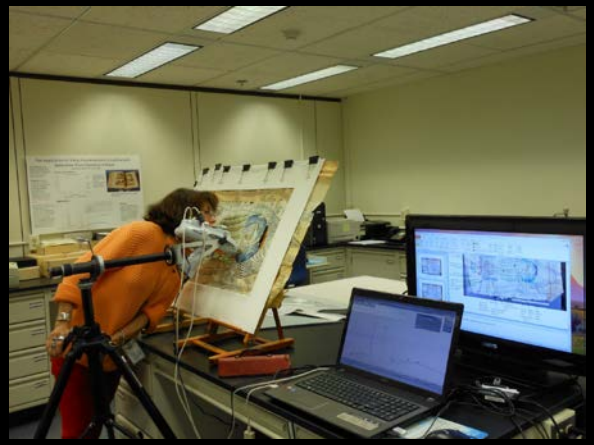
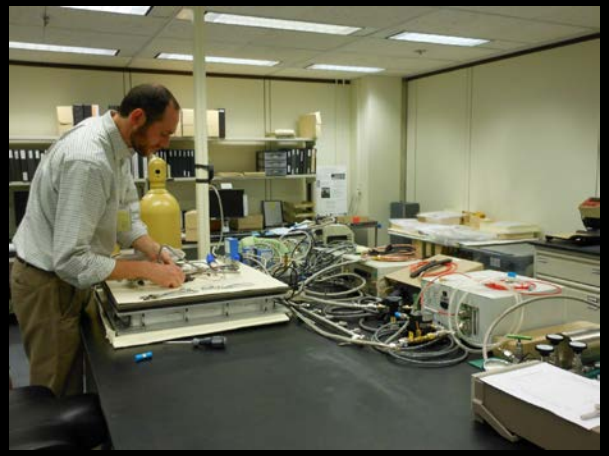
Preservation Research and Testing Division (PRTD) Research





Fenella G. France PhD, MBA, FAIC

Chief, Preservation Research and Testing Division

Library of Congress

Development of New Preservation Technologies

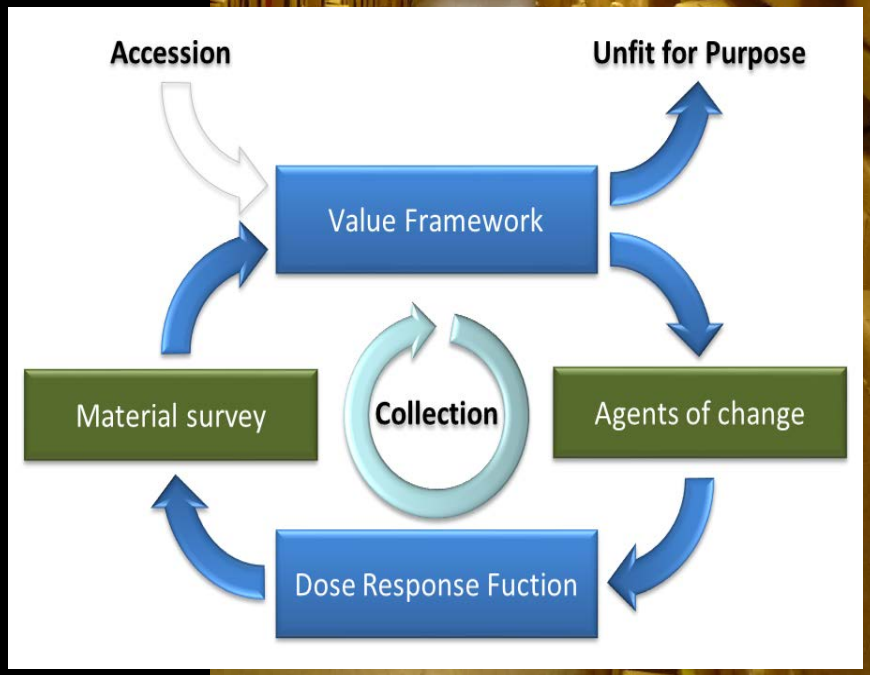
(increasing access to collections)

- Requirement for Library collection materials to be on (long-term) or semi-permanent exhibit
- **Inter-Agency Agreement** with the National Institute for Standard and Technology (NIST)
- Abel Buell Map of America (1784)
- Collaboration with NIST and NARA - develop oxygen sensor

Collections Demography

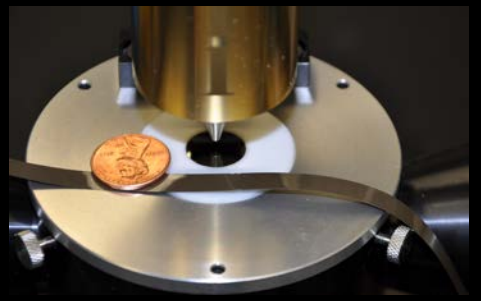
(collection preservation and management)

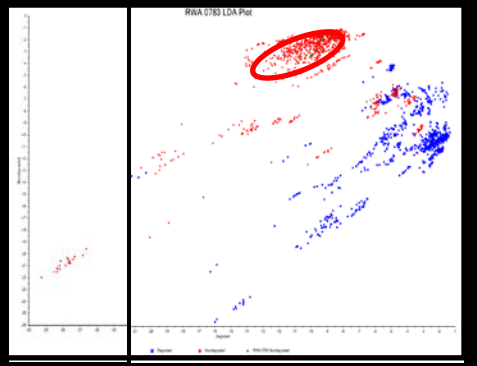
- Collaboration with University College London, Centre for Sustainable Heritage
- *Demography* –analysis of the size, distribution, and characteristics of a population
- Assessing specific materials as “collection” and user response
- Linking usage of collections with physical change
  - Handling reduced molecular weight of cellulose polymer
  - Developing non-invasive method to assess changes in collection materials



Degradation of Magnetic Tape

- LC as non-funded partner on Institute for Museum and Library Services (IMLS) 3year grant (ending 2016)
- To develop a tool for libraries, archives and museums to detect (before damage) whether a tape can safely be played for transfer and access to content
- Rapid non-destructive identification of degraded magnetic tape
- Final component to expand to wider range of tape formulations





Classification as non-degraded or degraded

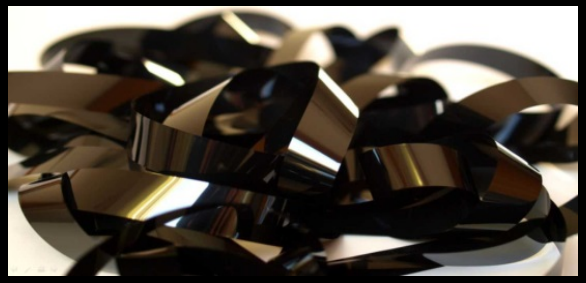
LIBRARY OF CONGRESS

UNIVERSITY OF SOUTH CAROLINA

INSTITUTE of Museum and Library SERVICES

Magnetic Tape Degradation

- Memorandum of Understanding (MOU) between LC and FujiFilm to utilize their accelerated aging laboratories to induce degradation of older tape formats
- Ongoing aging to assess chemical and physical properties in range of storage environments
- Tracking change over time



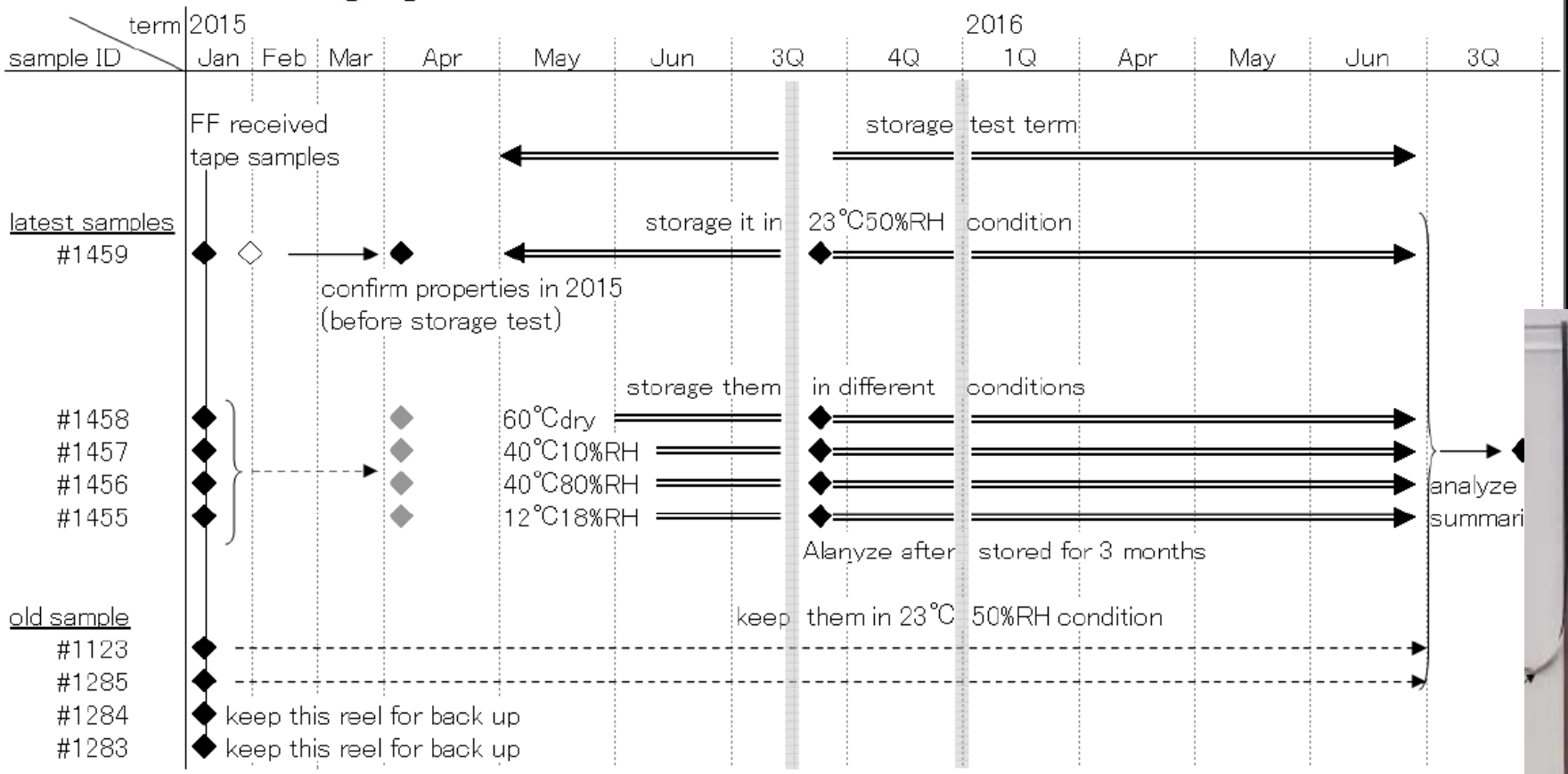
LIBRARY OF CONGRESS

FUJIFILM

Storage test plan-1

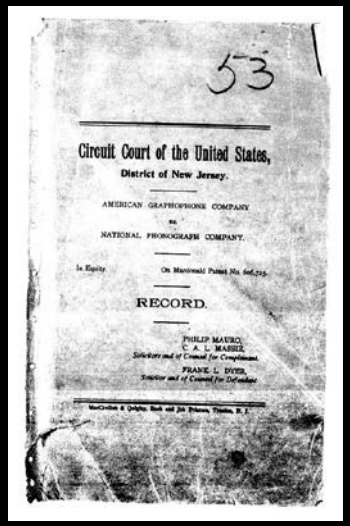
FUJIFILM

- The latest proposal of the schedule



Because Fujifilm will make shutdowns in summer and winter holidays, it will take a little longer than actual 12 month. Fujifilm would like to propose adding the analysis of 3 months storage in August to the analysis of 1 year storage.

Deterioration of Wax Cylinders


53

Circuit Court of the United States,
District of New Jersey.

AMERICAN GRAPHOPHONE COMPANY
vs.
NATIONAL PHONOGRAPH COMPANY.

In Equity. On Mandamus Patent No. 608,245.

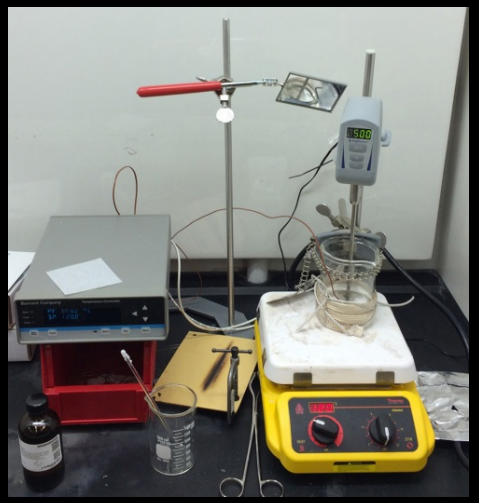
RECORD.

PHILIP MAURO,
C. A. L. MASSIE,
Solicitors and of Counsel for Complainant.

FRANK L. DYER,
Solicitor and of Counsel for Defendant.

Historical Documents

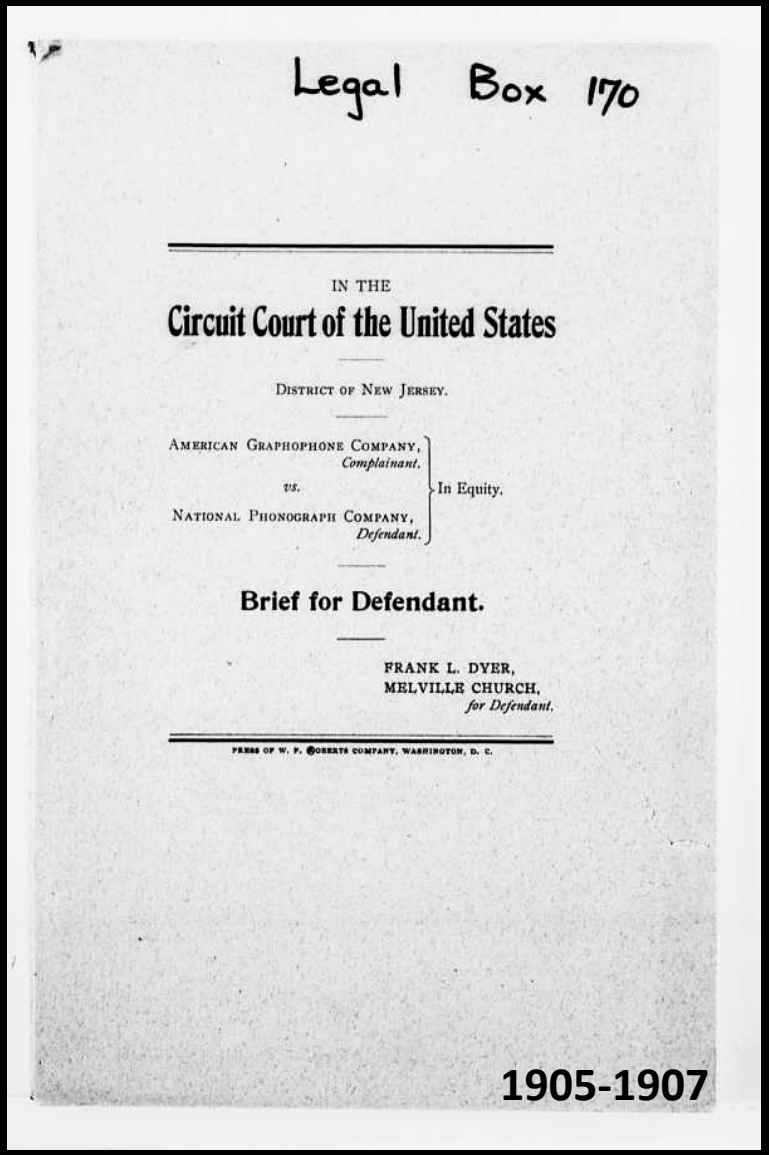
Chemical and Physical Analyses



Laboratory Synthesis

Understanding condition, composition, degradation and storage options

Lawsuit re: MacDonald Patent 606,725



Legal Box 170

IN THE

Circuit Court of the United States

DISTRICT OF NEW JERSEY.

AMERICAN GRAPHOPHONE COMPANY, *Complainant.*
vs.
NATIONAL PHONOGRAPH COMPANY, *Defendant.*
} In Equity.

Brief for Defendant.

FRANK L. DYER,
MELVILLE CHURCH,
for Defendant.

PRESS OF W. F. ROBERTS COMPANY, WASHINGTON, D. C.

1905-1907

14 COMPLAINANT'S PROOFS.

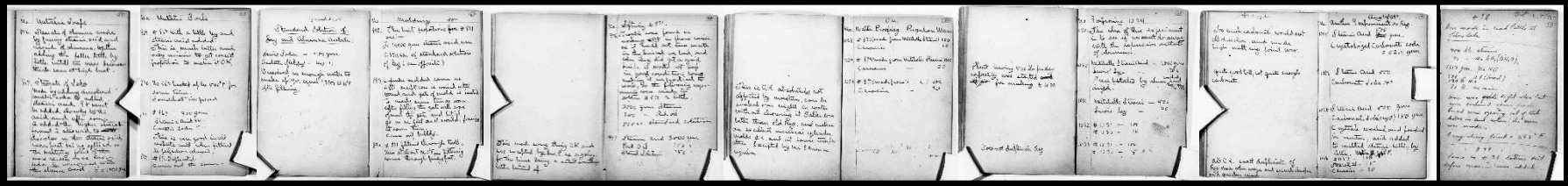
Comparing the process of the patent in suit and that described in the patent No. 782,375, and paralleling the formulas given we have the following:

Macdonald Patent in Suit.	*Aylsworth Patent No. 782,375.*
(1) stearic acid, 300 pounds;	(1) stearic acid, 100 pounds;
(2) caustic soda, 9 pounds;	(2) caustic soda, 452 gr. 1 lb.
(3) sal soda, 60 pounds;	(3) sal soda (sodium carbonate) 21.5 pounds;
(4) aluminium, 1.5 pounds;	(4) aluminium, 175 gr. equals .385 pounds;
(5) ceresin.	(5) ceresin;
	(6) carnauba wax.

10. Defendant further answering, on information and belief, says that the said Letters Patent herein sued upon are invalid and void, because the same were obtained surreptitiously and unjustly for an invention which was, in fact, invented by another or by others who were using reasonable diligence in adapting and perfecting the same, namely:—

By Thomas A. Edison at West Orange, New Jersey, now residing at Llewellyn Park, Orange, New Jersey.

By Jonas W. Aylsworth at West Orange, New Jersey, now residing at East Orange, New Jersey.



Experiment 1058

Aug 1889

Too much carbonate would not all dissolve, and made high melting point wax.

Quite good but, not quite enough carbonate.

all O.K. exact duplicate of Reg Made other ways and much cheaper and quicker made.

Aug 14/1889, (155)

No. Another Improvement on Reg.

1055. Stearic Acid ~~500~~ 500 gm.
Crystalized Carbonate soda 2,02.5 gm.

1056 Stearic Acid 500
Carbonate Soda 140

1057 Stearic Acid 500 gm
Carbonate Soda (cryst) 150 gm
Crystals washed, and powdred in mortar, and added to melted stearic little, by little, Water at 230° F.

1058 #1057 — 100
Stearat Al — 15
Cerasin — 30

Experiment 38 (NB 1000)

Oct 1895 #38 Oct 2.4/95 (77)

Wax made in lead kettle at Silver Lake

400 lb. stearic
92 " $Na_2CO_3(10H_2O)$
1359 gm. NaHO
598
120 lb. H_2O Al (powd)
80 lb. cerasin

Wax was quite light color but was darkened some from burnd wax ozering out of tack holes in lead where the seam was made.

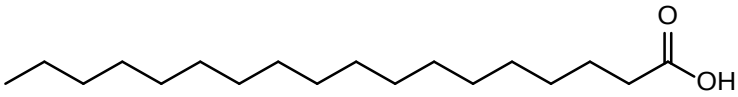
Congealing point = 262° F

#39

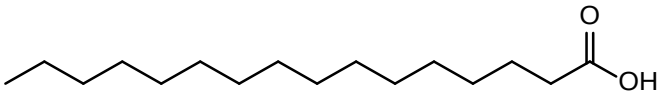
Same as #38 taken out before cerasin was added.

Chemical Composition from Lab Notebooks

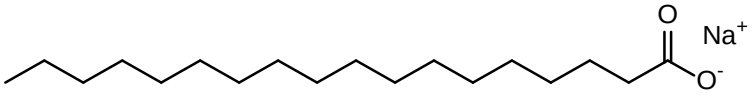
Stearic acid



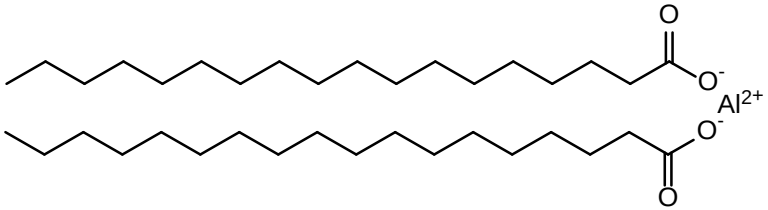
Palmitic acid



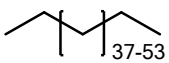
Sodium stearate (+ palmitate)



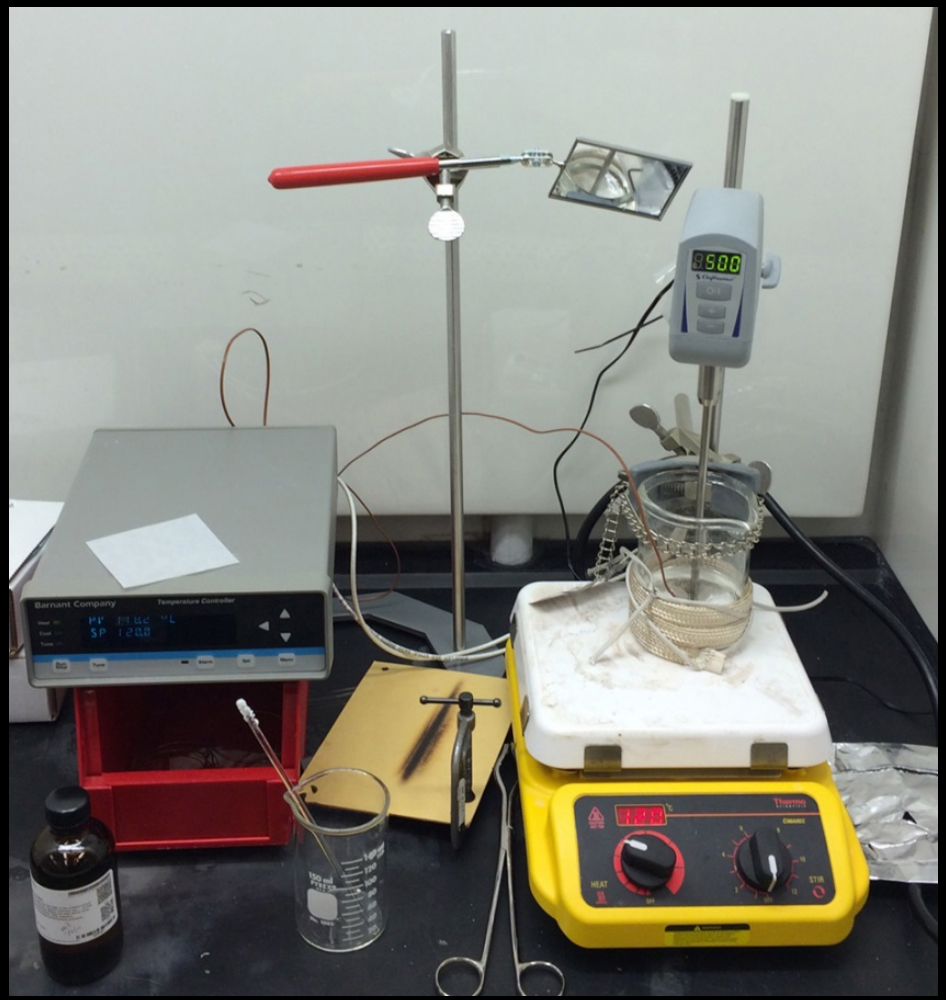
Aluminum stearate (+ palmitate)

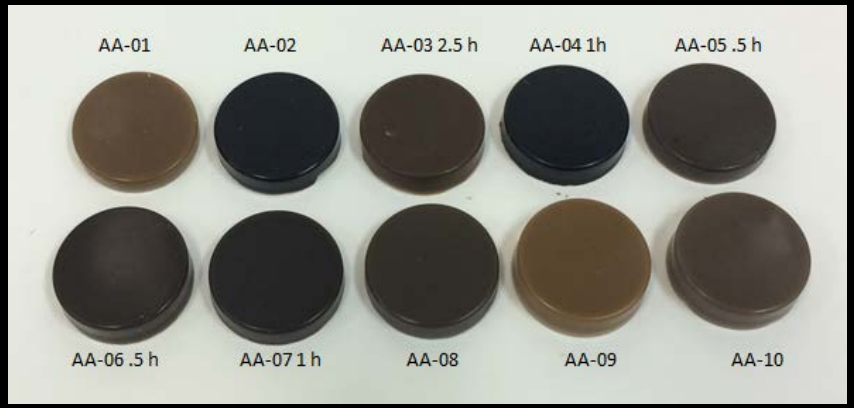


Ceresin wax

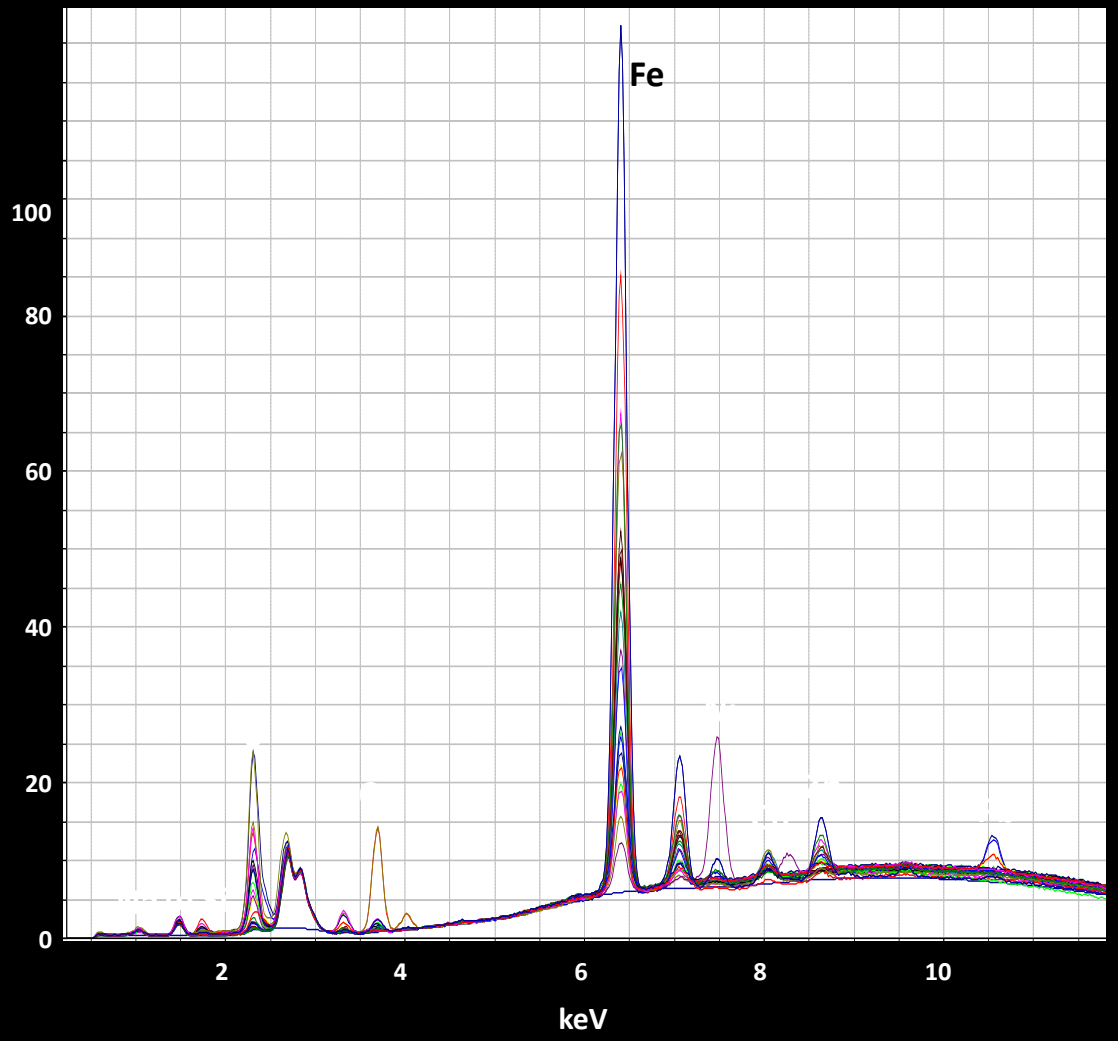


Producing Waxes from Historical Recipes

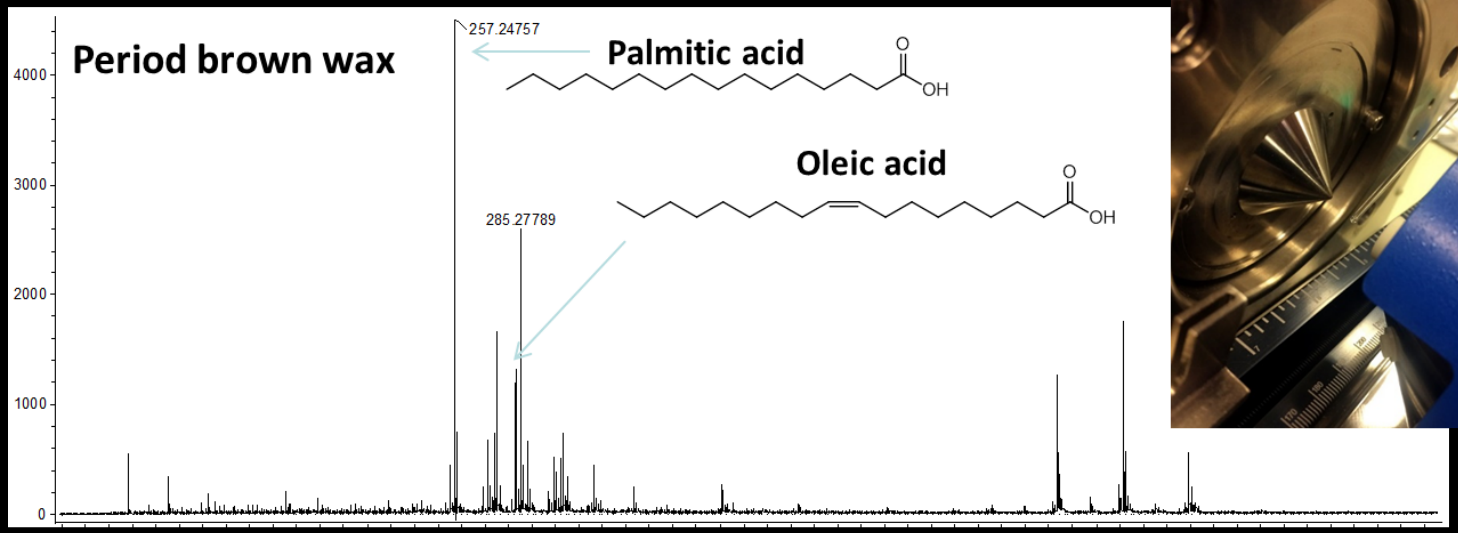


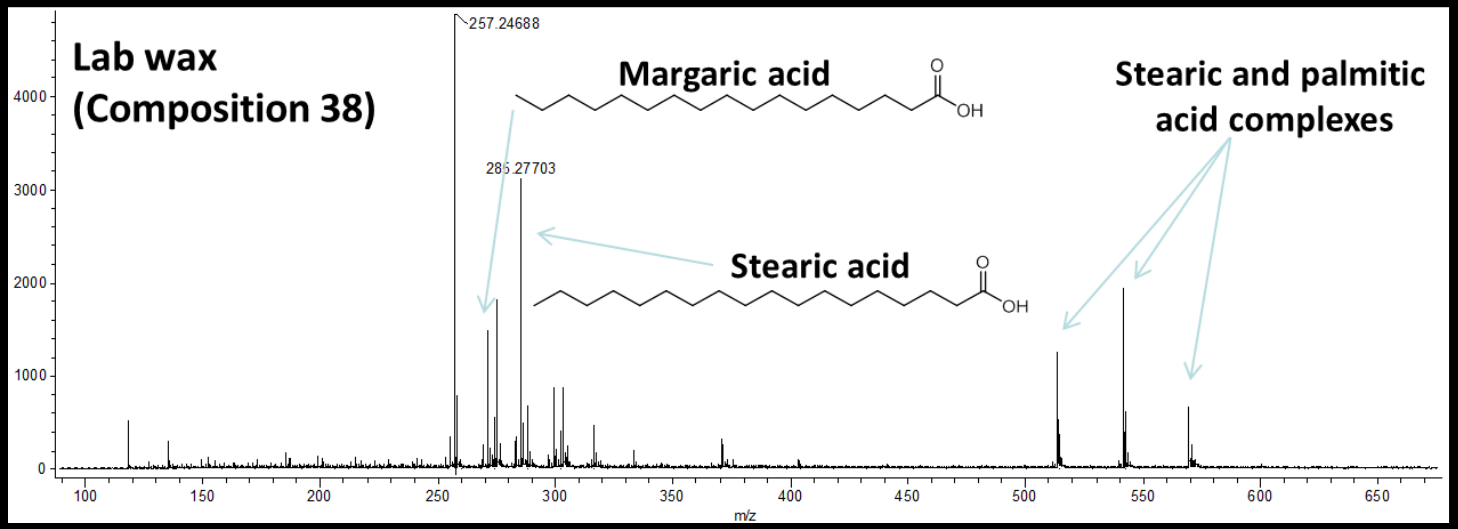


Non-invasive Analysis of Original Cylinders
Inorganic (trace metals)



Analysis of Organic Composition





Thermal Expansion: Impact on Cylinders