



THE GETTY
CONSERVATION
INSTITUTE

OBJECTS AND COLLECTIONS

Accession #: APJF085- APJF088
Number of Samples: 4
Photographer: Jose Miguel Ferreira

Date of Analysis: June 2009
Scientist(s): Dusan Stulik & Art Kaplan

A series of samples documenting the entire darkroom technique of the Palladiotype process were analyzed and studied using nondestructive methods of chemical analysis (XRF- X-ray fluorescence spectrometry, FTIR- Fourier Transform Infrared spectrometry). The microscopic structure of the image layer was observed using a Leica S6D zoom digital stereo-microscope.

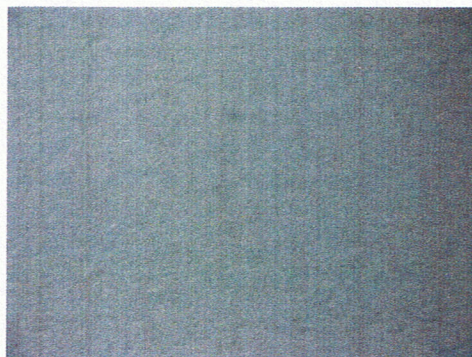
The XRF analysis of the unprocessed Bergger COT 320 paper shows that the paper is very clean with low concentrations of spectral impurities (iron) and low concentrations of calcium (paper buffer/filler). The FTIR analysis of the paper shows no presence of surface sizing (as indicated) and a low concentration of internal sizing.

The analysis of the sensitized but unprocessed (APJF086) paper shows a high concentration of iron (Fe) from iron (III) oxalate and palladium. The concentration of platinum (contrasting agent) is very low. The FTIR analysis shows a very broad and intense spectral peak of carboxylic functional groups (iron oxalate).

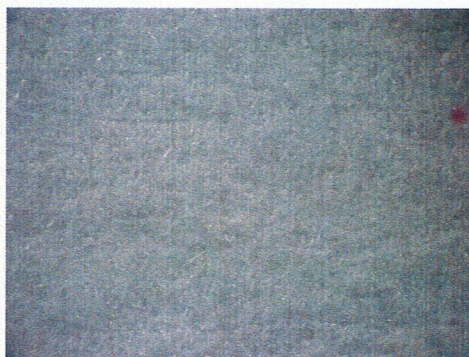
The XRF analysis of both final prints (APJF087 and APJF089) showed that some palladium was lost during the image processing. The concentration of iron that represents a superposition of iron from paper (paper impurity) and remaining iron from the photochemical process is very low and that speaks to very good clearing and washing accomplished using EDTA processing. Analyzed images will be very stable for a long time period. The FTIR analysis has not shown any organic impurities or remaining oxalate. That also speaks to very good processing of the submitted photographs.

All samples (together with all documentation and analytical results) submitted to the project will be registered as part of the GCI Reference Collection of Photographs and Photographic Materials and will be available as research material to students of photography, students of photograph conservation and students of art history interested in chemical and alternative process photography.

Jose Miguel Ferreira
Images using Leica S6D stereo microscope



APJF085 Bergger COT320 paper_6_3x.BMP



APJF085 Bergger COT320 paper_25x.BMP



APJF085 Bergger COT320 paper_40x.BMP



APJF086_Sensitized PtPd paper_6_3x.BMP



APJF086_Sensitized PtPd paper_25x.BMP



APJF086_Sensitized PtPd paper_40x.BMP



APJF088_PtPd print_6_3x.BMP



APJF088_PtPd print_25x.BMP



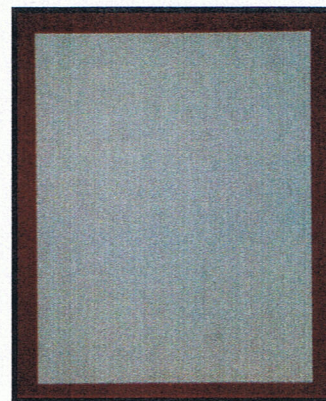
APJF088_PtPd print_40x.BMP



RESULTS : ANALYSIS

XRF (X-ray Fluorescence Spectrometry)

Sample Information



Date of Analysis	June 2009	Object Name	Bergger COT320 acid-free paper
Location	GCI Photo Lab	Object Number	APJF085
Artist	Jose Miguel Ferreira	Object Date	

Analysis Parameters

Instrument	KeyMaster Tracer III	X-ray Tube	Rhenium
Voltage	40keV	Filter	Yes
Current	12 μ A	Filter Type	Al/Cu
Vacuum	No	Analysis Time	300 sec.
Location of Analysis	Dmax		

Results

Major Elements Detected:	
Minor and Trace Elements Detected:	Ca, Fe

Interpretation:

Iron (Fe) – paper making process impurity (filler impurity)

Calcium (Ca) – paper buffer / filler

Notes:

S1PXRF - 17-Jun-2009 08:51:47

File Setup ID Download Tube Help

Clear



APJF085_Berger COT 320

INST FILE #

KT1 (.PDZ 40.00kV, 12.00µA)



Cnt:8	LSec:300.84	Chan:3.825	Kev:0.1530	Det:-44.5C	Amb:108.9F	Raw:2,159.00	Valid:1,702.00
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evch:40.0000

Shift:0.00000

APJF085 Berger COT320 Acid-free cotton paper

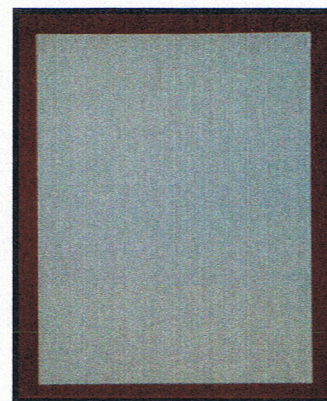


RESULTS : ANALYSIS

FTIR (Fourier Transform Infrared Spectroscopy)

Sample Information

Date of Analysis	June 2009	Object Name	Bergger COT320 acid-free paper
Location	GCI Photo Lab	Object Number	APJF085
Artist	Jose Miguel Ferreira	Object Date	



Analysis Parameters

Instrument	SensIR TravellIR (modified)	Method	64-64-4
Spectral Range	4000-650cm ⁻¹	Number of Scans	64

Results

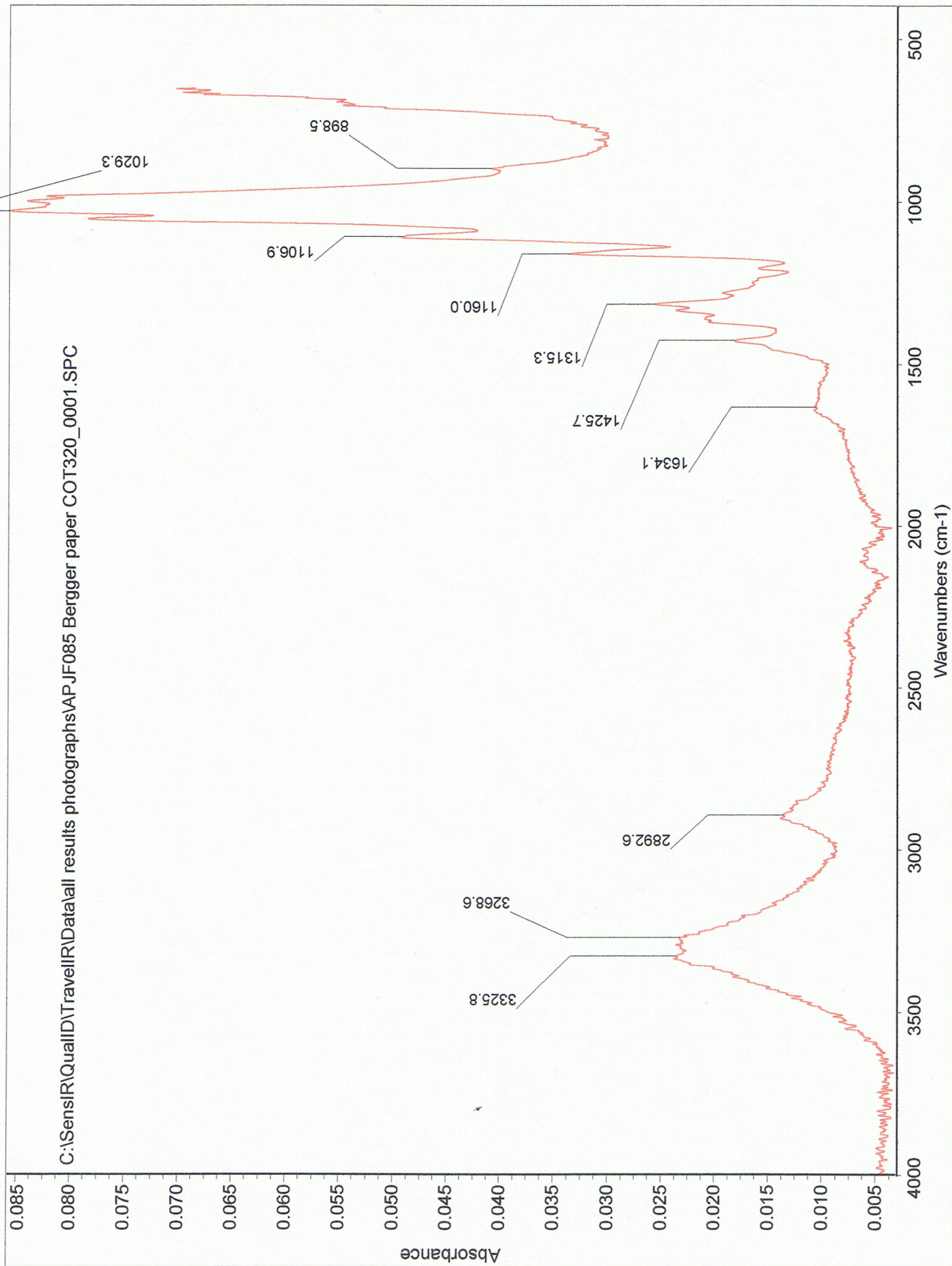
Major Spectral Bands	3300, 2890, 1634, 1400-850cm ⁻¹
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Interpretation:

Spectral peak at 1634cm⁻¹ is a combination peak of cellulose, internal sizing and adsorbed water (moisture). All other peaks are consistent with cellulose (paper substrate).

Notes:

C:\SensIR\QualID\TravelIR\Data\all results photographs\APJF085 Bergger paper COT320_0001.SPC

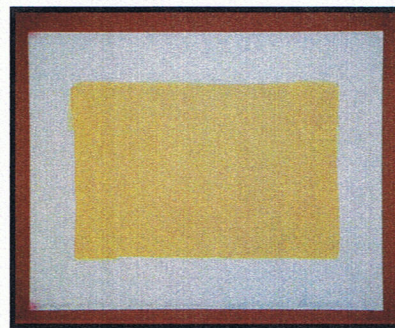




RESULTS : ANALYSIS

XRF (X-ray Fluorescence Spectrometry)

Sample Information



Date of Analysis	June 2009	Object Name	Sensitized Pt/Pd paper
Location	GCI Photo Lab	Object Number	APJF086
Artist	Jose Miguel Ferreira	Object Date	

Analysis Parameters

Instrument	KeyMaster Tracer III	X-ray Tube	Rhenium
Voltage	40keV	Filter	Yes
Current	12 μ A	Filter Type	Al/Cu
Vacuum	No	Analysis Time	300 sec.
Location of Analysis	Dmax		

Results

Major Elements Detected:	Fe, Pd
Minor and Trace Elements Detected:	Ca, Pt

Interpretation:

Iron (Fe) and palladium (Pd) – palladiotype chemistry

Platinum (Pt) – contrasting agent (very low concentration)

Calcium (Ca) – paper

Notes:

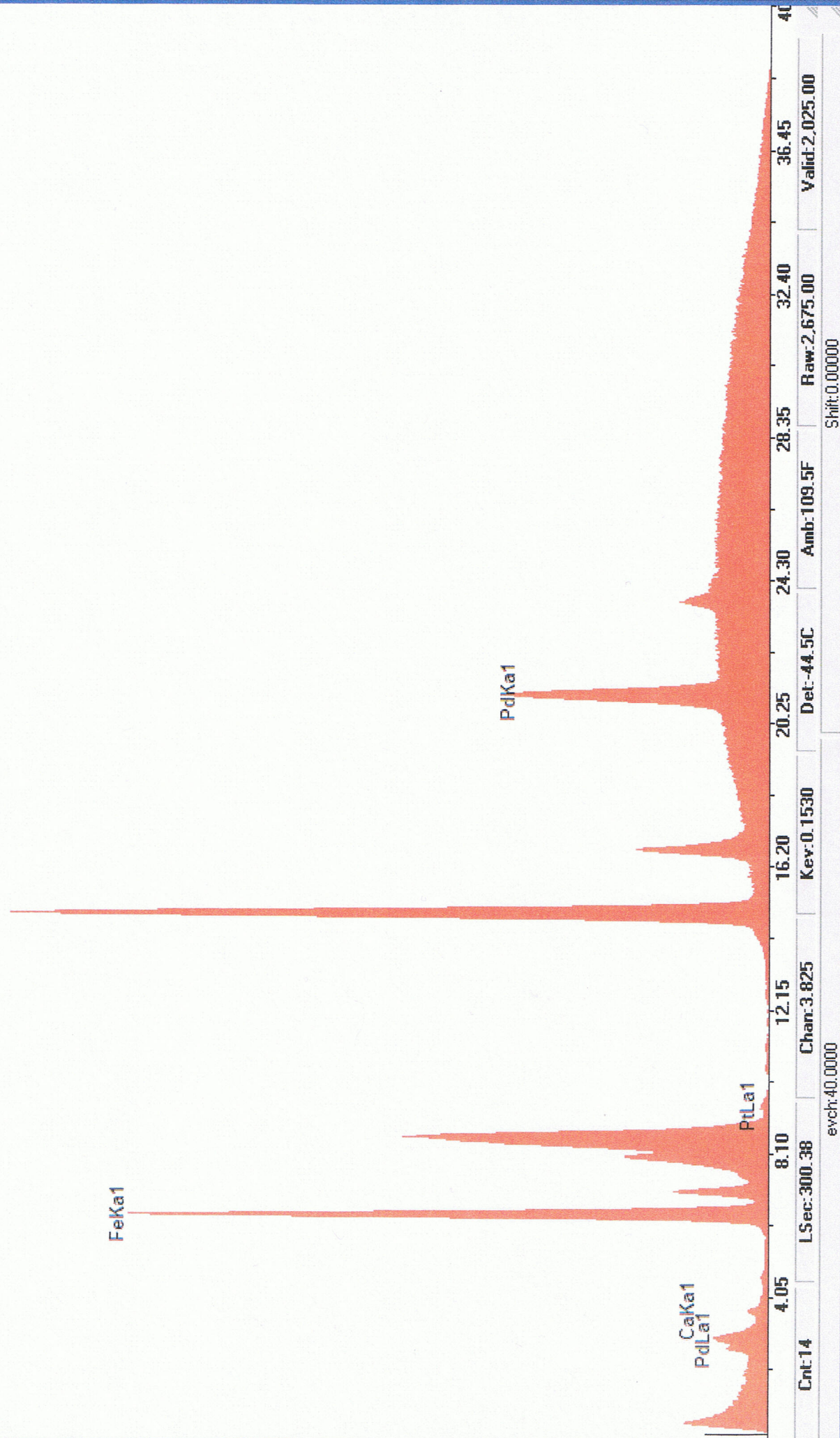
Clear



APJF086_Sensitized PtPd pi

INST FILE #

KTI (.PDZ 40.00kV, 12.00µA)



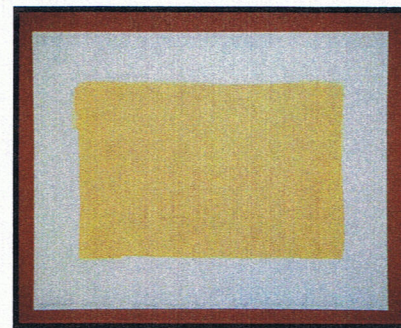
APJF086 Pt/Pd sensitized paper



RESULTS : ANALYSIS

FTIR (Fourier Transform Infrared Spectroscopy)

Sample Information



Date of Analysis	June 2009	Object Name	Sensitized Pt/Pd paper
Location	GCI Photo Lab	Object Number	APJF086
Artist	Jose Miguel Ferreira	Object Date	

Analysis Parameters

Instrument	SensIR TravellIR (modified)	Method	64-64-4
Spectral Range	4000-650cm ⁻¹	Number of Scans	64

Results

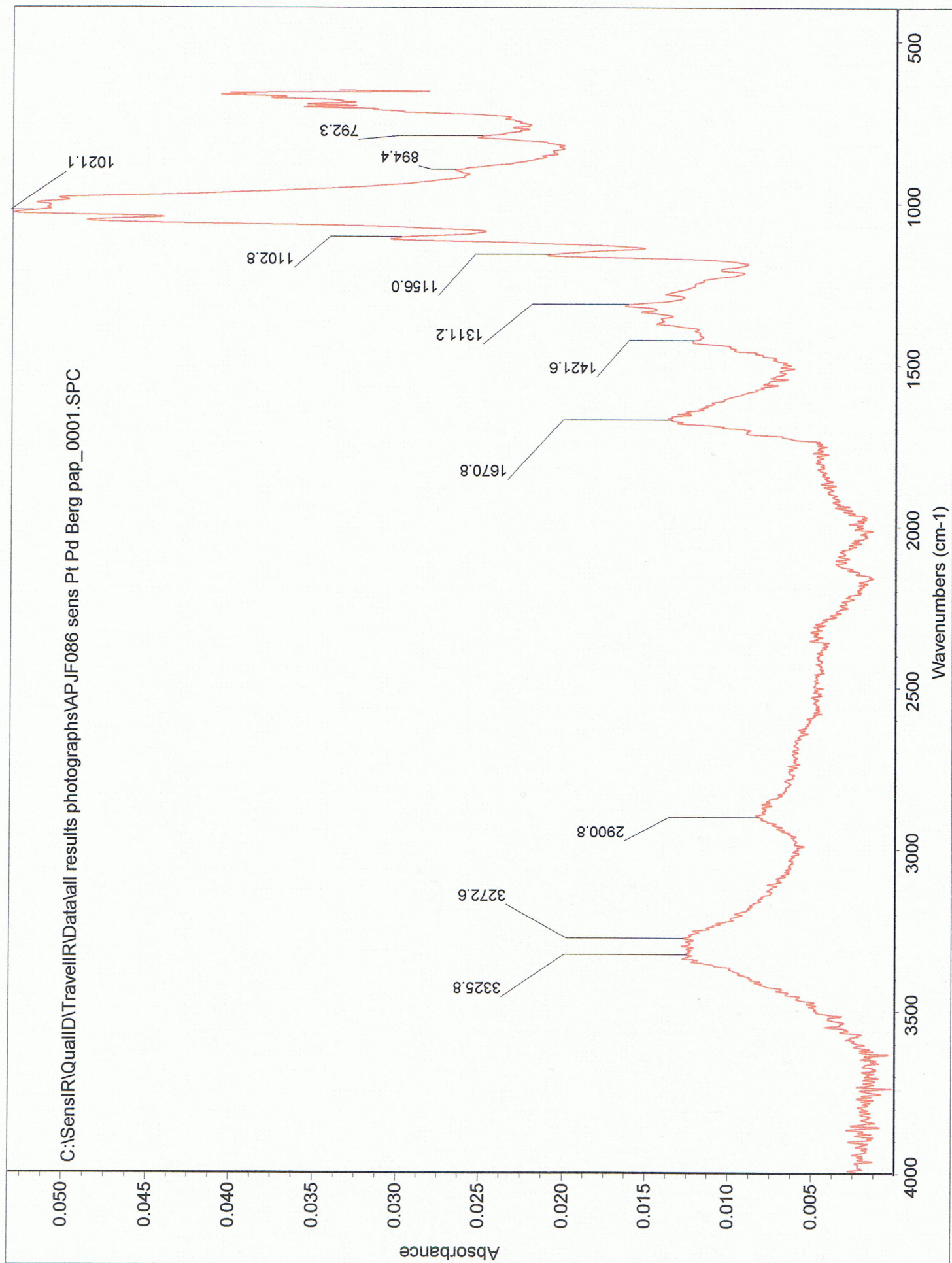
Major Spectral Bands	3300, 2900, 1670, 1400-850cm ⁻¹
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Interpretation:

A broad spectral peak at 1670cm⁻¹ is due to oxalate carboxylic functional groups. All other peaks are due to cellulose (paper substrate).

Notes:

C:\SensIR\QualID\TravelIR\Data\all results photographs\APJF086 sens Pt Pd Berg pap_0001.SPC

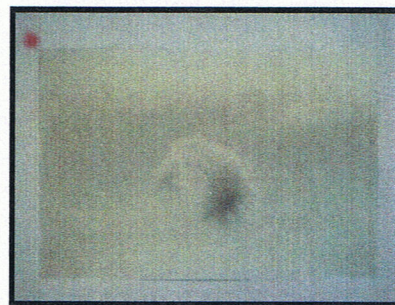




RESULTS : ANALYSIS

XRF (X-ray Fluorescence Spectrometry)

Sample Information



Date of Analysis	June 2009	Object Name	Pt/Pd print
Location	GCI Photo Lab	Object Number	APJF087
Artist	Jose Miguel Ferreira	Object Date	

Analysis Parameters

Instrument	KeyMaster Tracer III	X-ray Tube	Rhenium
Voltage	40keV	Filter	Yes
Current	12 μ A	Filter Type	Al/Cu
Vacuum	No	Analysis Time	300 sec.
Location of Analysis	Dmax		

Results

Major Elements Detected:	Pd
Minor and Trace Elements Detected:	Ca, Fe, Pt

Interpretation:

Palladium (Pd) – imaging element

Calcium (Ca) – paper buffer / filler

Iron (Fe) – impurity and iron (III) after clearing and washing

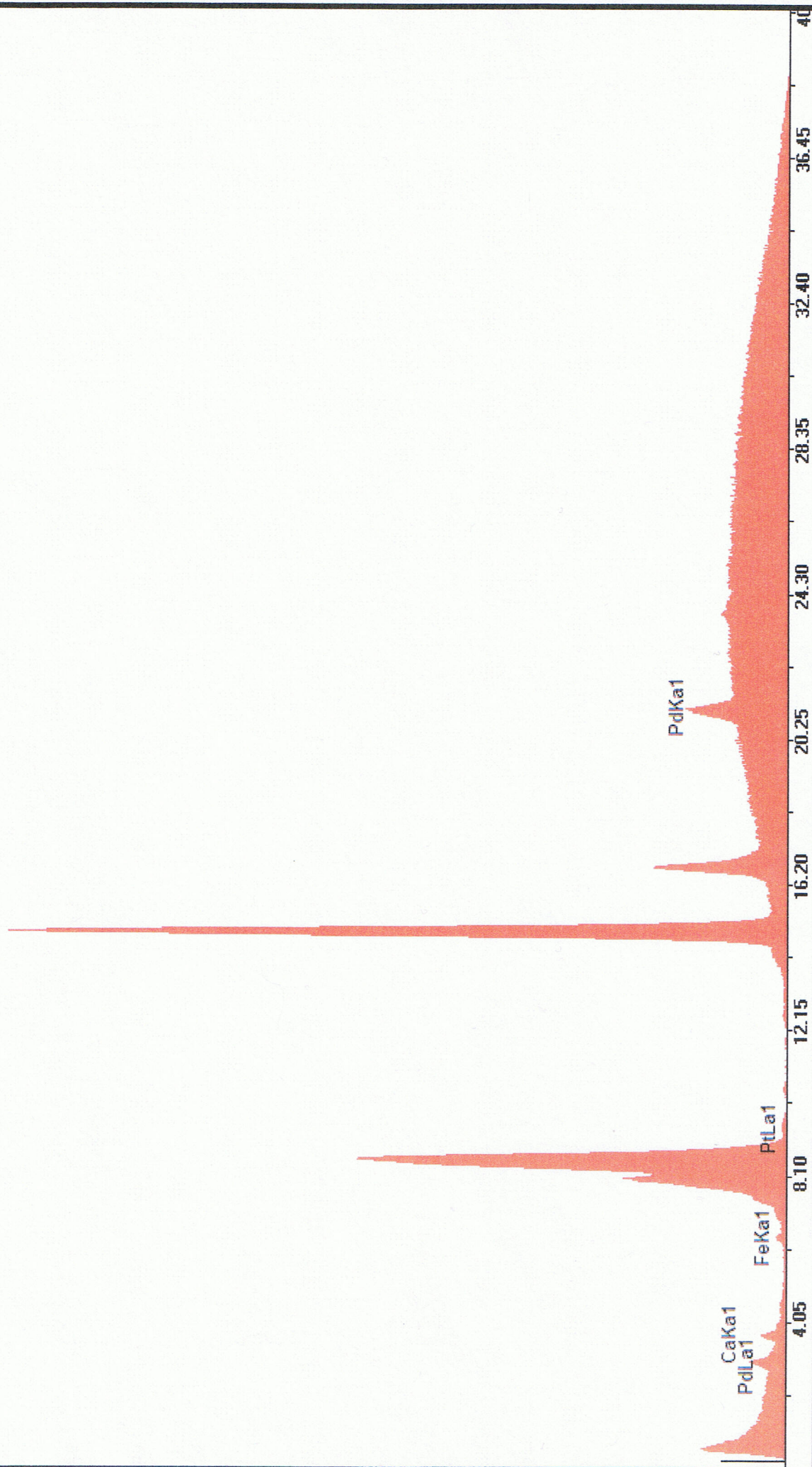
Notes:

51PXRF - 17-01-2009 08:55:10

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Clear APJF087_PtPd print_Dmax

INST FILE # KTI [PDZ 40.00kV, 12.00μA]





RESULTS : ANALYSIS

FTIR (Fourier Transform Infrared Spectroscopy)

Sample Information



Date of Analysis	June 2009	Object Name	Pt/Pd print
Location	GCI Photo Lab	Object Number	APJF087
Artist	Jose Miguel Ferreira	Object Date	

Analysis Parameters

Instrument	SensIR TravellIR (modified)	Method	64-64-4
Spectral Range	4000-650cm ⁻¹	Number of Scans	64

Results

Major Spectral Bands	3300, 2890, 1638, 1400-850cm ⁻¹
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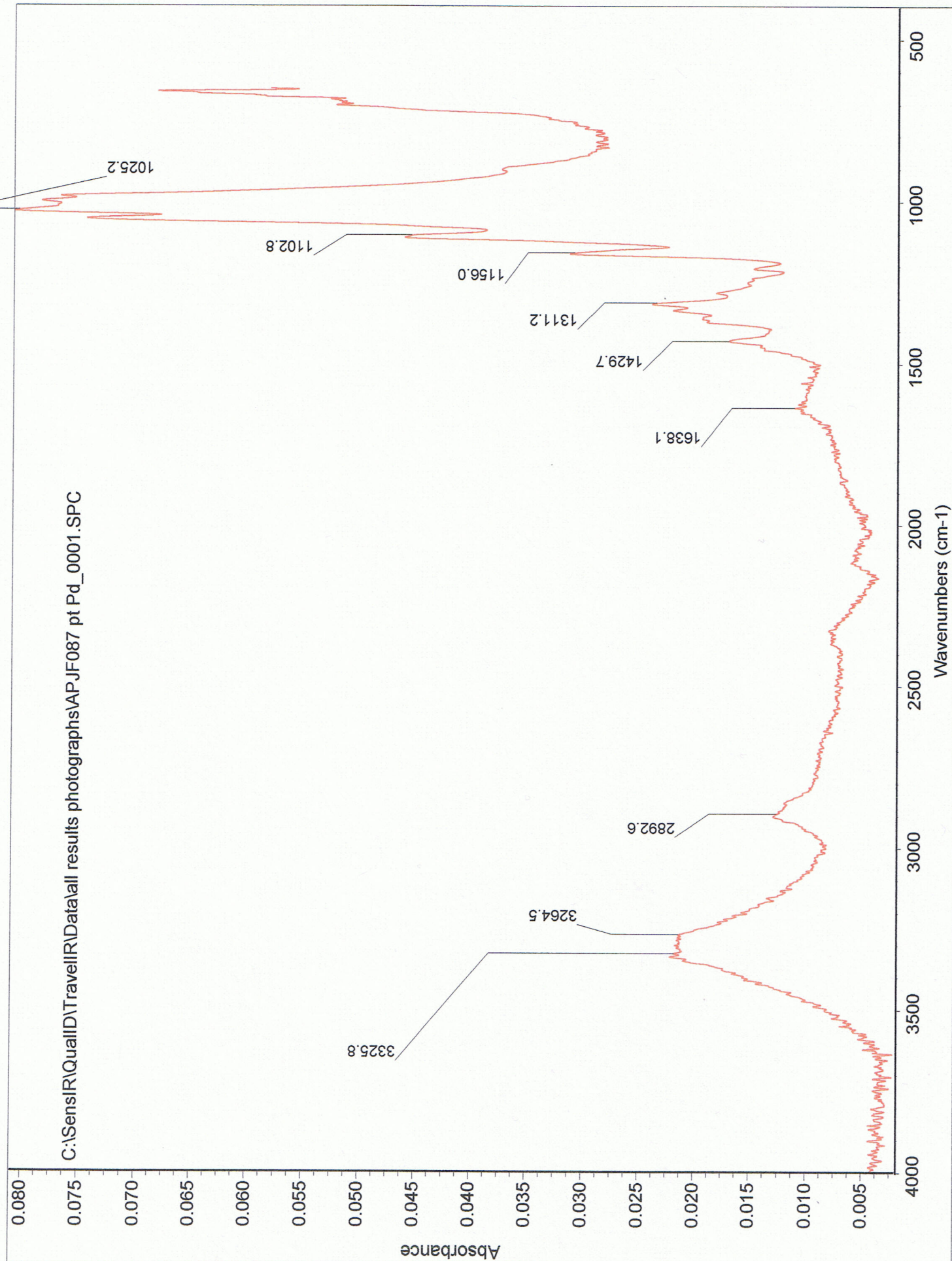
Interpretation:

All spectral peaks are consistent with cellulose (paper substrate).

Notes:

Palladium (Pd) is inactive in the FTIR spectrum (see XRF results).

C:\SensIR\QualID\TravelIR\Data\all results photographs\APJF087 pt Pd_0001.SPC

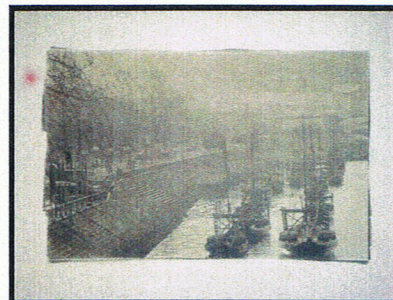




RESULTS : ANALYSIS

XRF (X-ray Fluorescence Spectrometry)

Sample Information



Date of Analysis	June 2009	Object Name	Pt/Pd print
Location	GCI Photo Lab	Object Number	APJF088
Artist	Jose Miguel Ferreira	Object Date	

Analysis Parameters

Instrument	KeyMaster Tracer III	X-ray Tube	Rhenium
Voltage	40keV	Filter	Yes
Current	12 μ A	Filter Type	Al/Cu
Vacuum	No	Analysis Time	300 sec.
Location of Analysis	Dmax		

Results

Major Elements Detected:	Pd
Minor and Trace Elements Detected:	Ca, Fe, Pt

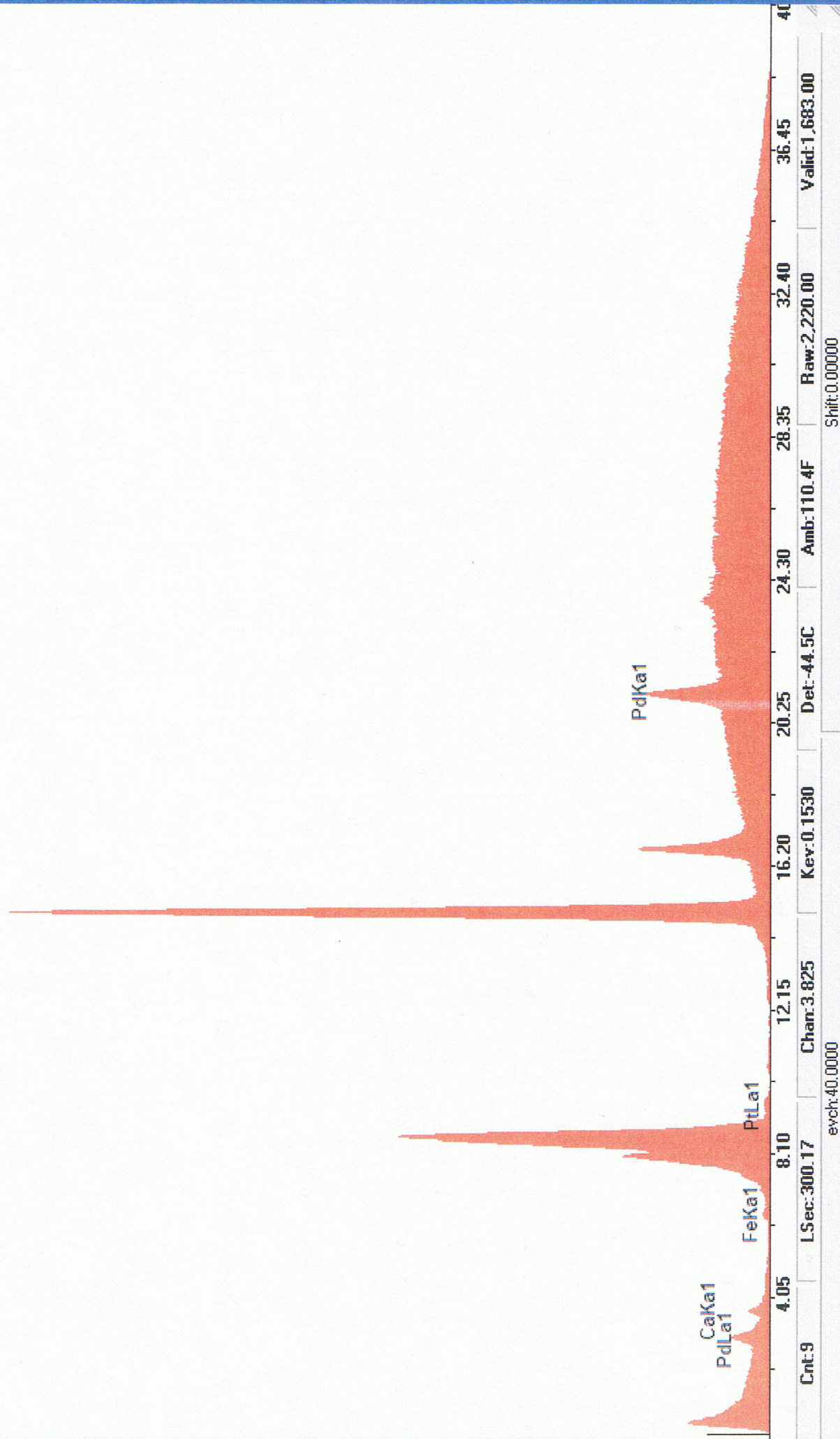
Interpretation:

Palladium (Pd) – imaging element

Calcium (Ca) – paper buffer / filler

Iron (Fe) – impurity and iron (III) after clearing and washing

Notes:



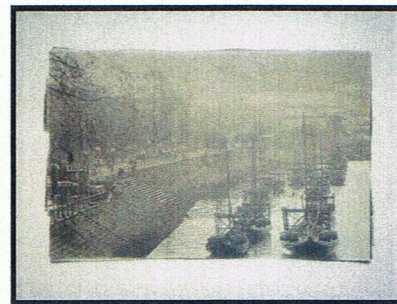
APJF088 Pt 1 Pd print (Dmax)



RESULTS : ANALYSIS

FTIR (Fourier Transform Infrared Spectroscopy)

Sample Information



Date of Analysis	June 2009	Object Name	Pt/Pd print
Location	GCI Photo Lab	Object Number	APJF088
Artist	Jose Miguel Ferreira	Object Date	

Analysis Parameters

Instrument	SensIR TravellIR (modified)	Method	64-64-4
Spectral Range	4000-650cm ⁻¹	Number of Scans	64

Results

Major Spectral Bands	3300, 2900, 1630, 1400-850cm ⁻¹
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Interpretation:

All spectral peaks are consistent with cellulose (paper substrate).

Notes:

Palladium (Pd) is inactive in the FTIR spectrum (see XRF results).

C:\SensIR\QualID\TravelIR\Data\all results photographs\APJF088 pt Pd_0001.SPC

