Team-Taught Forensic Science

John Bartlett, Bruce Gay, Timothy Metz, and **Michael Wells**

Campbell University

Where is Campbell University?

Buies Creek, NC

FNSC 101 Introduction to Forensic Science

An introduction to the fundamental concepts of forensics science. The use of science and technology to solve crime will be the major thrust of the course. Major topics emphasized include: crime scene analysis, evidence collection and analysis, and legal issues surrounding forensic science. The laboratory work will explore the science behind evidence analysis. The course is team-taught by members of the Criminal Justice, Biology, and Chemistry/Physics Departments. The course qualifies as a General College Curriculum science course. Forensic science courses with laboratory may be taken to meet the general college curriculum science requirement. Forensic science courses cannot be taken as biology or chemistry electives.

Required Texts

- Saferstein, R. (2007). Criminalistics: An Introduction to Forensic Science (9th ed.). Upper Saddle River, NJ: Prentice Hall.
- Gardner, R. (2005). Practical crime Scene Processing and Investigation. NY: CRC Press.

The Instructors

- Bruce Gay – Criminal Justice
- John Bartlett – Forensic Entomology
- Tim Metz – Hair and Blood
- Mike Wells – Chemical Evidence

Bruce Gay – Criminal Justice

- 10 years of law enforcement experience from the following agencies: the Dallas Police Department, ATF's Organized Crime Drug Enforcement Task Force, as a Deputy Constable and the Houston Police Department's Targeted Offenders Program.
- I maintain an active training and consulting schedule outside the university for police departments, police academies, several Federal law enforcement agencies, and the International Association of Chiefs of Police (I.A.C.P).
- Areas of training expertise include: use of force, street survival skills, gangs, extremist groups, biological terrorism, ethics, stress management, interviewing and verbal deception detection.
- My educational background includes a **B.A.** in Theology (Tennessee Temple University), **Th.G.** in Apologetics (Temple Baptist Theological Seminary), **M.A.** in Philosophy (University of Texas), and a **Ph.D.** in Criminal Justice (Sam Houston State University).

John Bartlett - Forensic Entomology

- Forensic Science 101 – Introduction to Forensic Science
- Biology 460 - Introduction to Forensic Entomology
- Biology 203 - Zoology
- Biology 205 - Introduction to Biological Research
- Biology 226 - Ornithology
- Biology 327 - Ecology

Tim Metz – Hair and Blood

- **EDUCATION** CORNELL UNIVERSITY, Ithaca, New York
- Ph.D. in Botany with a concentration in Plant Molecular Biology - August, 1994
- Minor concentrations: Genetics and Plant Breeding
- UNIVERSITY OF ILLINOIS, Urbana, Illinois
- B.S. in Agricultural Science, High Honors - May, 1989
- **EXPERIENCE** Teach introductory biology, botany, field botany, horticulture, biotechnology seminar
- CORNELL UNIVERSITY, Ithaca, NY
- Visiting Fellow, Department of Plant Breeding, (5/96 - 8/96)
- Development of PCR screening protocol for transgenic broccoli
- CORNELL UNIVERSITY, Ithaca, NY
- Thesis Project, Dr. Elizabeth D. Earle, Thesis Advisor, (8/90 - 8/94)
- Development of a gene transfer system for Brassica oleracea and analysis of transgenic plants expressing a Bacillus thuringiensis insecticidal crystal protein.
- UNIVERSITY OF ILLINOIS, Urbana , IL
- Undergraduate Research Project, Dr. Theodore Hymowitz, Advisor, (8/88 - 5/89)
- Isozyme detection of hybridization in crosses between Glycine tomentella and Glycine max.

Mike Wells – Chemical Evidence

- BS Chemistry and Computer Science East Carolina University 1993
- PhD – Organometallic Chemistry University of North Carolina at Chapel Hill 1996
- Teaches: Organic Chemistry, Inorganic Chemistry, Introduction to Forensic Science

From the Syllabus . . .

Criminal Justice Unit:
- articulate the purposes and functions of the forensic crime laboratory
- identify the key elements and objectives of processing the crime scene
- demonstrate knowledge and understanding of the legal considerations and restrictions of crime scene evidence collection
- identify and explain the common types of physical evidence found at crime scenes;
- demonstrate knowledge and understanding of the various type of fingerprints and the appropriate reagent for latent print development
- explain the forensic and geometric interpretation of various blood splatters as they relate to criminal investigations; and explain key concepts of collecting and preserving firearm and ballistic evidence.

Biology 1 Unit:
- Understand how a corpse will be examined to determine time and mode of death.
- Understand how to collect, identify and use insect visitors to the corpse to determine time and mode of death.

Biology 2 Unit:
- Distinguish between various types of microscopy and their applications to forensics
- Demonstrate proper use of compound and stereo microscopes with forensic specimens
- Explain how individual DNA differences can be utilized for identification
- Perform standard DNA typing (fingerprinting)
- Describe serological techniques utilized in forensic analysis
- Perform serological analysis of blood specimens

Chemistry Unit:
- demonstrate an understanding of how trace evidence such as glass, paint, fibers, soil, drugs, alcohol, and arson accelerants is collected in the field.
- demonstrate an understanding of the process by which this trace evidence is analyzed in the laboratory by chromatography and spectroscopy

Criminal Justice Unit

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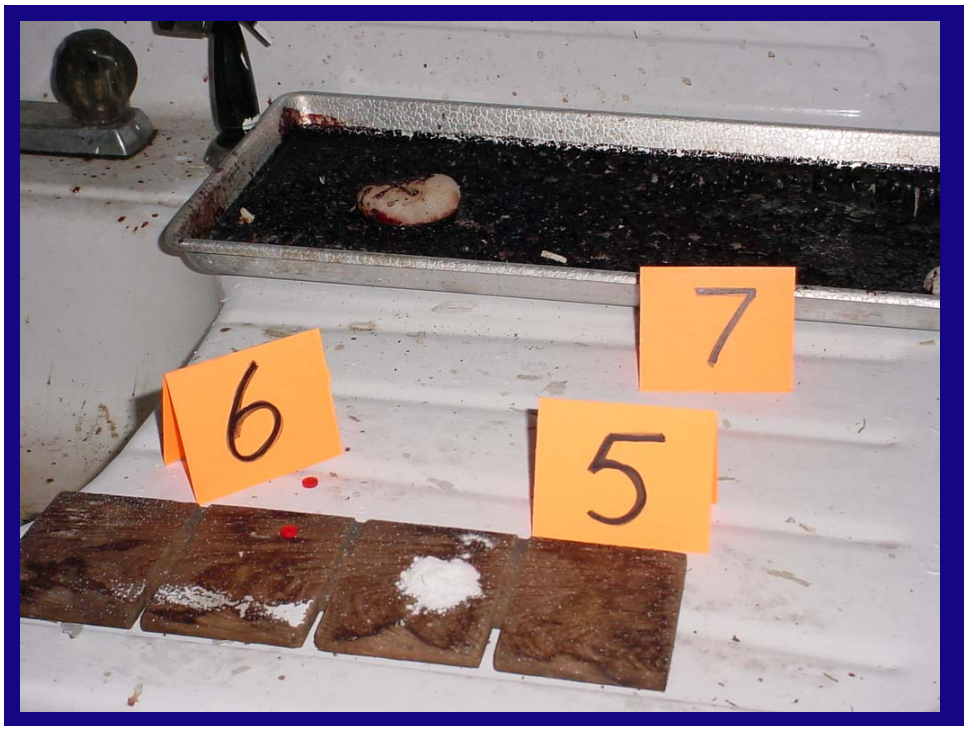
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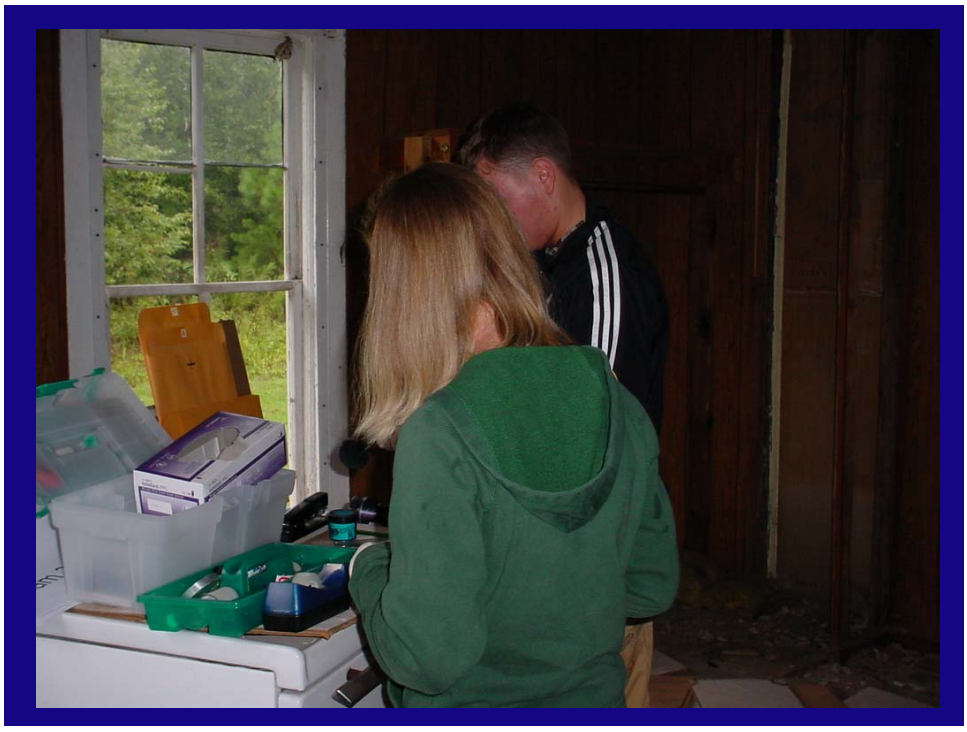

Blood Spatter

http://www.bloodspatter.com/BPATutorial.htm

Biology 1 Unit:
Forensic Entomology

Understand how a corpse will be examined to determine time and mode of death.

Understand how to collect, identify and use insect visitors to the corpse to determine time and mode of death.

Blood Spatter

by Flies

Biology 2 Unit:

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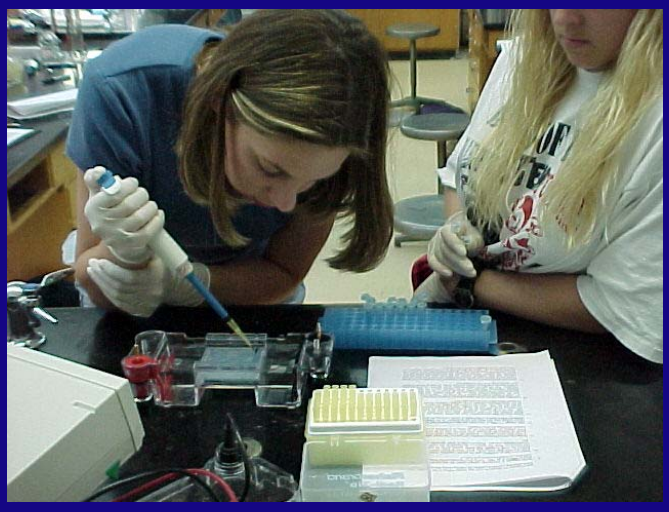

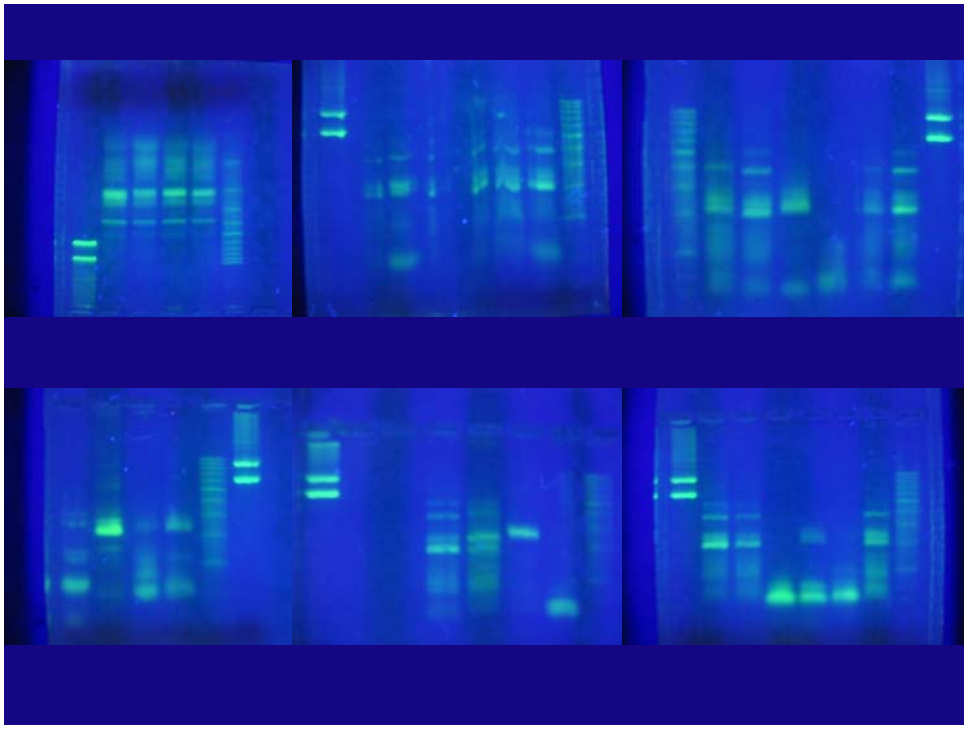

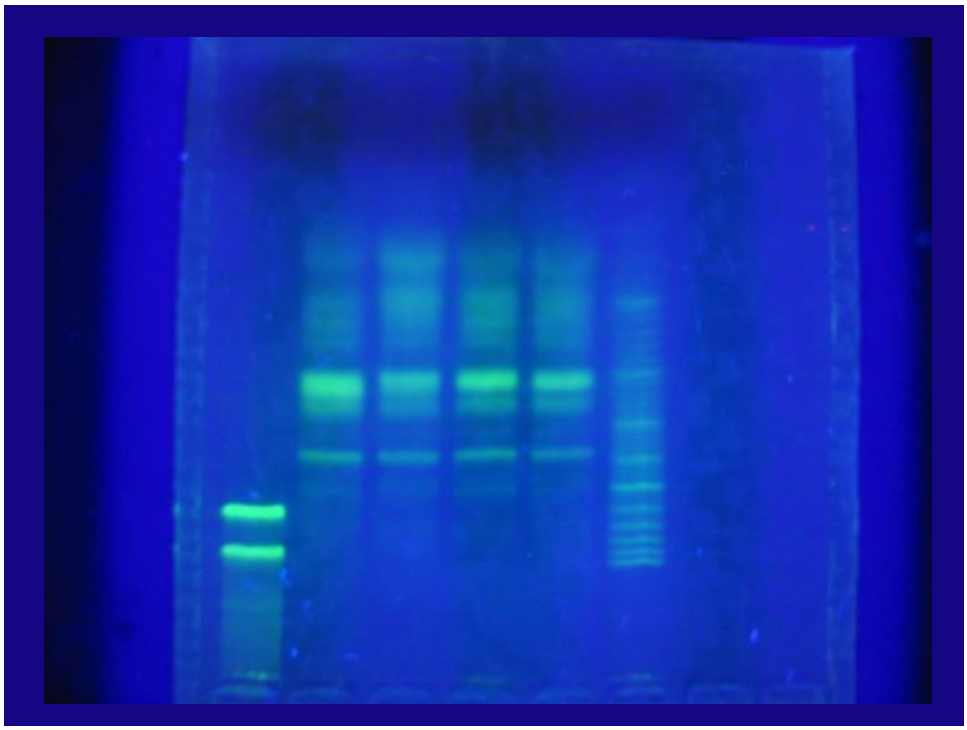

Chemistry Unit

demonstrate an understanding of how trace evidence such as glass, paint, fibers, soil, drugs, alcohol, and arson accelerants is collected in the field.

demonstrate an understanding of the process by which this trace evidence is analyzed in the laboratory by chromatography and spectroscopy

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Topics Covered

Spectroscopy: UV/Vis, IR

Chromatography: TLC, Paper, GC, HPLC, Electrophoresis, GC-MS

Density

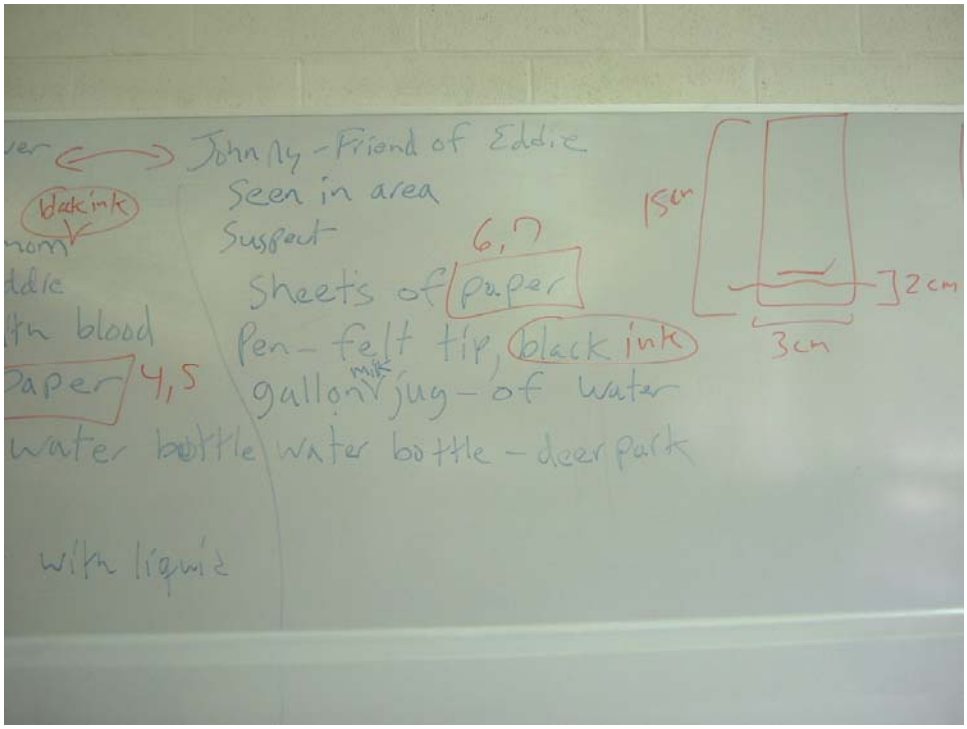
Phenolphthalein

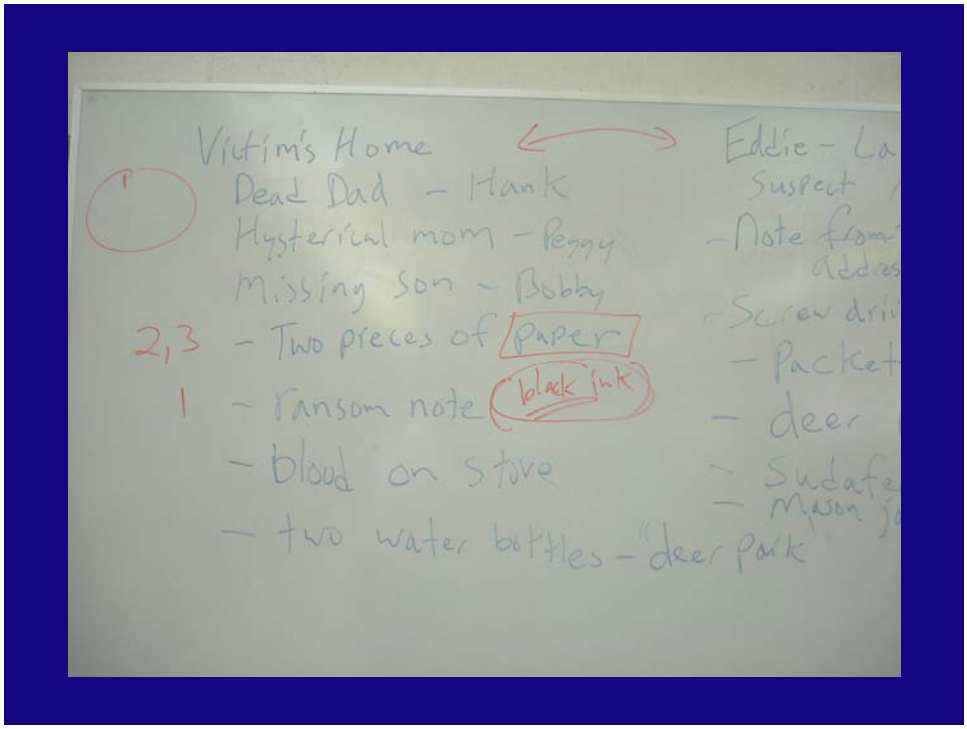
Chromium RedOx

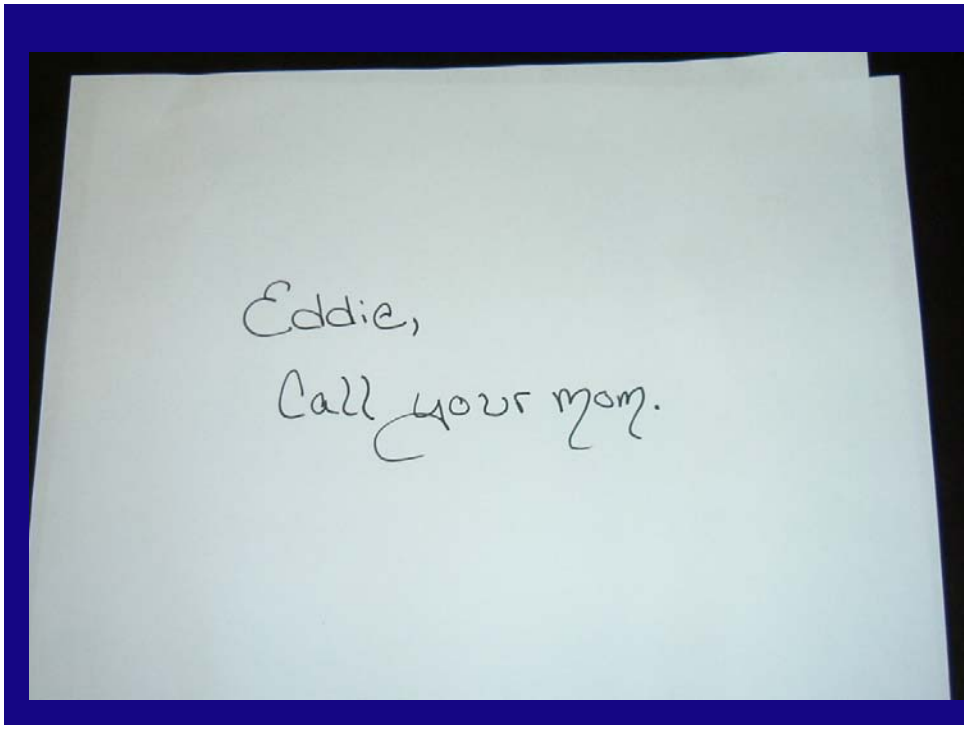
Luminol

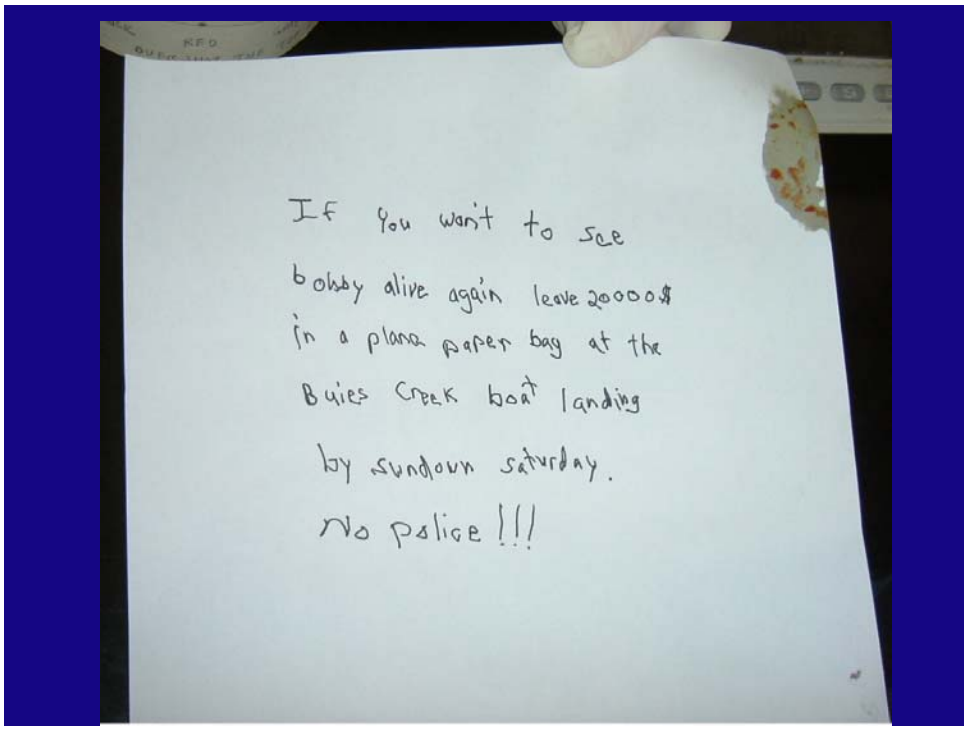
Latent Fingerprints – superglue

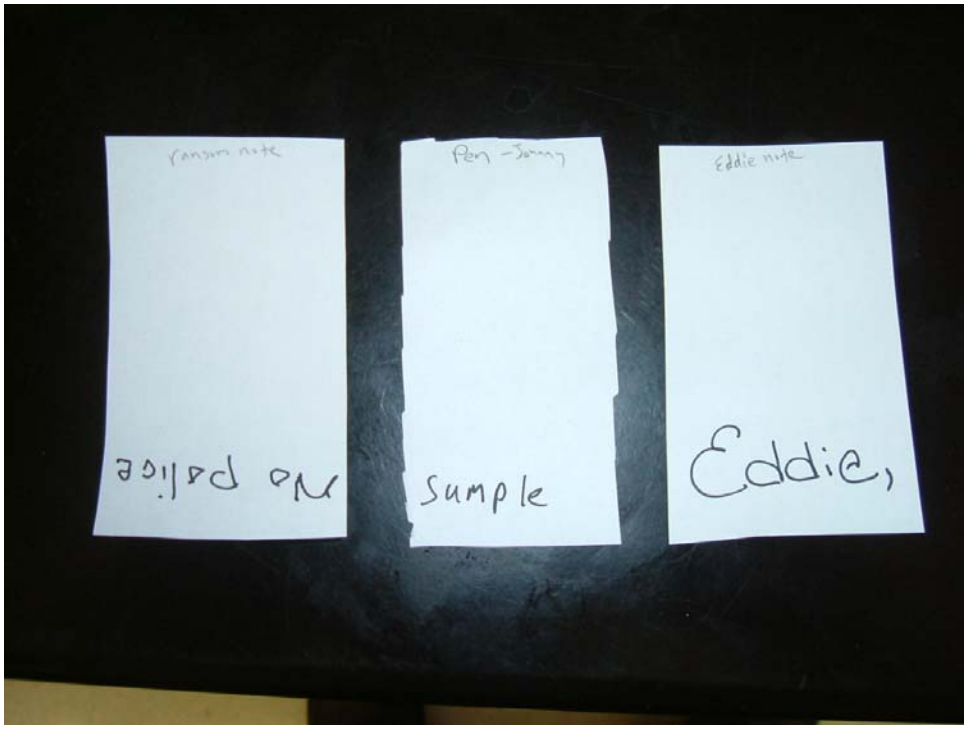

CRIME SCENE DO NOT ENTER
CRIME
ENTER
CRIME SCENE DO NOT ENTER

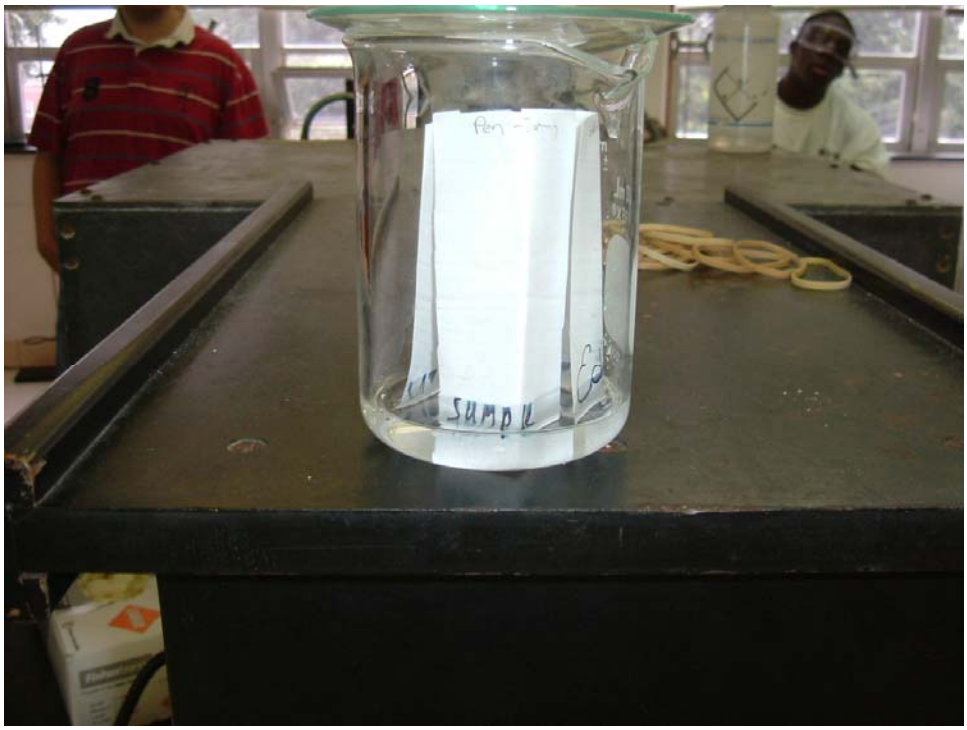

Johnny - Friend of Eddie
Seen in area
Suspect
6,7
Sheets of paper
Pen - felt tip, black ink
gallon jug - of water
water bottle - deer park
black ink
blood
paper
4,5
water bottle
with liquid
15cm
2cm
3cm

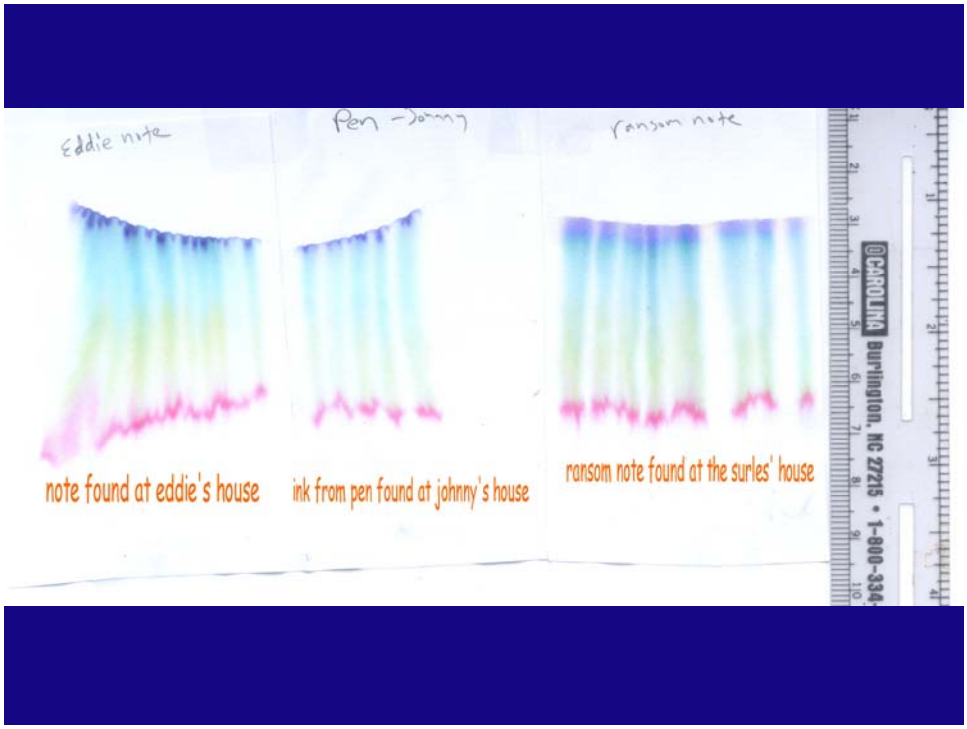

Victim's Home
Dead Dad - Hank
Hysterical mom - Peggy
Missing son - Bobby
2,3 - Two preces of paper
1 - ransom note
black ink
- blood on stove
- two water bottles - "deer park
Eddie - La
Suspect
- Note from
- Packet
- deer
- Sudafe
- Mason

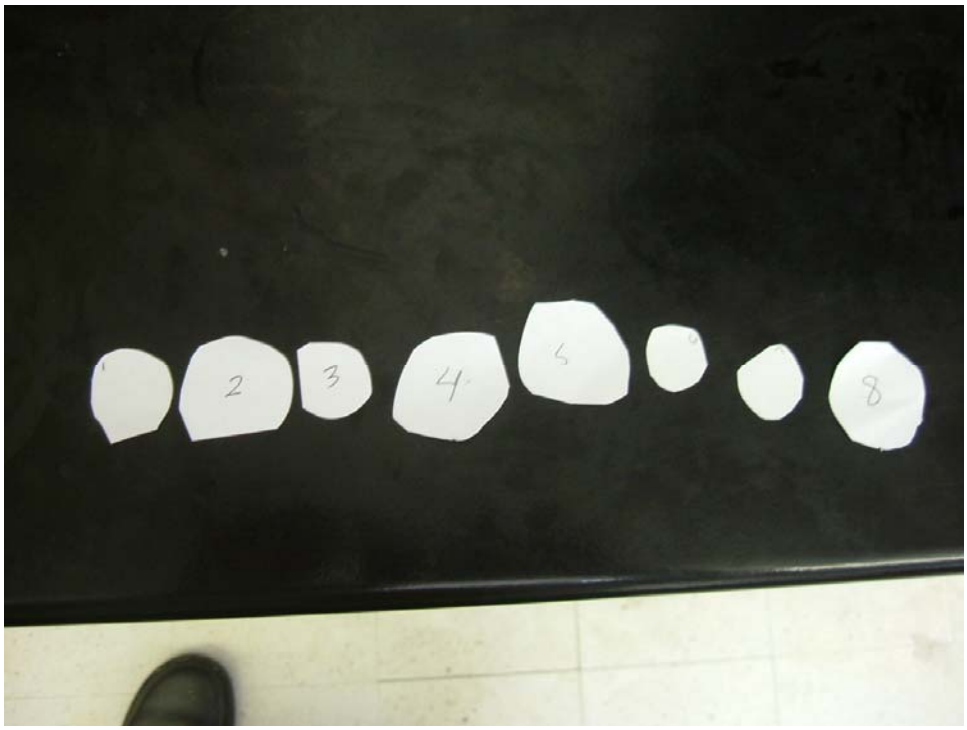

Eddie,
Call your mom.


If you want to see
bobby alive again leave 20000$
in a plane paper bag at the
Buies Creek boat landing
by sundown saturday.
No police !!!


ransom note
Eddie note
No police
sumple
Eddie,


SUMPLE


Eddie note
Pen - Johnny
ransom note
CAROLINA Burlington, NC 27215 • 1-800-334
note found at eddie's house
ink from pen found at johnny's house
ransom note found at the surles' house


2
3
4
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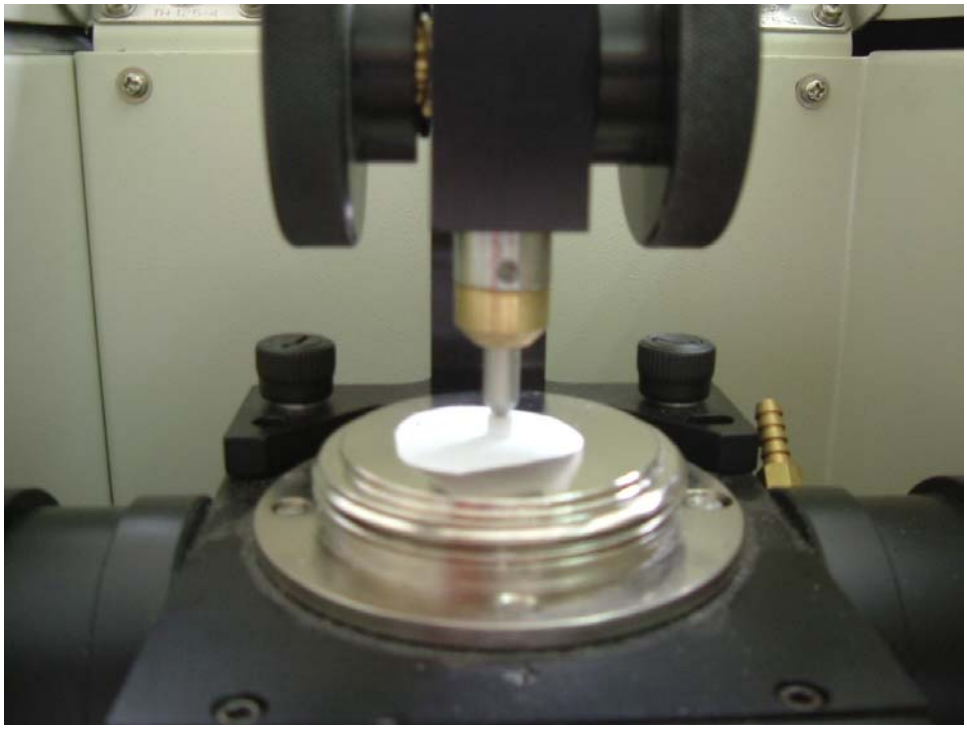
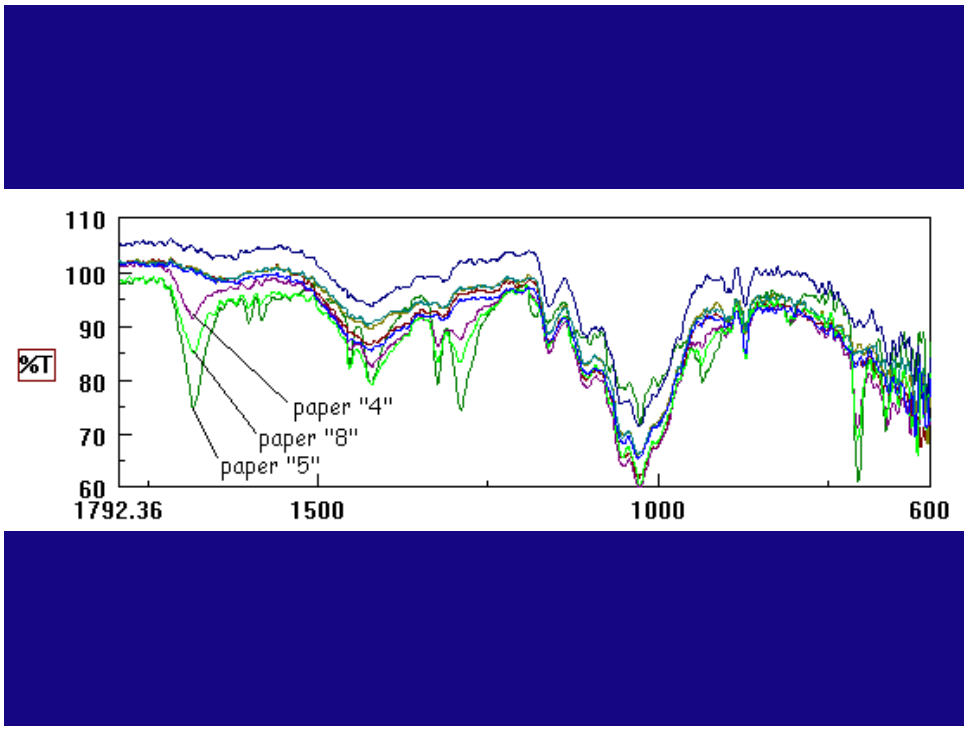
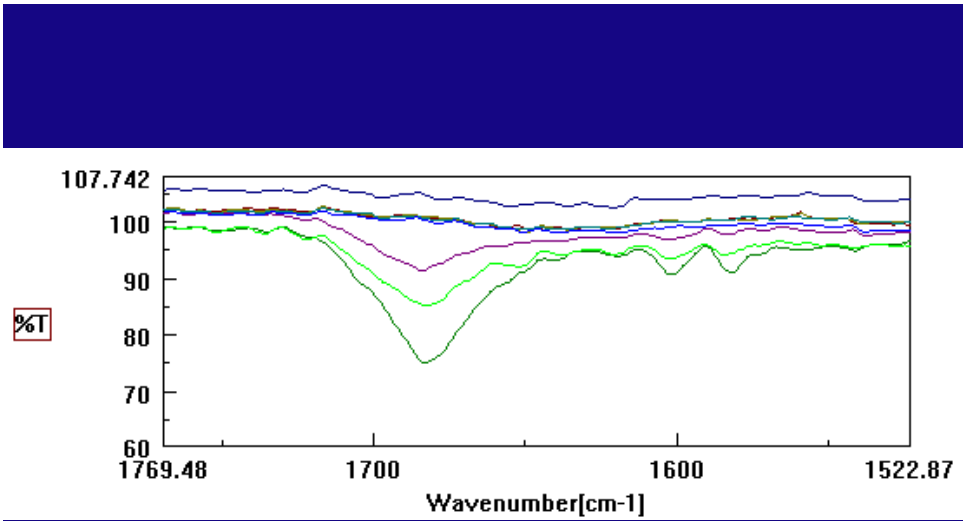
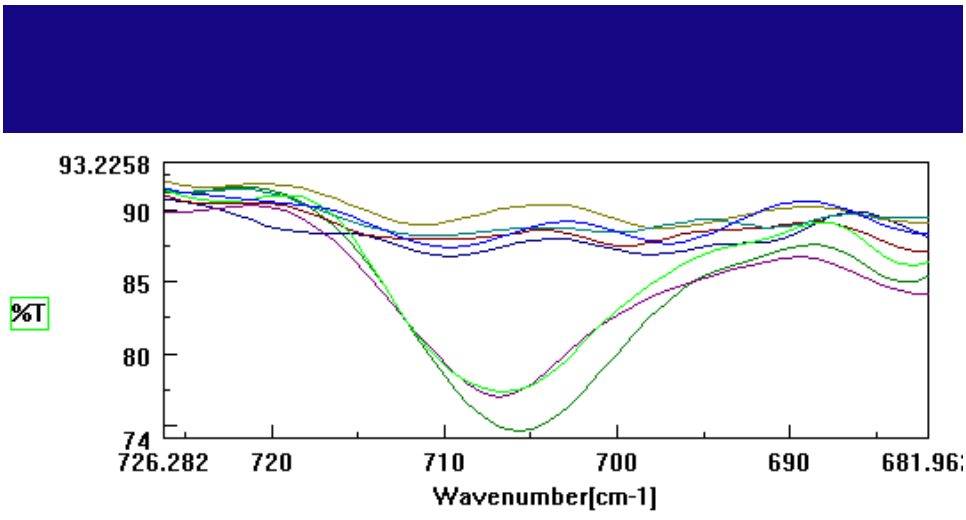
8

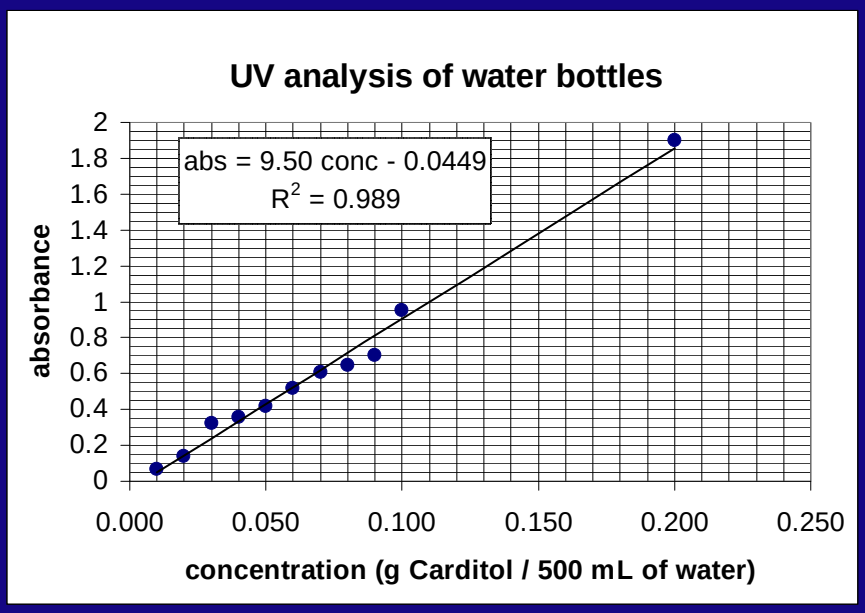



110
100
90
80
70
60
%T
paper "4"
paper "8"
paper "5"
1792.36
1500
1000
600

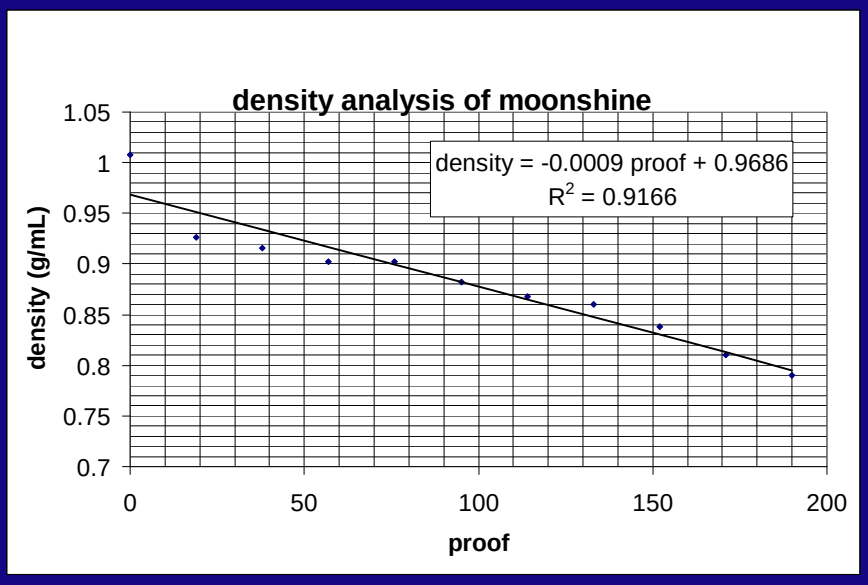

107.742
100
90
%T
80
70
60
1769.48
1700
1600
1522.87
Wavenumber[cm-1]

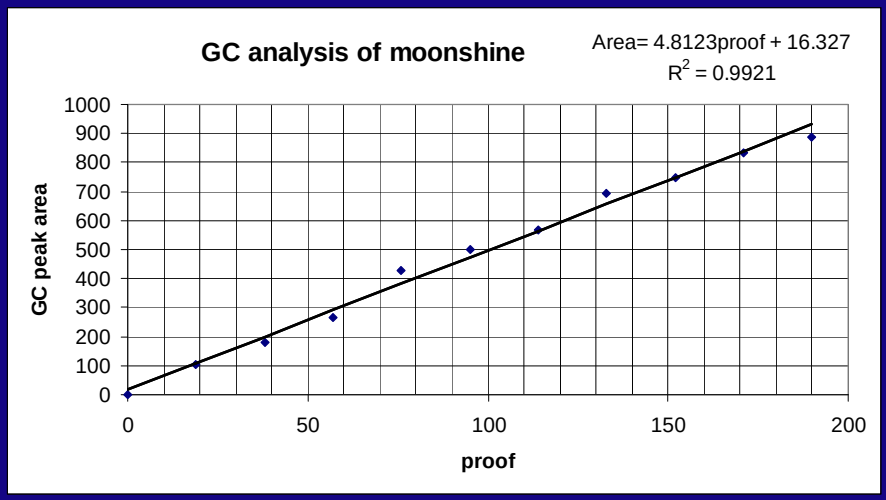

93.2258
90
85
%T
80
74
726.282
720
710
700
690
Wavenumber[cm-1]

sample	g/ 500 mL	absorbance
α: standard	0.200	1.901
a: standard	0.100	0.953
b: standard	0.090	0.702
c: standard	0.080	0.649
d: standard	0.070	0.606
e: standard	0.060	0.519
f: standard	0.050	0.417
g: standard	0.040	0.354
h: standard	0.030	0.324
i: standard	0.020	0.14
j: standard	0.010	0.069
1: opened bottle at Surles home	?	1.258
2: unopened bottle at Surles home	?	0
3: unopened bottle at Eddie's home	?	0
4: mason jar at Eddie's home	?	0
5: gallon jug at Johnny's home	?	0
6: opened bottle at Johnny's home	?	0.92

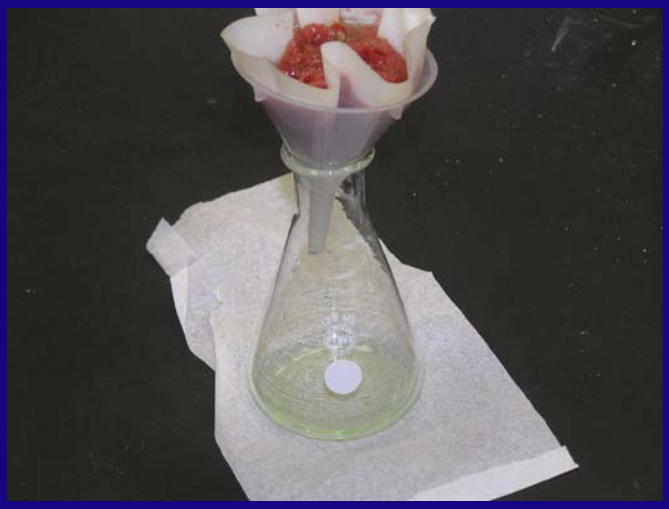


standards	mL 190 proof in 10 mL	proof	mass of 5.0 mL	denisty g/mL	GC peak area
0	0	0	5.04	1.008	0
1	1	19	4.63	0.926	102.5
2	2	38	4.58	0.916	180.9
3	3	57	4.51	0.902	266.3
4	4	76	4.51	0.902	427.1
5	5	95	4.41	0.882	499.7
6	6	114	4.34	0.868	569.5
7	7	133	4.3	0.86	692.7
8	8	152	4.19	0.838	749.1
9	9	171	4.05	0.81	835.5
10	10	190	3.95	0.79	885.2
mason			4.67	0.934	150.3
jug			4.69	0.938	148.4




GC analysis of moonshine
Area= 4.8123proof + 16.327
R2 = 0.9921
GC peak area
1000
900
800
700
600
500
400
300
200
100
0
0
50
100
150
200
proof


STORAGE HOOD



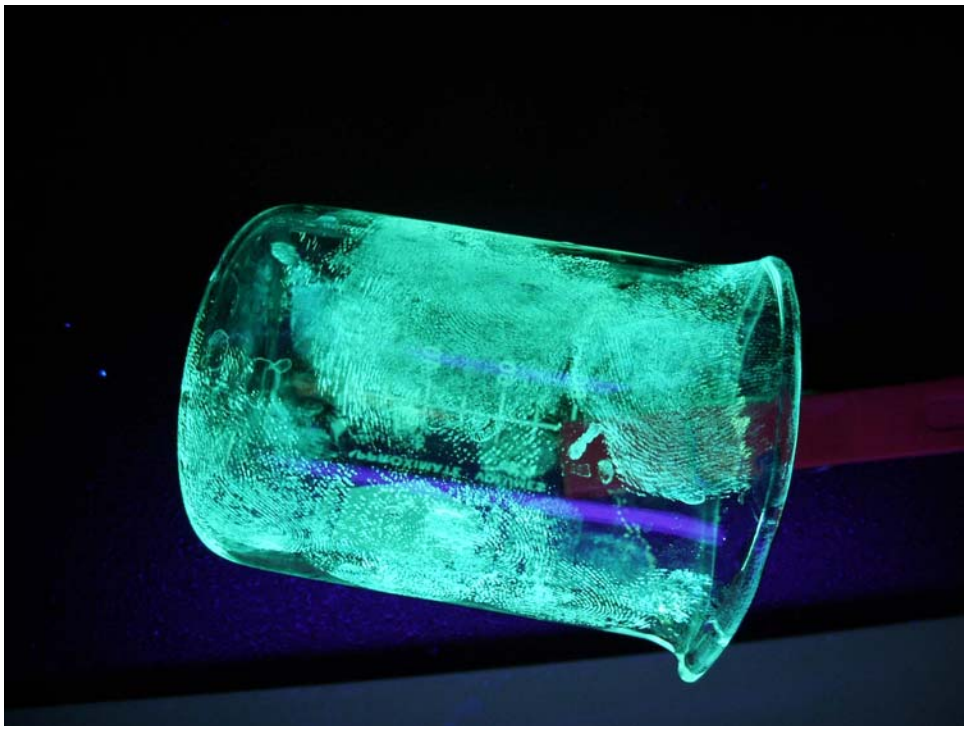

CORROSIVES


K·S·E


K·S·E


Smoothy


3 Musketeers
Almond Joy

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Team Teaching

The Good . . .

- Expertise of instructors

The Bad . . .

- Disjointed
- Scheduling

In the Future

One Crime Scenario

Use of Local Police

Thanks

NSF- National Science Foundation

CWCS – Center for Workshops in the Chemical Sciences

Professor Larry Kaplan, Williams College