

**Supplementary Information for “Enzyme-based paper test for detection of
lactose in illicit drugs”**

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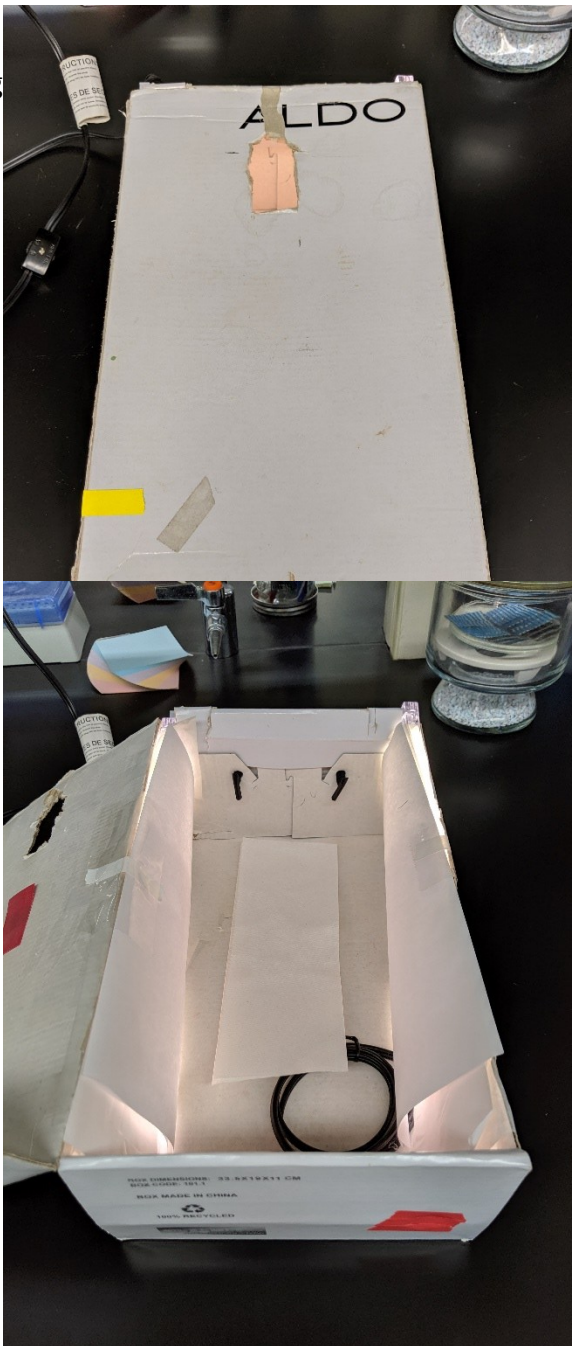
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S.1 Lig



S.2 Lactose detection at various concentrations

Lactose eye at cor use in starch.



S.3 Blinded study to detect lactose

S.3.a Sample composition and reader identifications

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
7VG	Lactose	100					Correct	Correct	Correct
87G	Lactose	100					Correct	Correct	Correct
CMN	Lactose	100					Correct	Correct	Correct
M3B	Lactose	100					Correct	Correct	Correct
SVZ	Lactose	100					Correct	Correct	Correct
X8Z	Lactose	100					Correct	Correct	Correct
7TA	Cocaine	50	Lactose	50			Correct	Correct	Correct
AW9	Cocaine	50	Lactose	50			Correct	Correct	Correct
DBZ	Cocaine	50	Lactose	50			Correct	Correct	Correct
JVT	Cocaine	50	Lactose	50			Correct	Correct	Correct
QF2	Cocaine	50	Lactose	50			Correct	Correct	Correct
BBL	Crack Cocaine	50	Lactose	50			Correct	Correct	Correct
CRJ	Crack Cocaine	50	Lactose	50			Correct	Correct	Correct
SUC	Crack Cocaine	50	Lactose	50			Correct	Correct	Correct
T8Q	Crack Cocaine	50	Lactose	50			Correct	Correct	Correct
YCH	Crack Cocaine	50	Lactose	50			Correct	Correct	Correct
CMD	Heroin	50	Lactose	50			Correct	Correct	Correct
CSV	Heroin	50	Lactose	50			Correct	Correct	Correct
D4H	Heroin	50	Lactose	50			Correct	Correct	Correct
FA4	Heroin	50	Lactose	50			Correct	Correct	Correct
ZFC	Heroin	50	Lactose	50			Correct	Correct	Correct

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
2HJ	Heroin	50	Starch	50			Correct	Correct	Correct
4UC	Heroin	50	Starch	50			Correct	Correct	Correct
A01	Heroin	50	Starch	50			Correct	Correct	Correct
AHC	Heroin	50	Starch	50			Correct	Correct	Correct
B01	Heroin	50	Starch	50			Correct	Correct	Correct
C01	Heroin	50	Starch	50			Image missing	Image missing	Image missing
D01	Heroin	50	Starch	50			Correct	Correct	Correct
E01	Heroin	50	Starch	50			Incorrect	Correct	Incorrect
GUH	Heroin	50	Starch	50			Correct	Correct	Correct
HLS	Heroin	50	Starch	50			Correct	Correct	Correct
8DZ	Cocaine	75	Lactose	25			Correct	Correct	Correct
F77	Cocaine	75	Lactose	25			Correct	Correct	Correct
FKY	Cocaine	75	Lactose	25			Correct	Correct	Correct
GZV	Cocaine	75	Lactose	25			Correct	Correct	Correct
RAL	Cocaine	75	Lactose	25			Correct	Correct	Correct
6FD	Heroin	75	Lactose	25			Correct	Correct	Correct
DSR	Heroin	75	Lactose	25			Correct	Correct	Correct
JM2	Heroin	75	Lactose	25			Correct	Correct	Correct
JW7	Heroin	75	Lactose	25			Correct	Correct	Correct
UVT	Heroin	75	Lactose	25			Correct	Correct	Correct
QZC	Cocaine	50	Lactose	25	Starch	25	Correct	Correct	Correct
U9A	Cocaine	50	Lactose	25	Starch	25	Correct	Correct	Correct
Z3Z	Cocaine	50	Lactose	25	Starch	25	Correct	Correct	Correct
6ZD	Crack Cocaine	50	Lactose	25	Starch	25	Correct	Correct	Correct
VFR	Crack Cocaine	50	Lactose	25	Starch	25	Correct	Correct	Correct
TW7	Heroin	50	Lactose	25	Starch	25	Correct	Correct	Correct

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
V6F	Heroin	50	Lactose	25	Starch	25	Correct	Correct	Correct
ZBE	Heroin	50	Lactose	25	Starch	25	Correct	Correct	Correct
48W	Cocaine	90	Lactose	10			Correct	Correct	Correct
6S8	Cocaine	90	Lactose	10			Correct	Correct	Correct
FYC	Cocaine	90	Lactose	10			Correct	Correct	Correct
T79	Cocaine	90	Lactose	10			Correct	Correct	Correct
TQW	Cocaine	90	Lactose	10			Correct	Correct	Correct
G7S	Crack Cocaine	90	Lactose	10			Correct	Correct	Correct
W8Z	Crack Cocaine	90	Lactose	10			Correct	Correct	Correct
ACH	Heroin	90	Lactose	10			Image missing	Image missing	Image missing
AUV	Heroin	90	Lactose	10			Correct	Correct	Correct
KPM	Heroin	90	Lactose	10			Correct	Correct	Correct
RJJ	Heroin	90	Lactose	10			Correct	Correct	Correct
UW3	Heroin	90	Lactose	10			Correct	Correct	Correct
4G4	Cocaine	100					Correct	Correct	Correct
6Q2	Cocaine	100					Correct	Correct	Correct
PFT	Cocaine	100					Correct	Correct	Correct
T9H	Cocaine	100					Correct	Correct	Correct
ZCK	Cocaine	100					Correct	Correct	Correct
6VW	Crack Cocaine	100					Correct	Correct	Correct
AGF	Crack Cocaine	100					Correct	Correct	Correct
Q96	Crack Cocaine	100					Correct	Correct	Correct
RUJ	Crack Cocaine	100					Correct	Correct	Correct

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
VS2	Crack Cocaine	100					Correct	Correct	Correct
Z6X	Crack Cocaine	100					Correct	Correct	Correct
9VW	Dimethyl Sulfone	100					Correct	Correct	Incorrect
DBW	Dimethyl Sulfone	100					Correct	Correct	Correct
JB4	Dimethyl Sulfone	100					Correct	Correct	Correct
KBY	Dimethyl Sulfone	100					Correct	Correct	Correct
QXM	Dimethyl Sulfone	100					Correct	Correct	Correct
7PG	Heroin	100					Correct	Correct	Correct
8CF	Heroin	100					Correct	Correct	Correct
A4F	Heroin	100					Correct	Correct	Correct
RE6	Heroin	100					Image missing	Image missing	Image missing
VEA	Heroin	100					Correct	Correct	Correct
A02	Mannitol	100					Correct	Correct	Correct
B02	Mannitol	100					Correct	Correct	Correct
C02	Mannitol	100					Correct	Correct	Correct
D02	Mannitol	100					Correct	Correct	Correct
E02	Mannitol	100					Correct	Correct	Correct
9NE	Methamphet amine	100					Correct	Correct	Correct
E3R	Methamphet amine	100					Correct	Correct	Correct
NB4	Methamphet	100					Correct	Correct	Correct

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
	amine								
R68	Methamphet amine	100					Incorrec t	Correct	Incorrect
V6Z	Methamphet amine	100					Correct	Correct	Correct
B3C	Procaine	100					Correct	Correct	Correct
HLV	Procaine	100					Correct	Correct	Correct
HUP	Procaine	100					Correct	Correct	Correct
JDH	Procaine	100					Correct	Correct	Correct
T6D	Procaine	100					Correct	Correct	Correct
3NS	Starch	100					Correct	Correct	Correct
6KR	Starch	100					Correct	Correct	Correct
CQR	Starch	100					Correct	Correct	Correct
TFG	Starch	100					Sample not run	Sample not run	Sample not run
V2Z	Starch	100					Correct	Correct	Correct

S.3.b Images of tests after running with samples

RUJ



TQW



B02



48W



V2Z



FYC



87G



7VG



UVT



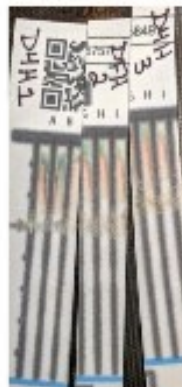
GDH



CSV



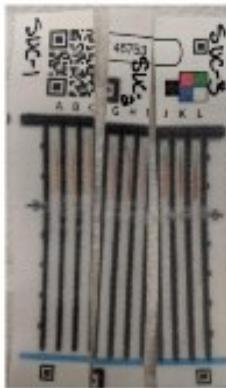
D4H



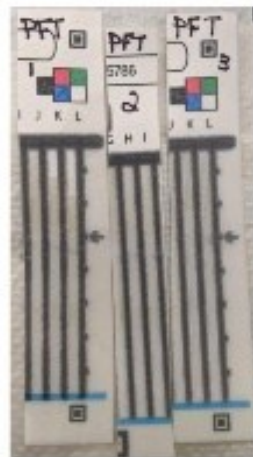
KBY



SUC



PFT



B01



RAL



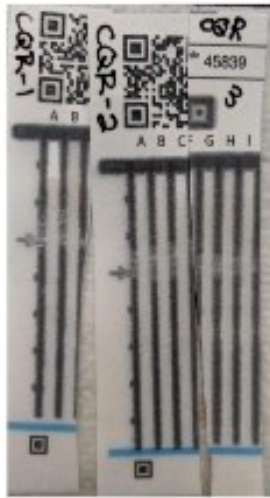
SVZ



YCH



CQR



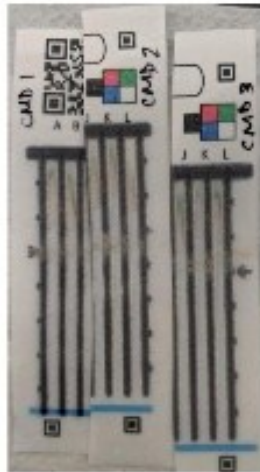
JMZ



6QZ



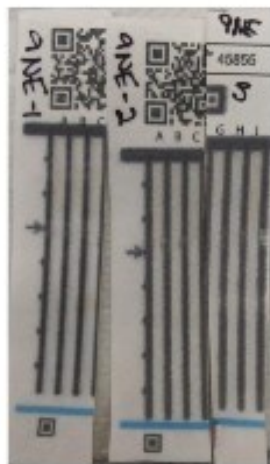
CMD



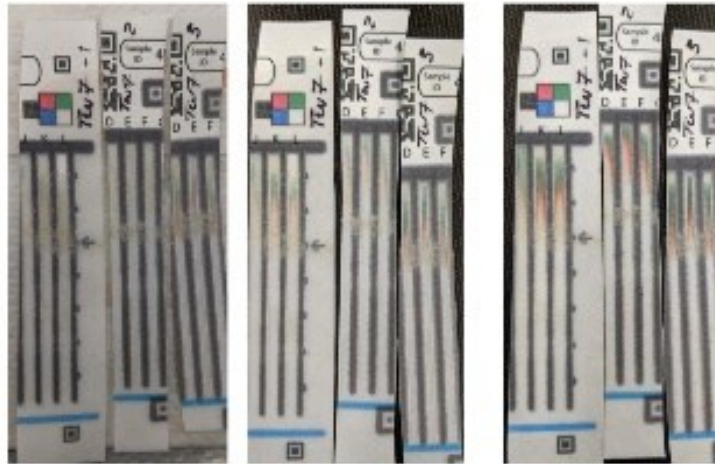
T79



9NE



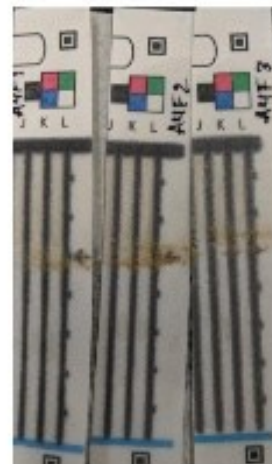
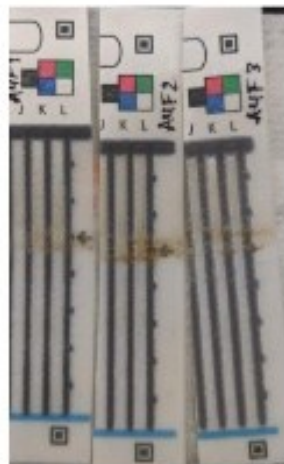
TW7



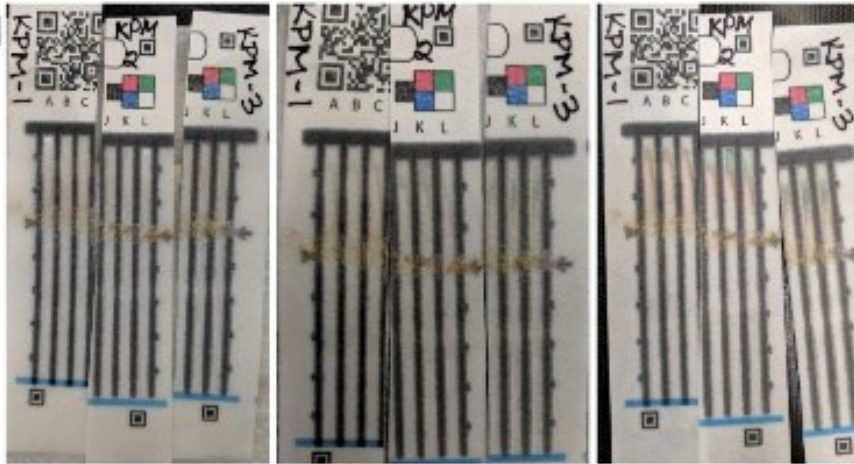
DBZ



A4F



KPM



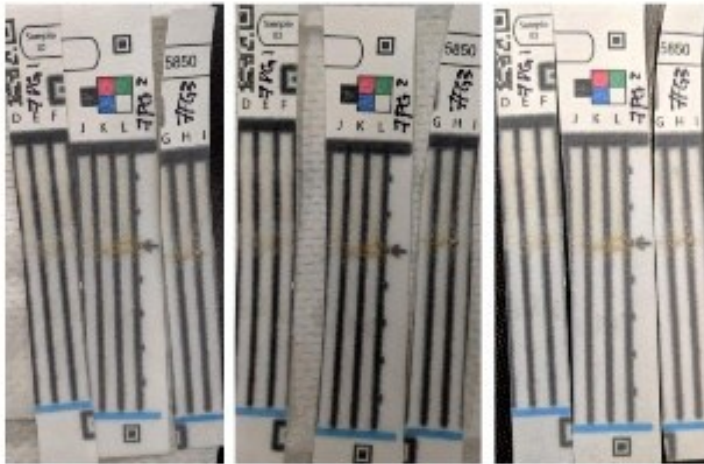
Z8X



V6Z



7PG



D02



T9H



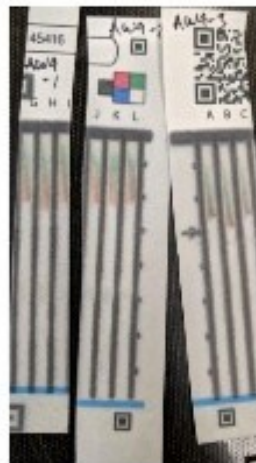
JB4



6VW



AW9



ACH



AUV



CRJ



JVT



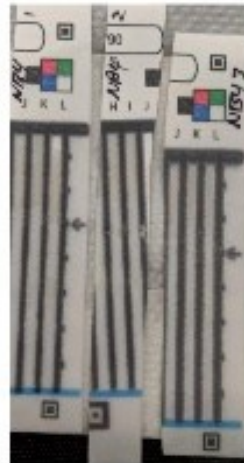
A02



BCF



NB4



BBL



2HJ



E01



6FD



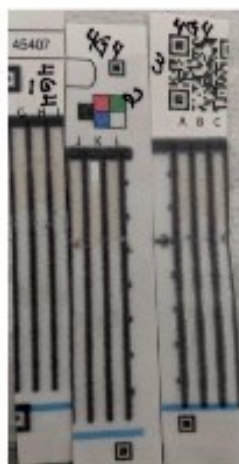
ZFC



GZV



4G4



FKY



DBW



HUP



T6D



FA4



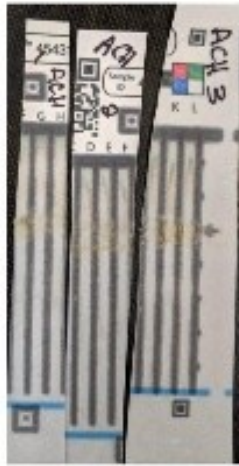
HLS



4UC



ACH



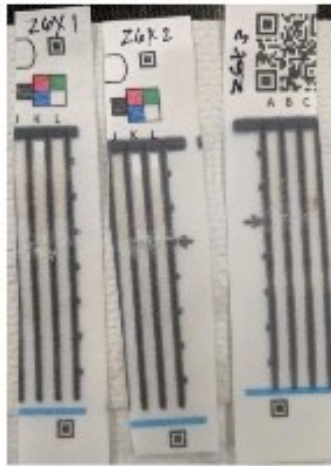
HLV



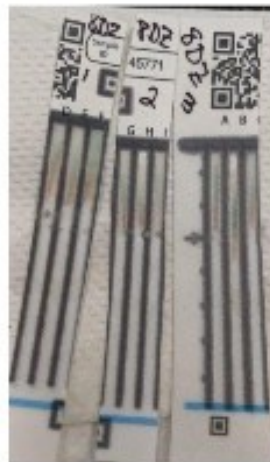
ZCK



Z6X



8DZ



A01



658



VSZ



Z3Z



QZC



ZBE



JW7



U9A



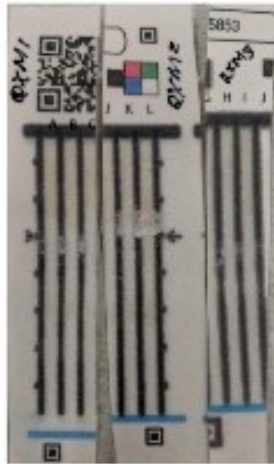
7TA



VEA



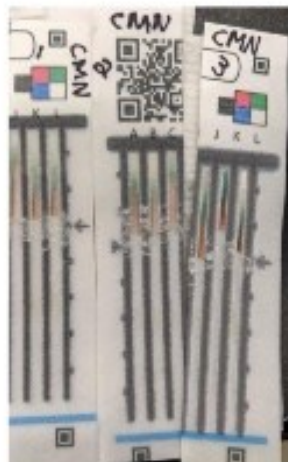
QXM



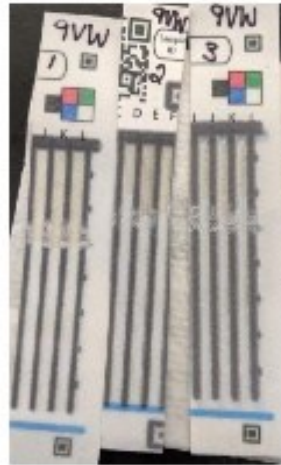
WBZ



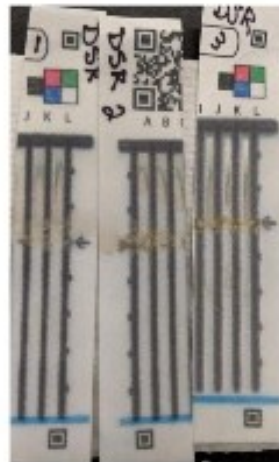
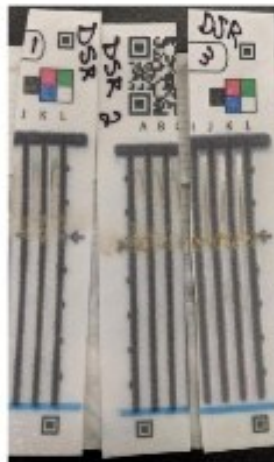
CMN



9VW



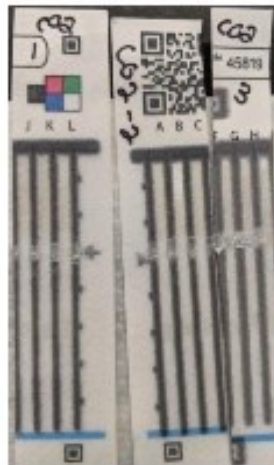
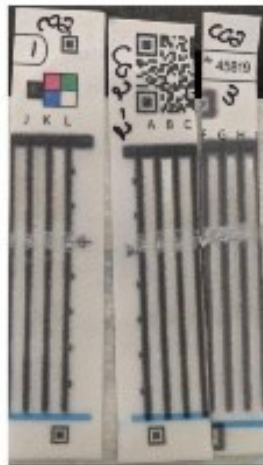
DSR



B3C



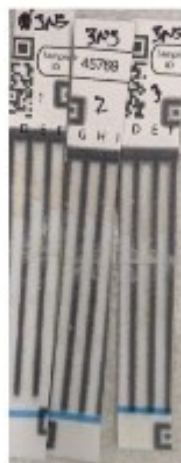
C02



VFR



3NS



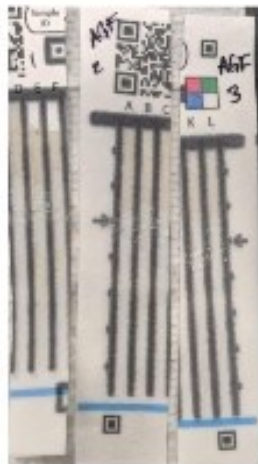
QF2



UW3



AGF



D01



T8Q



6KR



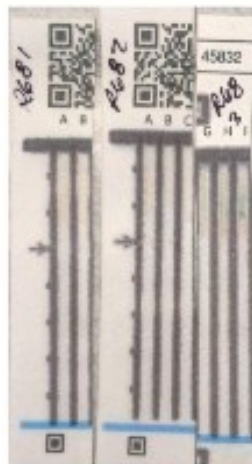
JDH



RJJ



R68



G75



V6F



F77



6ZD



E02



E3R



S.4 Blinded samples run on idPAD

S.4.a sample composition and reader identifications

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
T3C	Lactose	100					Correct	Correct	Correct
XFU	Lactose	100					Correct	Correct	Correct
VN2	Lactose	100					Correct	Correct	Correct
YC6	Lactose	100					Correct	Correct	Correct
SWH	Cocaine	50	Lactose	50			Correct	Correct	Correct
QNF	Cocaine	50	Lactose	50			Correct	Correct	Correct
FXJ	Cocaine	50	Lactose	50			Correct	Correct	Correct
LHH	Cocaine	50	Lactose	50			Correct	Correct	Correct
SBR	Cocaine	50	Lactose	50			Correct	Correct	Correct
MSW	Heroin	50	Lactose	50			Correct	Correct	Correct
QQ8	Heroin	50	Lactose	50			Correct	Correct	Correct
XML	Heroin	50	Lactose	50			Correct	Correct	Correct
MMG	Heroin	50	Lactose	50			Correct	Correct	Correct

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
R8R	Heroin	50	Lactose	50			Correct	Correct	Correct
XU3	Crack Cocaine	75	Lactose	25			Correct	Correct	Correct
GAB	Crack Cocaine	75	Lactose	25			Correct	Correct	Correct
3B2	Crack Cocaine	75	Lactose	25			Correct	Correct	Correct
Y4F	Cocaine	50	Lactose	25	Starch	25	Correct	Correct	Correct
8N4	Cocaine	50	Lactose	25	Starch	25	Correct	Correct	Correct
69Q	Heroin	50	Lactose	25	Starch	25	Correct	Correct	Correct
EKP	Heroin	50	Lactose	25	Starch	25	Correct	Correct	Correct
V93	Cocaine	90	Lactose	10			Correct	Correct	Correct
AUU	Cocaine	90	Lactose	10			Correct	Correct	Correct
QQJ	Cocaine	90	Lactose	10			Correct	Correct	Correct
6AM	Cocaine	90	Lactose	10			Correct	Correct	Correct
TAN	Cocaine	90	Lactose	10			Correct	Correct	Correct
YYR	Crack Cocaine	90	Lactose	10			Correct	Correct	Correct
7LC	Crack Cocaine	90	Lactose	10			Correct	Correct	Correct

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
FB2	Crack Cocaine	90	Lactose	10			Correct	Correct	Correct
VPW	Heroin	90	Lactose	10			Correct	Correct	Correct
WBN	Heroin	90	Lactose	10			Correct	Correct	Correct
J3T	Heroin	90	Lactose	10			Correct	Correct	Incorrect*
2PA	Heroin	90	Lactose	10			Correct	Correct	Correct
2AB	Heroin	90	Lactose	10			Correct	Correct	Correct
27Z	Cocaine	100					Correct	Correct	Correct
*For sample J3T, reader 3 identified the illicit drug correctly, but missed the presence of lactose.									Correct
4ZN	Cocaine	100					Correct	Correct	Correct
BBU	Cocaine	100					Correct	Correct	Correct
C6S	Cocaine	100					Correct	Correct	Correct
EQ2	Crack Cocaine	100					Correct	Correct	Correct
Q96	Crack Cocaine	100					Correct	Correct	Correct
KN3	Crack Cocaine	100					Correct	Correct	Correct
6UF	Crack Cocaine	100					Correct	Correct	Correct
TR7	Crack	100					Correct	Correct	Correct

Sample ID	Drug 1	Composition 1	Drug 2	Composition 2	Drug 3	Composition 3	Reader One ID	Reader Two ID	Reader Three ID
	Cocaine								
FRJ	Dimethyl Sulfone	100					Correct	Correct	Correct
Q9H	Dimethyl Sulfone	100					Correct	Correct	Correct
K9E	Dimethyl Sulfone	100					Correct	Correct	Correct
QF7	Dimethyl Sulfone	100					Correct	Correct	Correct
FHM	Dimethyl Sulfone	100					Correct	Correct	Correct
C3S	Heroin	100					Correct	Correct	Correct
MP6	Heroin	100					Correct	Correct	Correct
JRH	Heroin	100					Correct	Correct	Correct
CNS	Heroin	100					Correct	Correct	Correct
4UA	Heroin	100					Correct	Correct	Correct

S.4.b Images of PADs after running with samples

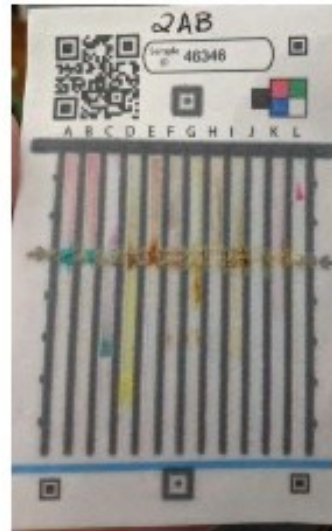
FB2



TR7



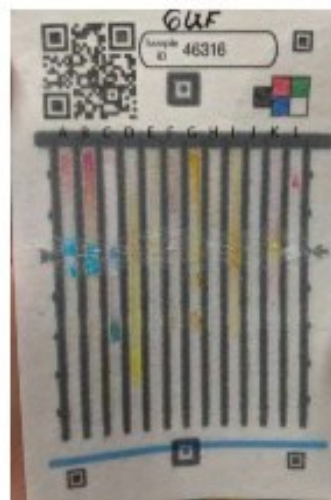
2AB



C6S



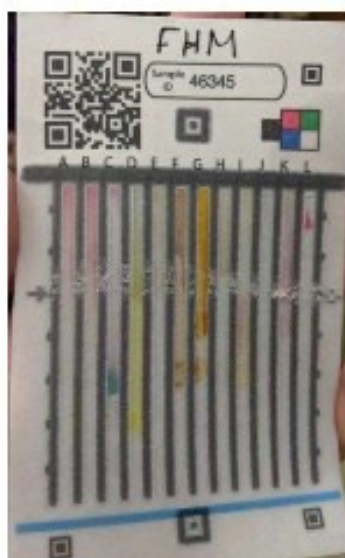
6UF



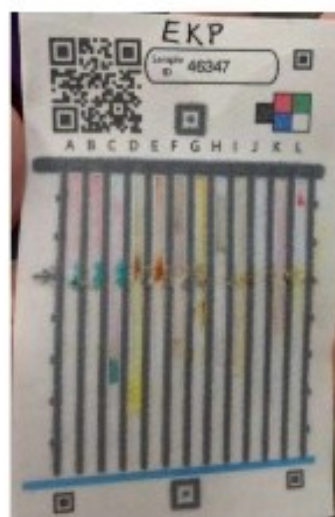
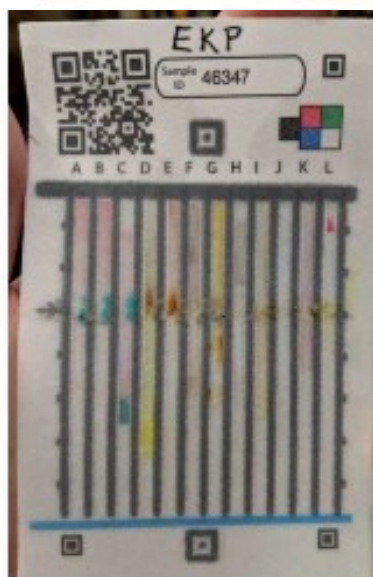
YC6



FHM



EKP



3B2



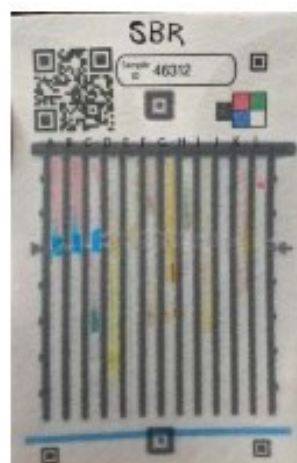
BBU



VN2



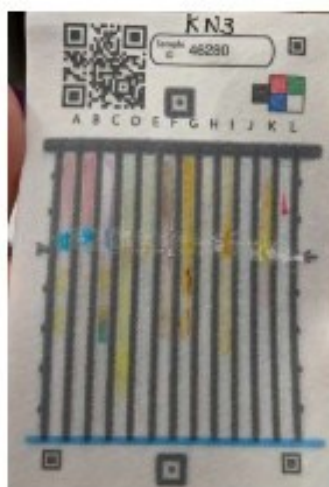
SBR



TAN



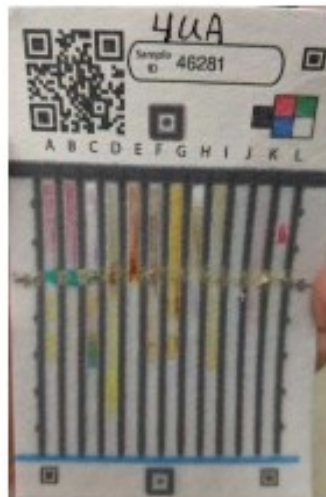
KN3



7LC



4UA



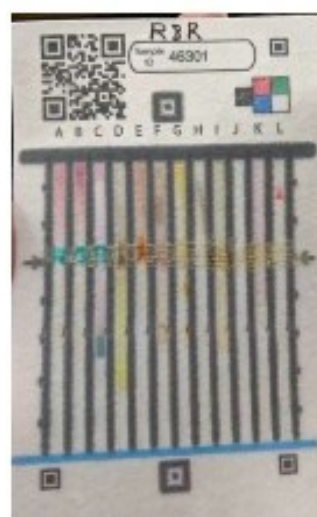
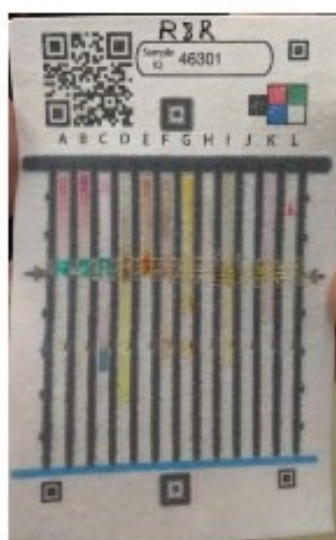
4ZN



XFU



R8R



6AM



MMG



Q96



8N4



LHH



QQJ



F?XJ



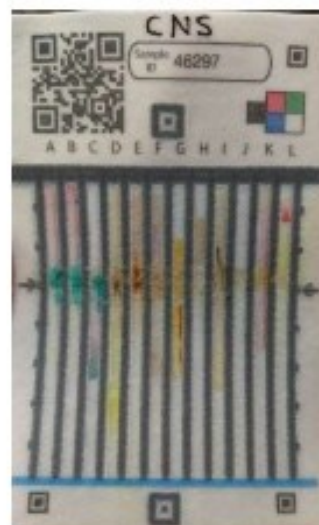
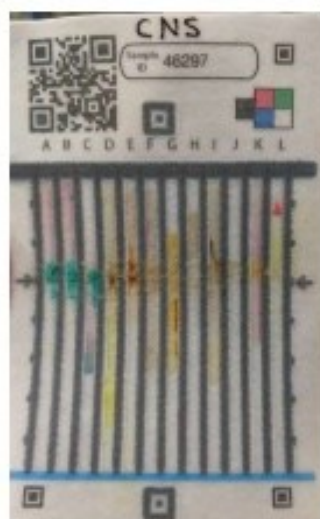
AUU



QF7



CNS



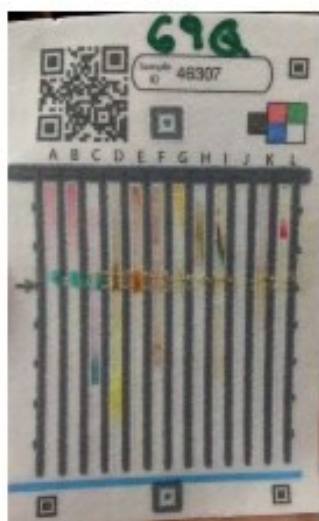
XML



2PA



69Q



J3T



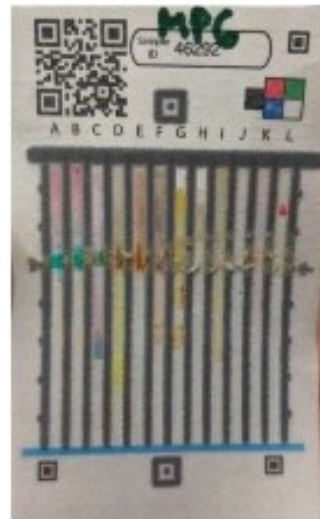
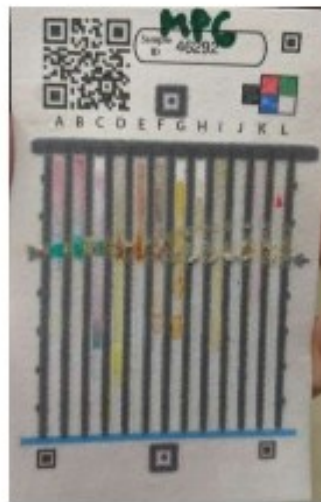
K9E



JRH



MPG



GAB



QNF



Y4F



Q9H



QQ8



V93



MSW



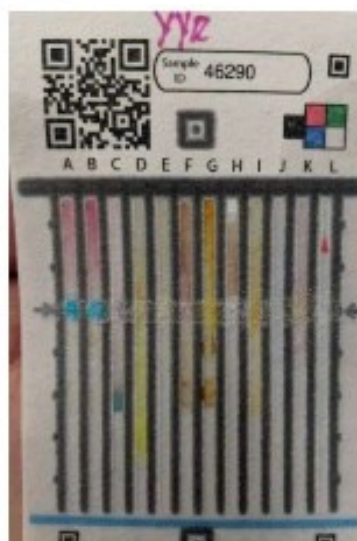
WBN



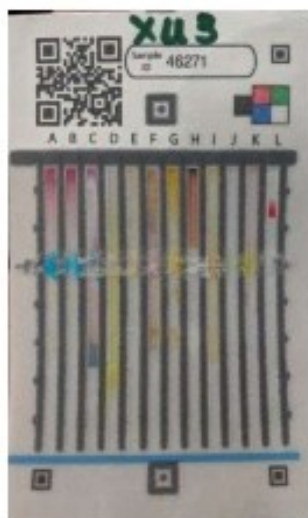
HMS



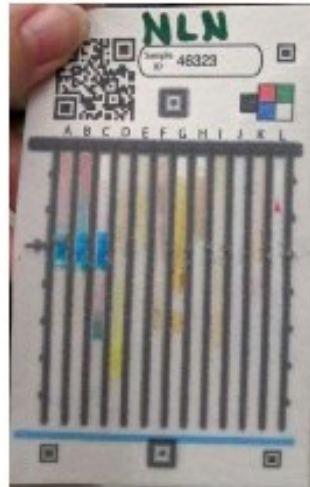
YYR



XU3



NLN



VPW



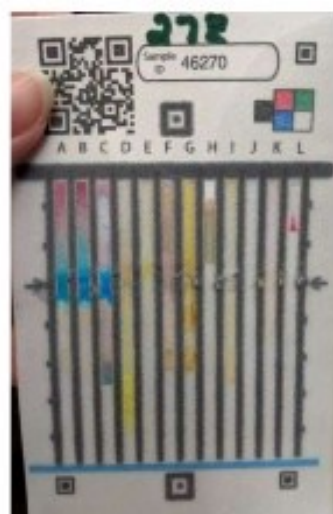
C3S



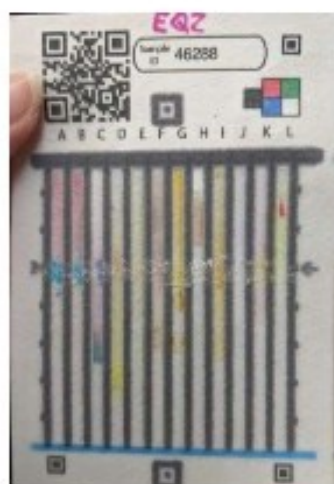
T3C



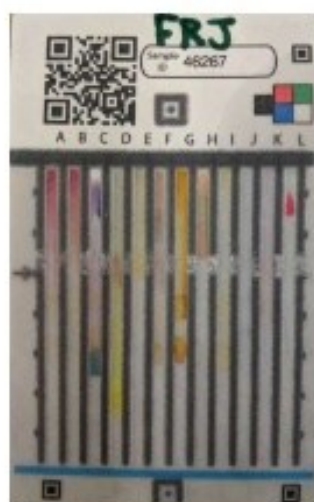
27Z



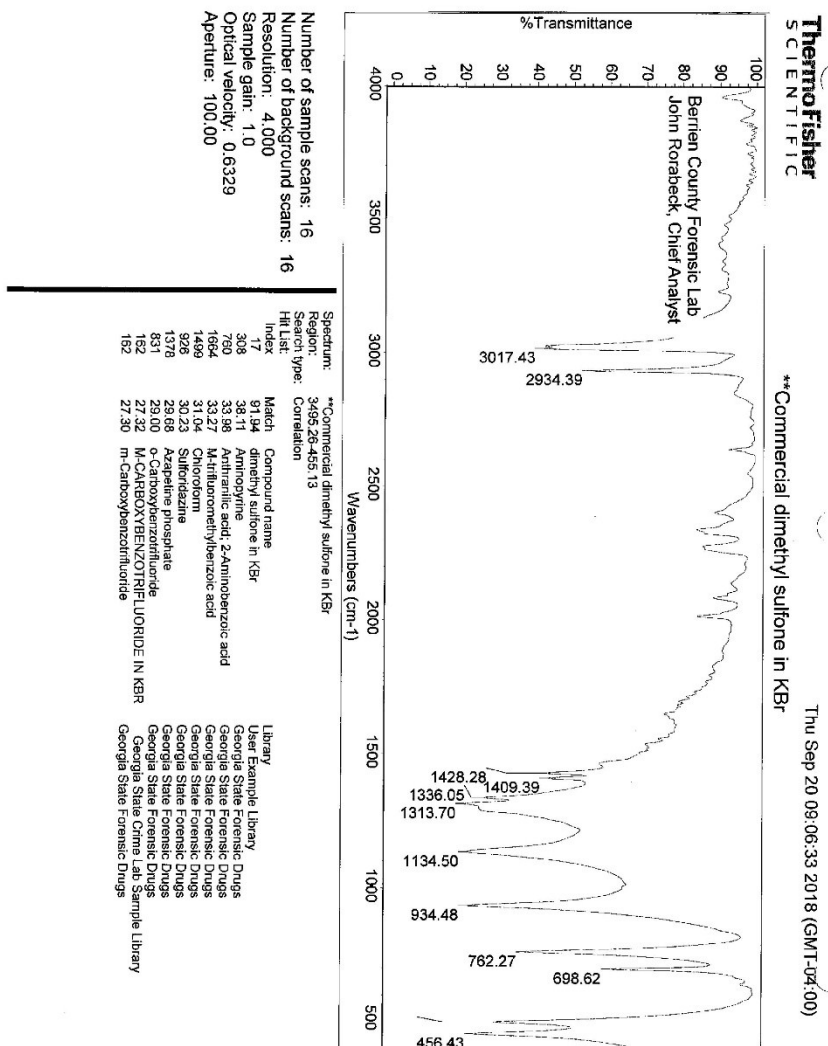
EQZ

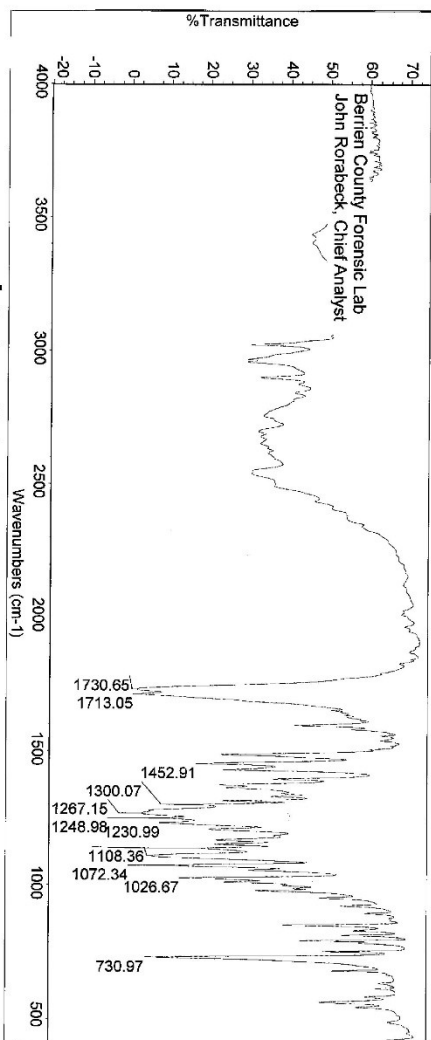


FRJ



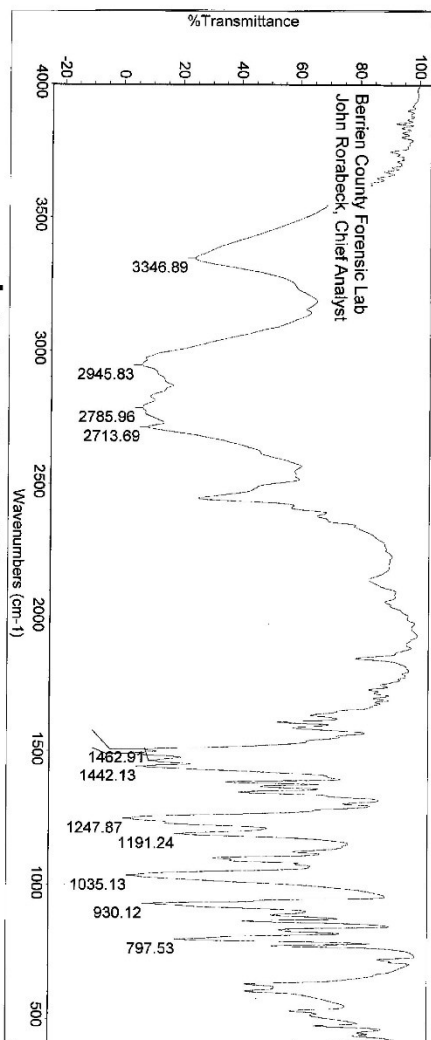
S.5 FTIR data for illicit drug batches used





Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 1.0
Optical velocity: 0.6329
Aperture: 100.00

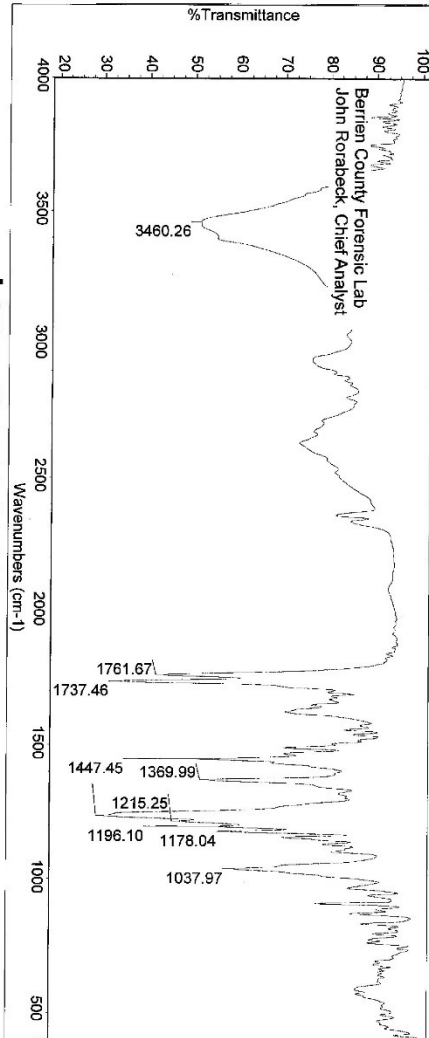
Spectrum:		Street-grade Cocaine HCl in KBr	
Region:		3495.25-455.13	
Search type:		Correlation	
Hit List			
Index	Match	Compound name	Library
1	96.22	Cocaine HCl	HR Nicolet Sample Library
1373	94.32	Cocaine HCl	Georgia State Forensic Drugs
1372	94.18	Cocaine HCl	Georgia State Forensic Drugs
1	92.43	COCOAINE HCL IN KBR	Georgia State Crime Lab Sample Library
1329	92.39	Cocaine HCl	Georgia State Forensic Drugs
1311	92.12	Cocaine HCl + lactose, 9:1	Georgia State Forensic Drugs
1320	90.40	Cocaine HCl + mannitol, 9:1	Georgia State Forensic Drugs
1321	89.98	Cocaine HCl + insulin, 9:1	Georgia State Forensic Drugs
1338	89.80	Cocaine HCl + insulin, 8:2	Georgia State Forensic Drugs
	88.17	Cocaine HCl + dextrose, 8:2	Georgia State Forensic Drugs



Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 1.0
Optical velocity: 0.6329
Aperture: 100.00

Spectrum: **Street-grade MDMA in KBr	
Region: 3495.26-455.13	
Search type: Correlation	
Hit List:	
Index	Match
1079	93.04 3,4-Methylenedioxyamphetamine .HCl
1073	76.92 3,4-Methylenedioxyamphetamine
1917	74.97 N-tylodoxy-3,4-mda .HCl
1569	74.96 3,4-methylenedioxyethylamphetamine
1913	73.18 3,4-methylenedioxypropylamphetamine
1273	69.41 3,4-Methylenedioxyamphetamine .HCl
1236	67.95 Sallrole
1357	66.39 3,4-Methylenedioxyphenylacetone
1062	56.87 Hydrastinine
46	56.46 3,4-Methylenedioxyamphetamine .HCl
Library	
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs

****Street-grade hi purity heroin in KBr**



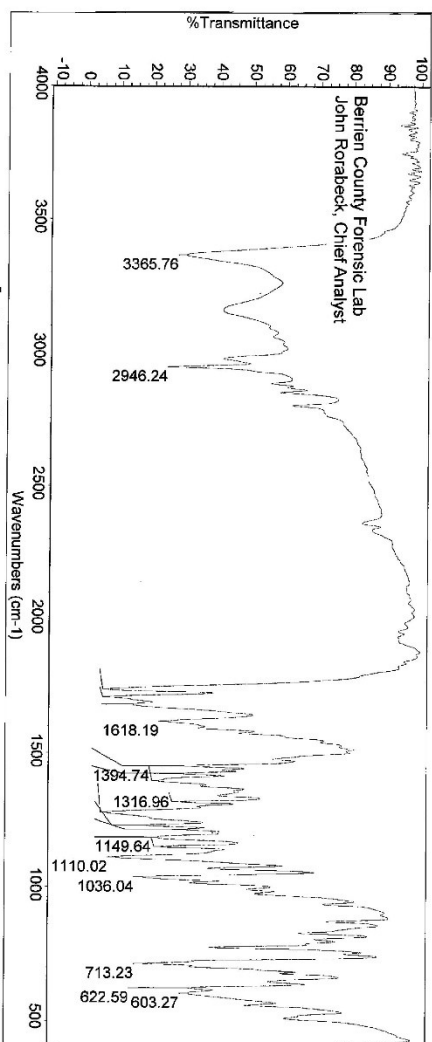
Berrien County Forensic Lab
John Rorabeck, Chief Analyst

Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 1.0
Optical velocity: 0.6329
Aperture: 100.00

Spectrum: **Street-grade hi purity heroin in KBr
Region: 3489.26-455.13
Search type: Correlation
Hit List:

Index	Match	Compound name	Library
15	91.79	Heroin .HCl; Diacetylmorphine .HCl	Georgia State Forensic Drugs
15	91.75	HEROIN HCl IN KBr	Georgia State Crime Lab Sample Library
15	88.47	Heroin .HCl; Diacetylmorphine .HCl	HR Nicotol Sampler Library
1289	82.73	Heroin .HCl; Diacetylmorphine .HCl	Georgia State Forensic Drugs
3	61.43	Heroin .HCl; Diacetylmorphine .HCl	Hummel Polymer Sample Library
29	60.82	POLYVINYL ACETATE-ETHYLENE 3:1	Georgia State Forensic Drugs
409	59.22	Is-Acetyl-N,N-dimethylbadi .HCl	Georgia State Forensic Drugs
1851	57.75	Androstenediol diacetate	Georgia State Forensic Drugs
1759	56.86	Ethyl acetate	Georgia State Forensic Drugs
17	56.02	ETHYL ACETATE, 99.5+%, SPECTROPHOTOMETRI	Adrich Vapor Phase Sample Library

C GRADE

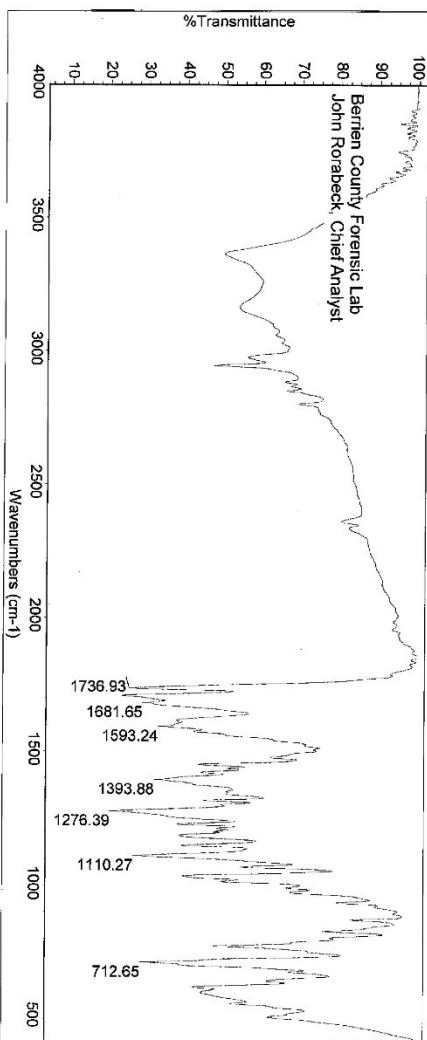


Berrien County Forensic Lab
John Rorabeck, Chief Analyst

Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 1.0
Optical velocity: 0.6329
Aperture: 100.00

Spectrum: 3465.28-455.13	
Region:	**Crack Cocaine in KBr
Search type:	Correlation
Hit List	
Index	Match
1744	84.01 Cocaine (synthesized crack)
178	82.38 Cocaine
178	82.28 COCAINE IN KBr
356	46.27 Pseudococaine HCl
1296	44.82 Pseudococaine
1850	44.72 Acetaminophen-3-acetate-17-benzo
209	44.13 Cocaine HCl
1899	42.76 Androstenediol benzoate
1846	41.56 Dihydrotestosterone benzoate
1611	41.50 Bicalutrol mesylate
	Library
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Crime Lab Sample Library
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs
	Georgia State Forensic Drugs

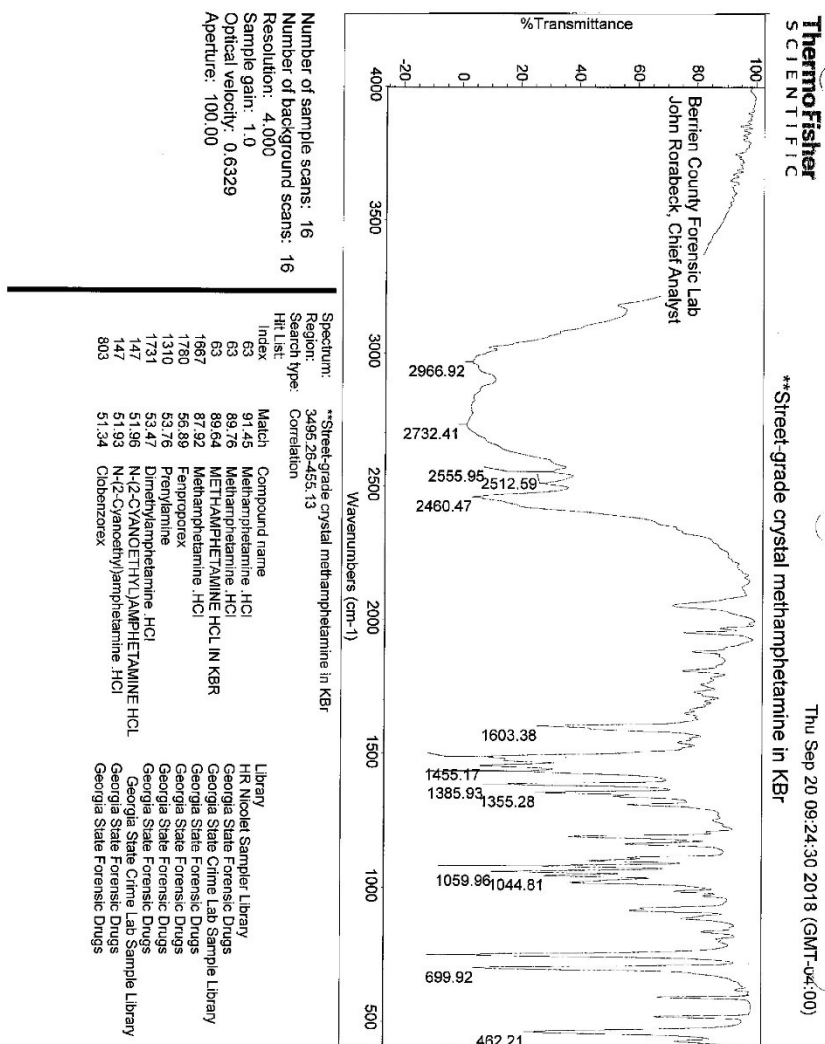
****Crack Cocaine cut with nicotinamide in KBr**



Berrien County Forensic Lab
John Rorabeck, Chief Analyst

Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 1.0
Optical velocity: 0.6329
Aperture: 100.00

Spectrum: 3405.28-455.13	
Region: Correlation	
Hit List	
Index	Match
1744	79.32 Cocaine (synthesized crack)
178	77.64 Cocaine IN KBr
178	77.47 COCAINE IN KBr
256	49.17 Nicotinamide
356	45.41 Pseudoecaine .HCl
1296	44.98 ETHYL BENZOATE, 99+%
51	44.64 Dehydroepiandrosterone benzoate
1846	44.55 Androstenediol-3-acetate-17-benzo
1850	43.71 Androstenediol benzoate
1899	
Library	
Georgia State Forensic Drugs	
Georgia State Forensic Drugs	
Georgia State Crime Lab Sample Library	
Georgia State Forensic Drugs	
Georgia State Forensic Drugs	
Georgia State Forensic Drugs	
Georgia State Forensic Drugs	
Aldrich Condensed Phase Sample Library	
Georgia State Forensic Drugs	
Georgia State Forensic Drugs	
Georgia State Forensic Drugs	



S.6 Spotting guide for idPAD fabrication

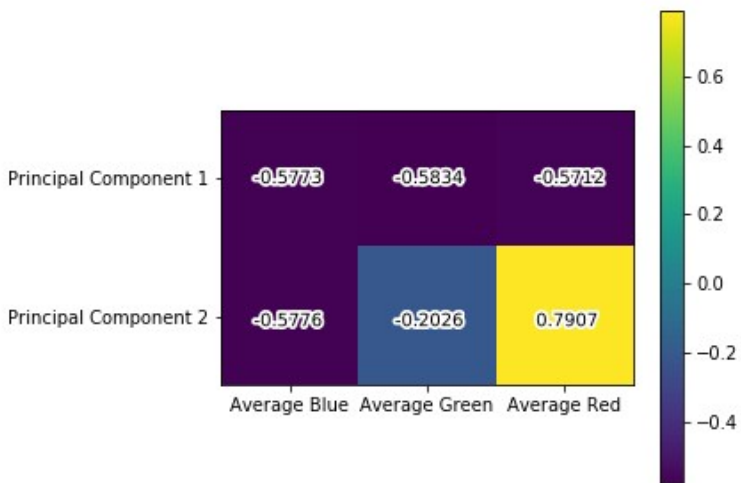
Test	Lane	Row	Reagent	Reagent Preparation	Testing For	Signal
Acidic Co(SCN)2	A	3	Co(SCN)2	1M: 3g Co(II) nitrate hexahydrate + 2g KSCN in 10mL H2O	Tertiary Amines	Bright Blue
		4	Co(SCN)2	1M: 3g Co(II) nitrate hexahydrate + 2g KSCN in 10mL H2O		
		5	HOTs (Tosic Acid)	1M: 1.72g HOTs in		

				10mL H ₂ O		
		6	HOTs (Tosic Acid)	1M: 1.72g HOTs in 10mL H ₂ O		
pH 8 Co(SCN) ₂	B	3	Co(SCN) ₂	1M: 3g Co(II) nitrate hexahydrate + 2g KSCN in 10mL H ₂ O	Tertiary Amines	Bright Blue
		4	Co(SCN) ₂	1M: 3g Co(II) nitrate hexahydrate + 2g KSCN in 10mL H ₂ O		
		5	Tris buffer pH 8	Use 1M TrisBase and 1M TrisHCl, mix in Tris until desired pH (8)		
		6	Tris buffer pH 8	Use 1M TrisBase and 1M TrisHCl, mix in Tris until desired pH (8)		
Basic Co(SCN) ₂	C	3	Co(SCN) ₂	1M: 3g Co(II) nitrate hexahydrate + 2g KSCN in 10mL H ₂ O	Tertiary Amines	Dark Blue
		4	Co(SCN) ₂	1M: 3g Co(II) nitrate hexahydrate + 2g KSCN in 10mL H ₂ O		
		5	2M NaOH	2M: 0.80g NaOH in 10mL H ₂ O		
		6	2M NaOH	2M: 0.80g NaOH in 10mL H ₂ O		
P- Nitroaniline	D	1	2M NaOH	2M: 0.80g NaOH in 10mL H ₂ O		
		2	2M NaOH	2M: 0.80g NaOH in 10mL H ₂ O	Phenol	Red
		3	HOTs (Tosic Acid)	1M: 1.72g HOTs in 10mL H ₂ O		

		5	P-nitroaniline	0.2M: 0.3g P-Nitroaniline in 10mL CH ₃ CN (remake frequently)		
		6	NaNO ₂	0.4M: 0.3g NaNO ₂ in 10mL H ₂ O (remake frequently)		
Sulfanilamide	E	1	2M NaOH	2M: 0.80g NaOH in 10mL H ₂ O		
		2	2M NaOH	2M: 0.80g NaOH in 10mL H ₂ O	Phenol	Orange/Red
		3	HOTs (Tosic Acid)	1M: 1.72g HOTs in 10mL H ₂ O		
		5	Sulfanilamide	0.17M: 0.3g Sulfanilamide in 10mL H ₂ O		
		6	NaNO ₂	0.4M: 0.3g NaNO ₂ in 10mL H ₂ O (remake frequently)		
NQS (Nu)	F	1	4M NaOH	4M: 1.6g NaOH in 10mL H ₂ O		Flame red at Top of Lane
		2	2M NaOH	2M: 0.80g NaOH in 10mL H ₂ O		
		4	NQS	0.03M: 0.1g Napthoquinine Sulfonate in 10mL H ₂ O		
		5	HOTs (Tosic Acid)	1M: 1.72g HOTs in 10mL H ₂ O		
Starch	G	3	Triiodine/Povidone	Stir 0.40g Povidone overnight in 10mL H ₂ O (4% PVD)	Starch	Black/ Dark Signal
		4	Triiodine/Povidone	Dissolve 0.050g I ₂ and 0.10g KI in 10mL water. Add PVD slowly.		
Ethambutol	H	2	2M NaOH	2M: 0.80g NaOH in		

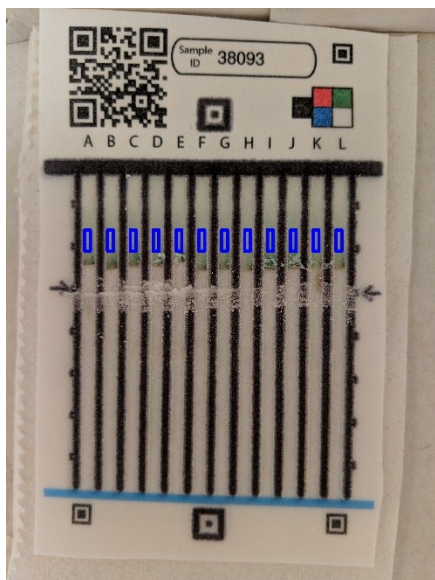
				10mL H ₂ O		
		3	CuSO ₄ *5H ₂ O	1M: 2.5g CuSO ₄ in 10mL H ₂ O		
Carbonate	I	3	FeCl ₃	0.3M: 0.5g FeCl ₃ in 10mL H ₂ O		Orange-Black
		4	FeCl ₃	0.3M: 0.5g FeCl ₃ in 10mL H ₂ O		
Ninhydrin	J	2	Ninhydrin	0.17M: 0.3g Ninhydrin in 10mL CH ₃ CN		
		3	Ninhydrin	0.17M: 0.3g Ninhydrin in 10mL CH ₃ CN		
		4	K ₂ CO ₃	2M: 2.76g in 10mL H ₂ O (remake frequently)		
		5	K ₂ CO ₃	2M: 2.76g in 10mL H ₂ O (remake frequently)		
DMAC	K	2	DMAC (Soln 1)	0.05g Dimethylaminocinnamaldehyde in 10mL CH ₃ CN		
		3	DMAC (Soln 1)	0.05g Dimethylaminocinnamaldehyde in 10mL CH ₃ CN	Indoles	Royal Purple/Blue
		5	HOTs (Tosic Acid)	1M: 1.72g HOTs in 10mL H ₂ O		
		6	HOTs (Tosic Acid)	1M: 1.72g HOTs in 10mL H ₂ O		
Timer	L	0	NiCl ₂	0.2M: 0.713g in 15mL H ₂ O	Card to be done running	Red
		3	Nioxime or DMG	0.2M: 0.3g DMG in 10mL 0.4M NaOH		

S.7 Principal component analysis contribution to variance



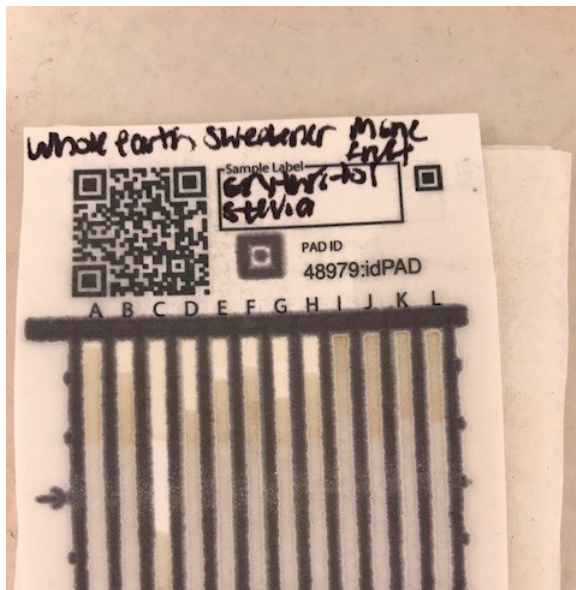
S.8 Example of pixel sampling method for RGB analysis

Pixels were sampled from each lane in the blue rectangles shown. The area is 40x150 pixels.



S.9 Additional study for possible interferences

Sample	Color Result
Aspartame sweetener containing dextrose	positive
Milk powder	positive
Powdered coffee creamer	positive
Saccharine sweetener containing dextrose	positive
Diphenhydramine capsule containing lactose	positive
Procaine HCl	negative
Baby powder	negative
Flour, all-purpose	negative
Mannitol	negative
Acetaminophen, dextromethorphan HBr, phenylephrine HCl tablet	negative
Powdered cleaner, "Barkeeper's Friend"	negative
Baking soda	negative
Baking powder	negative
Cream of tartar	negative
Corn starch	negative
Bath bomb containing maltodextrin	negative
Caffeine	negative
Talc	negative
Whole earth sweetener packet containing erythritol, fructose, stevia, monk fruit extract	negative
Pure aspartame	negative
Liquid saccharine containing benzoic acid and methyl paraben (Sweet'N Low)	negative
Diphenhydramine tablet without lactose	negative
Quinine	negative
Pure xylitol	negative



3











