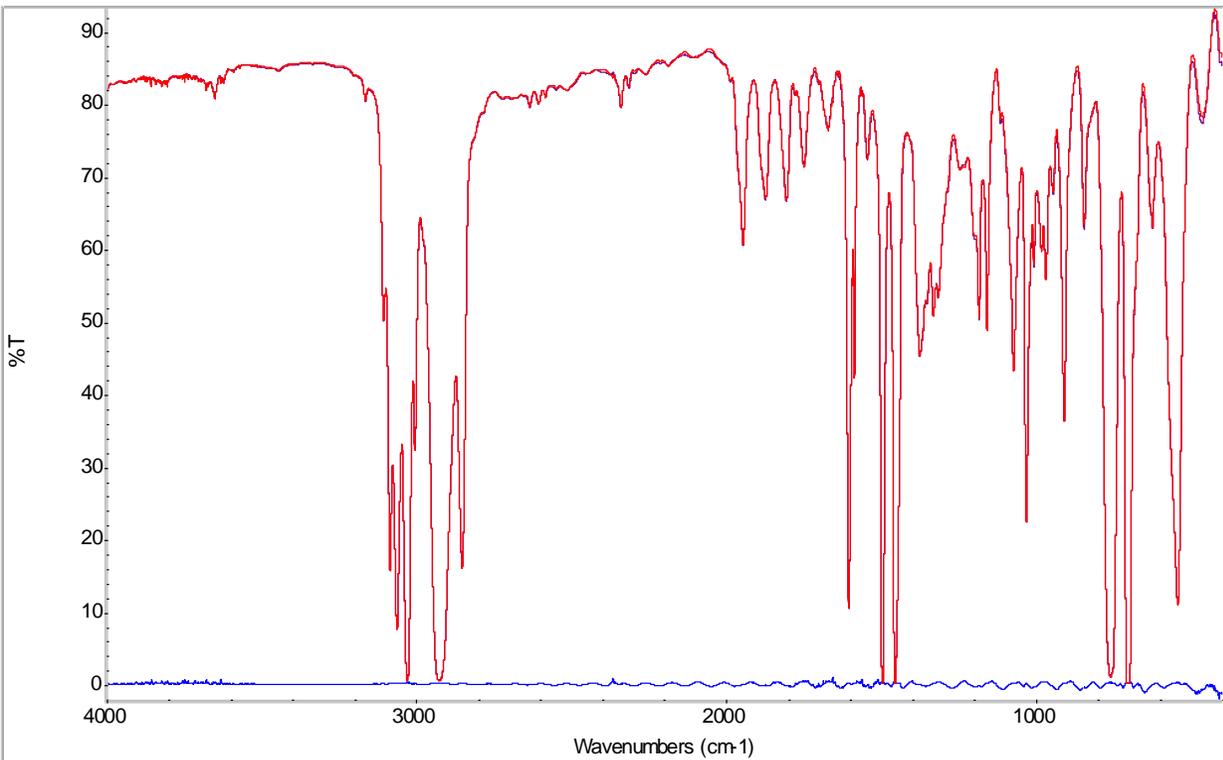
Index	Title	Usage	Actual class	Mismatch	Calculated class	Calculated distance	Next class	Next distance
12	USPS 35 micron 4	Calibration	USPS		USPS	0.5872	Thermo2ndStd	14.6797
13	USPS 35 micron 3	Validation	USPS		USPS	0.6175	Thermo2ndStd	14.9438
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2	Thermo 1.5 mil secondary PS 4	Calibration	Thermo2ndStd		Thermo2ndStd	0.7888	ThermoValWheel	6.4277
7	Thermo Validation Wheel PS 44 microns 4	Validation	ThermoValWheel		ThermoValWheel	0.7915	Thermo2ndStd	6.4005
3	Thermo 1.5 mil secondary PS 3	Calibration	Thermo2ndStd		Thermo2ndStd	0.8269	ThermoValWheel	6.1963
11	USPS 35 micron 5	Calibration	USPS		USPS	0.8505	Thermo2ndStd	15.1741
6	Thermo Validation Wheel PS 44 microns 5	Calibration	ThermoValWheel		ThermoValWheel	0.8987	Thermo2ndStd	6.4068
18	Jasco PS 40 microns 3	Calibration	Jasco		Jasco	0.9014	ThermoValWheel	11.345
15	USPS 35 micron 1	Calibration	USPS		USPS	0.9124	Thermo2ndStd	15.1876
17	Jasco PS 40 microns 4	Calibration	Jasco		Jasco	0.9221	ThermoValWheel	10.7428
9	Thermo Validation Wheel PS 44 micros 2	Calibration	ThermoValWheel		ThermoValWheel	0.9263	Thermo2ndStd	5.7413
5	Thermo 1.5 mil secondary PS	Calibration	Thermo2ndStd		Thermo2ndStd	0.9423	ThermoValWheel	6.1904
4	Thermo 1.5 mil secondary PS 2	Calibration	Thermo2ndStd		Thermo2ndStd	0.9423	ThermoValWheel	6.3934
8	Thermo Validation Wheel PS 44 microns 3	Calibration	ThermoValWheel		ThermoValWheel	0.9431	Thermo2ndStd	6.2975
10	Thermo Validation Wheel PS 44 micros	Calibration	ThermoValWheel		ThermoValWheel	0.9433	Thermo2ndStd	6.7528
20	Jasco PS 40 microns 2	Calibration	Jasco		Jasco	0.9461	ThermoValWheel	10.8219
1	Thermo 1.5 mil secondary PS 5	Validation	Thermo2ndStd		Thermo2ndStd	1.0855	ThermoValWheel	6.4618
19	Jasco PS 40 microns 2	Validation	Jasco		Jasco	1.3965	ThermoValWheel	11.6831

MSC is best as the it makes the distinction between each clearer.

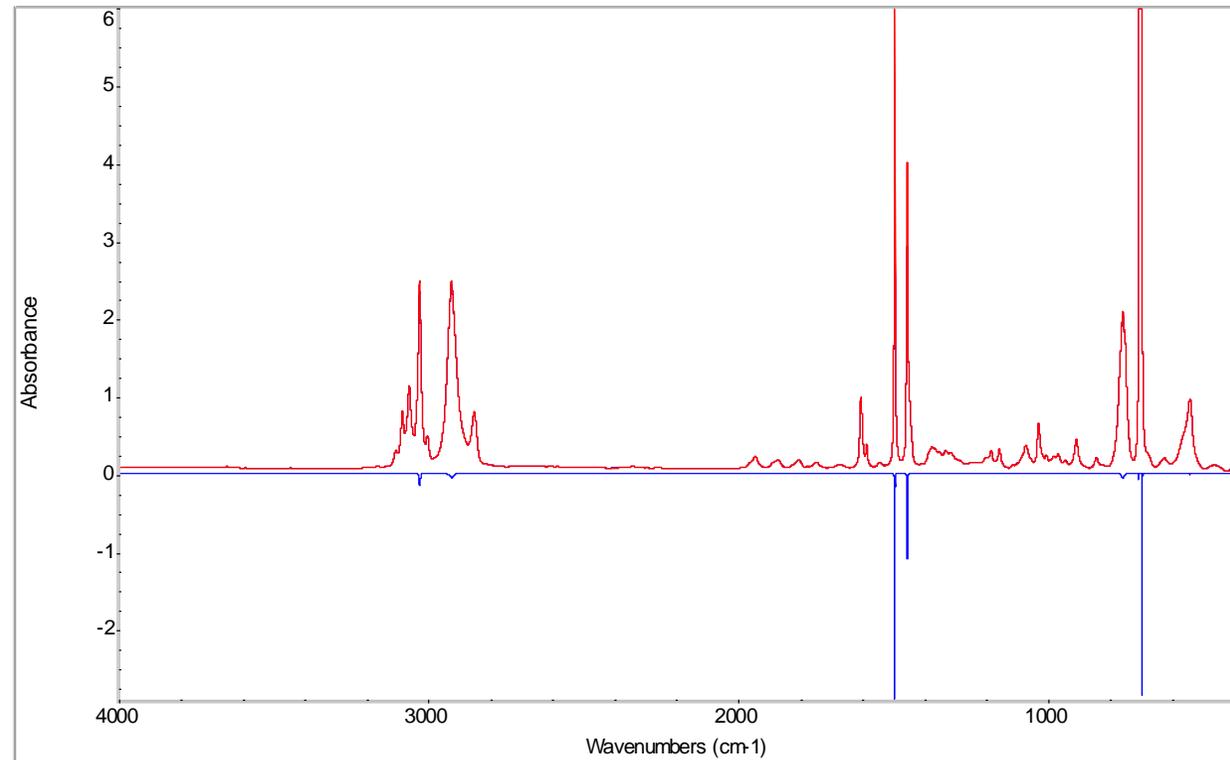
Resolution - TQ Analyst version

	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs									
Jasco PS 40 microns 2	1.082	2.609	0.825	0.953	0.339	0.257	0.647	0.408	0.497	0.455	0.381	0.086	0.183	0.127	0.148	0.147	
Jasco PS 40 microns 2	1.079	2.515	0.823	0.947	0.339	0.257	0.645	0.408	0.497	0.456	0.38	0.087	0.182	0.127	0.148	0.147	
Jasco PS 40 microns 3	1.079	2.511	0.825	0.948	0.34	0.258	0.645	0.409	0.497	0.457	0.382	0.088	0.183	0.128	0.149	0.149	
Jasco PS 40 microns 4	1.075	2.402	0.822	0.944	0.34	0.258	0.644	0.407	0.497	0.456	0.383	0.087	0.184	0.128	0.149	0.148	
Jasco PS 40 microns 5	1.075	2.381	0.821	0.943	0.339	0.257	0.643	0.407	0.497	0.456	0.381	0.087	0.183	0.127	0.149	0.148	
USPS 35 micron 1	1.029	2.101	0.764	0.907	0.358	0.288	0.609	0.386	0.492	0.458	0.384	0.098	0.221	0.151	0.165	0.133	
USPS 35 micron 2	1.022	2.02	0.761	0.901	0.357	0.287	0.606	0.384	0.49	0.457	0.383	0.097	0.221	0.151	0.164	0.133	
USPS 35 micron 3	1.027	2.069	0.764	0.905	0.358	0.288	0.608	0.386	0.492	0.459	0.385	0.098	0.222	0.152	0.166	0.134	
USPS 35 micron 4	1.025	2.063	0.762	0.903	0.357	0.287	0.606	0.385	0.491	0.457	0.383	0.097	0.221	0.151	0.165	0.133	
USPS 35 micron 5	1.029	2.092	0.764	0.907	0.358	0.288	0.609	0.386	0.493	0.459	0.384	0.098	0.222	0.152	0.165	0.134	
Thermo Validation Wheel PS 44 microns	1.134	2.492	0.798	0.991	0.376	0.313	0.655	0.44	0.521	0.482	0.371	0.073	0.222	0.158	0.147	0.116	
Thermo Validation Wheel PS 44 microns 2	1.13	2.338	0.795	0.987	0.376	0.312	0.655	0.44	0.521	0.482	0.372	0.075	0.222	0.16	0.148	0.121	
Thermo Validation Wheel PS 44 microns 3	1.131	2.465	0.799	0.988	0.378	0.314	0.654	0.44	0.522	0.483	0.373	0.073	0.223	0.158	0.148	0.116	
Thermo Validation Wheel PS 44 microns 4	1.141	2.657	0.801	0.993	0.377	0.314	0.657	0.442	0.523	0.484	0.374	0.074	0.223	0.159	0.148	0.119	
Thermo Validation Wheel PS 44 microns 5	1.13	2.431	0.795	0.985	0.375	0.31	0.651	0.438	0.521	0.482	0.371	0.072	0.221	0.157	0.146	0.118	
Thermo 1.5 mil secondary PS	1.209	2.862	0.834	1.047	0.394	0.324	0.696	0.452	0.552	0.51	0.389	0.078	0.227	0.169	0.151	0.145	
Thermo 1.5 mil secondary PS 2	1.212	3.158	0.833	1.049	0.394	0.322	0.698	0.449	0.551	0.509	0.387	0.076	0.228	0.169	0.152	0.144	
Thermo 1.5 mil secondary PS 3	1.221	6.208	0.838	1.057	0.395	0.323	0.7	0.451	0.553	0.511	0.389	0.077	0.229	0.17	0.153	0.145	
Thermo 1.5 mil secondary PS 4	1.219	6.13	0.836	1.052	0.394	0.322	0.698	0.45	0.553	0.51	0.388	0.076	0.228	0.169	0.151	0.144	
Thermo 1.5 mil secondary PS 5	1.215	4.727	0.835	1.051	0.394	0.321	0.697	0.449	0.551	0.509	0.388	0.076	0.228	0.169	0.152	0.144	
Jasco PS 40 microns 2	0.585	2.154	0.444	0.867	0.156	0.13	0.499	0.261	0.581	2.0276	0.4418	0.86	0.1564	0.13	0.4962	0.26	
Jasco PS 40 microns 2	0.582	2.059	0.443	0.86	0.157	0.13	0.497	0.261	0.003	0.0933343	0.002168	0.004301	0.000548	0	0.001924	0.001	
Jasco PS 40 microns 3	0.582	2.054	0.443	0.86	0.157	0.13	0.496	0.26	0.516351	4.6031932	0.490708	0.500135	0.350206	0	0.387654	0.384615	
Jasco PS 40 microns 4	0.578	1.946	0.439	0.857	0.156	0.13	0.495	0.259									
Jasco PS 40 microns 5	0.578	1.925	0.44	0.856	0.156	0.13	0.494	0.259									
USPS 35 micron 1	0.537	1.643	0.38	0.809	0.137	0.137	0.444	0.253	0.5348	1.611	0.3792	0.807	0.1362	0.1362	0.4426	0.252	AVG
USPS 35 micron 2	0.532	1.563	0.378	0.804	0.136	0.136	0.442	0.251	0.001924	0.0309758	0.000837	0.002121	0.000447	0.000447	0.001342	0.000707	STD DEV
USPS 35 micron 3	0.535	1.61	0.379	0.807	0.136	0.136	0.442	0.252	0.359674	1.9227683	0.220638	0.262865	0.328351	0.328351	0.303127	0.280598	% Error
USPS 35 micron 4	0.534	1.606	0.379	0.806	0.136	0.136	0.441	0.252									
USPS 35 micron 5	0.536	1.633	0.38	0.809	0.136	0.136	0.444	0.252									
Thermo Validation Wheel PS 44 micros	0.613	2.01	0.427	0.918	0.154	0.155	0.508	0.324	0.6116	1.994	0.4254	0.9154	0.1542	0.1542	0.507	0.322	AVG
Thermo Validation Wheel PS 44 micros 2	0.609	1.856	0.423	0.912	0.154	0.152	0.507	0.319	0.003975	0.1156611	0.001817	0.00305	0.000447	0.001643	0.001581	0.002345	STD DEV
Thermo Validation Wheel PS 44 microns 3	0.609	1.982	0.426	0.915	0.155	0.156	0.506	0.324	0.649922	5.8004585	0.427031	0.333143	0.290022	1.065608	0.311862	0.728325	% Error
Thermo Validation Wheel PS 44 microns 4	0.618	2.173	0.427	0.919	0.154	0.155	0.509	0.323									
Thermo Validation Wheel PS 44 microns 5	0.609	1.949	0.424	0.913	0.154	0.153	0.505	0.32									
Thermo 1.5 mil secondary PS	0.657	2.352	0.445	0.969	0.167	0.155	0.545	0.307	0.6632	4.1072	0.447	0.9746	0.1662	0.1532	0.546	0.3058	AVG
Thermo 1.5 mil secondary PS 2	0.661	2.649	0.446	0.973	0.166	0.153	0.546	0.305	0.004324	1.5839333	0.001581	0.004037	0.000447	0.001095	0.001	0.000837	STD DEV
Thermo 1.5 mil secondary PS 3	0.668	5.697	0.449	0.98	0.166	0.153	0.547	0.306	0.652043	38.564796	0.353722	0.414255	0.269082	0.715043	0.18315	0.273597	% Error
Thermo 1.5 mil secondary PS 4	0.666	5.62	0.448	0.976	0.166	0.153	0.547	0.306			*		*				
Thermo 1.5 mil secondary PS 5	0.664	4.218	0.447	0.975	0.166	0.152	0.545	0.305			<.5		<.5				Spec





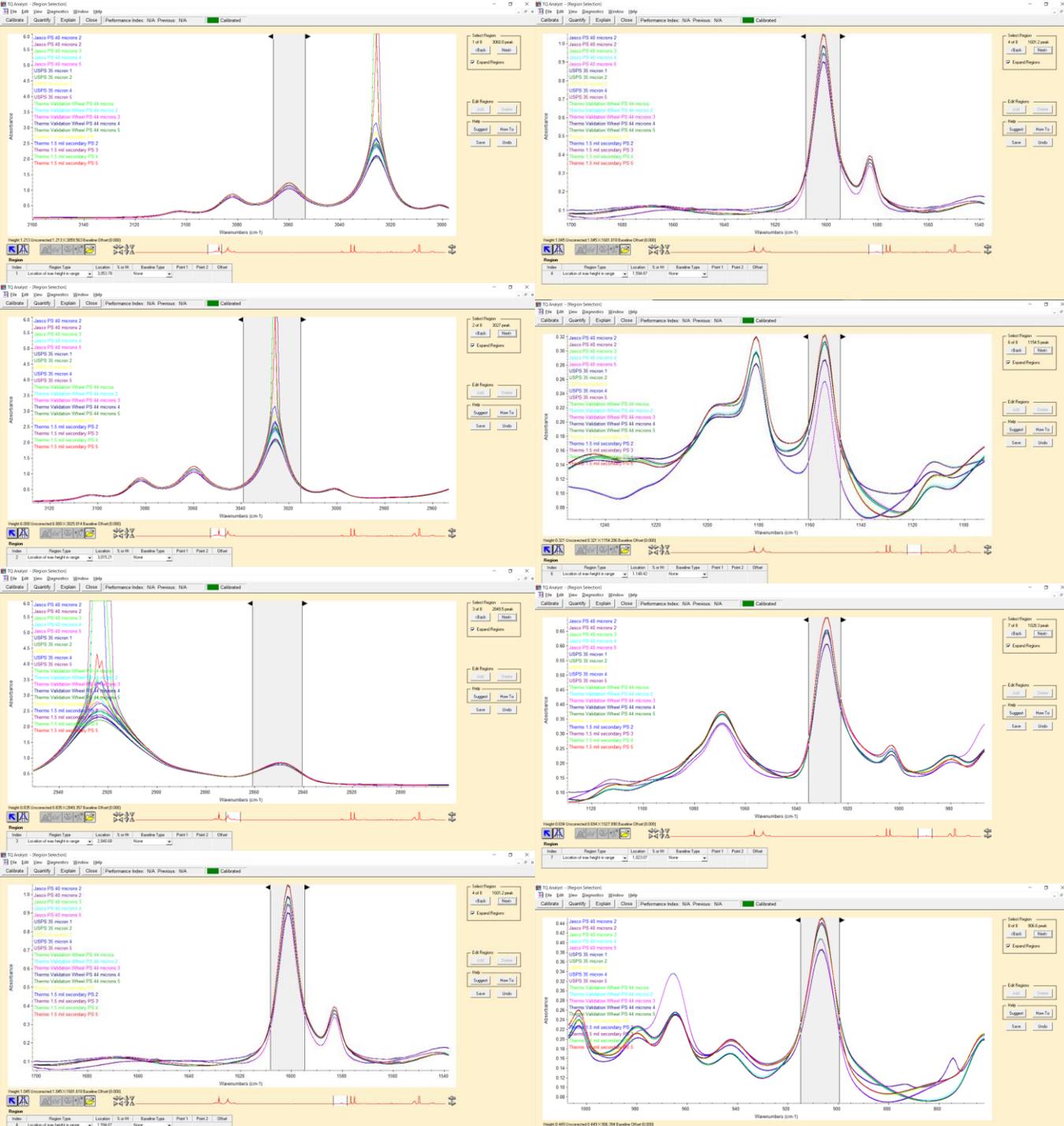
Differences consecutive measures % Transmittance



Differences consecutive measures Absorbance

Taking differences in both % Transmittance and Absorbance from consecutive measures.  
Not good to use absorbance if saturated.

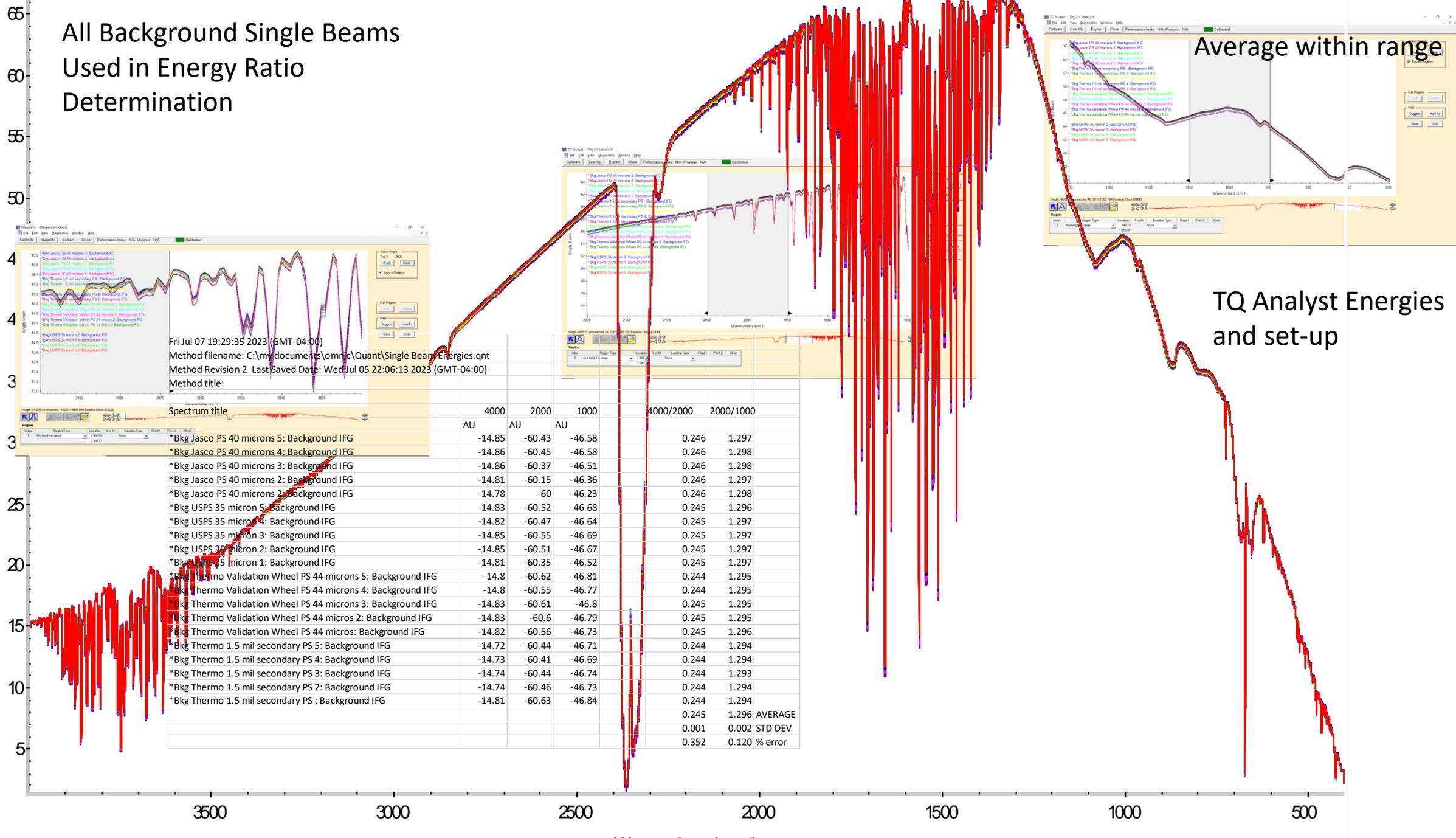




TQ Analyst set-up peak picking polystyrene

# All Background Single Beams Used in Energy Ratio Determination

Single Beam



Fri Jul 07 19:29:35 2023 (GMT-04:00)  
 Method filename: C:\my documents\omnic\Quant\Single Beam Energies.qnt  
 Method Revision 2 Last Saved Date: Wed Jul 05 22:06:13 2023 (GMT-04:00)  
 Method title:

Spectrum title	4000 AU	2000 AU	1000 AU	4000/2000	2000/1000
*Bkg Jasco PS 40 microns 5: Background IFG	-14.85	-60.43	-46.58	0.246	1.297
*Bkg Jasco PS 40 microns 4: Background IFG	-14.86	-60.45	-46.58	0.246	1.298
*Bkg Jasco PS 40 microns 3: Background IFG	-14.86	-60.37	-46.51	0.246	1.298
*Bkg Jasco PS 40 microns 2: Background IFG	-14.81	-60.15	-46.36	0.246	1.297
*Bkg Jasco PS 40 microns 2: Background IFG	-14.78	-60	-46.23	0.246	1.298
*Bkg USPS 35 micron 5: Background IFG	-14.83	-60.52	-46.68	0.245	1.296
*Bkg USPS 35 micron 4: Background IFG	-14.82	-60.47	-46.64	0.245	1.297
*Bkg USPS 35 micron 3: Background IFG	-14.85	-60.55	-46.69	0.245	1.297
*Bkg USPS 35 micron 2: Background IFG	-14.85	-60.51	-46.67	0.245	1.297
*Bkg USPS 35 micron 1: Background IFG	-14.81	-60.35	-46.52	0.245	1.297
*Bkg Thermo Validation Wheel PS 44 microns 5: Background IFG	-14.8	-60.62	-46.81	0.244	1.295
*Bkg Thermo Validation Wheel PS 44 microns 4: Background IFG	-14.8	-60.55	-46.77	0.244	1.295
*Bkg Thermo Validation Wheel PS 44 microns 3: Background IFG	-14.83	-60.61	-46.8	0.245	1.295
*Bkg Thermo Validation Wheel PS 44 microns 2: Background IFG	-14.83	-60.6	-46.79	0.245	1.295
*Bkg Thermo Validation Wheel PS 44 microns: Background IFG	-14.82	-60.56	-46.73	0.245	1.296
*Bkg Thermo 1.5 mil secondary PS 5: Background IFG	-14.72	-60.44	-46.71	0.244	1.294
*Bkg Thermo 1.5 mil secondary PS 4: Background IFG	-14.73	-60.41	-46.69	0.244	1.294
*Bkg Thermo 1.5 mil secondary PS 3: Background IFG	-14.74	-60.44	-46.74	0.244	1.293
*Bkg Thermo 1.5 mil secondary PS 2: Background IFG	-14.74	-60.46	-46.73	0.244	1.294
*Bkg Thermo 1.5 mil secondary PS : Background IFG	-14.81	-60.63	-46.84	0.244	1.294
				0.245	1.296 AVERAGE
				0.001	0.002 STD DEV
				0.352	0.120 % error

Average within range

TQ Analyst Energies  
and set-up