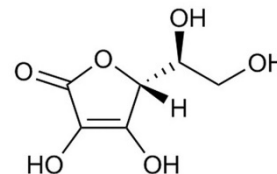


Ascorbic acid (Vitamin C)



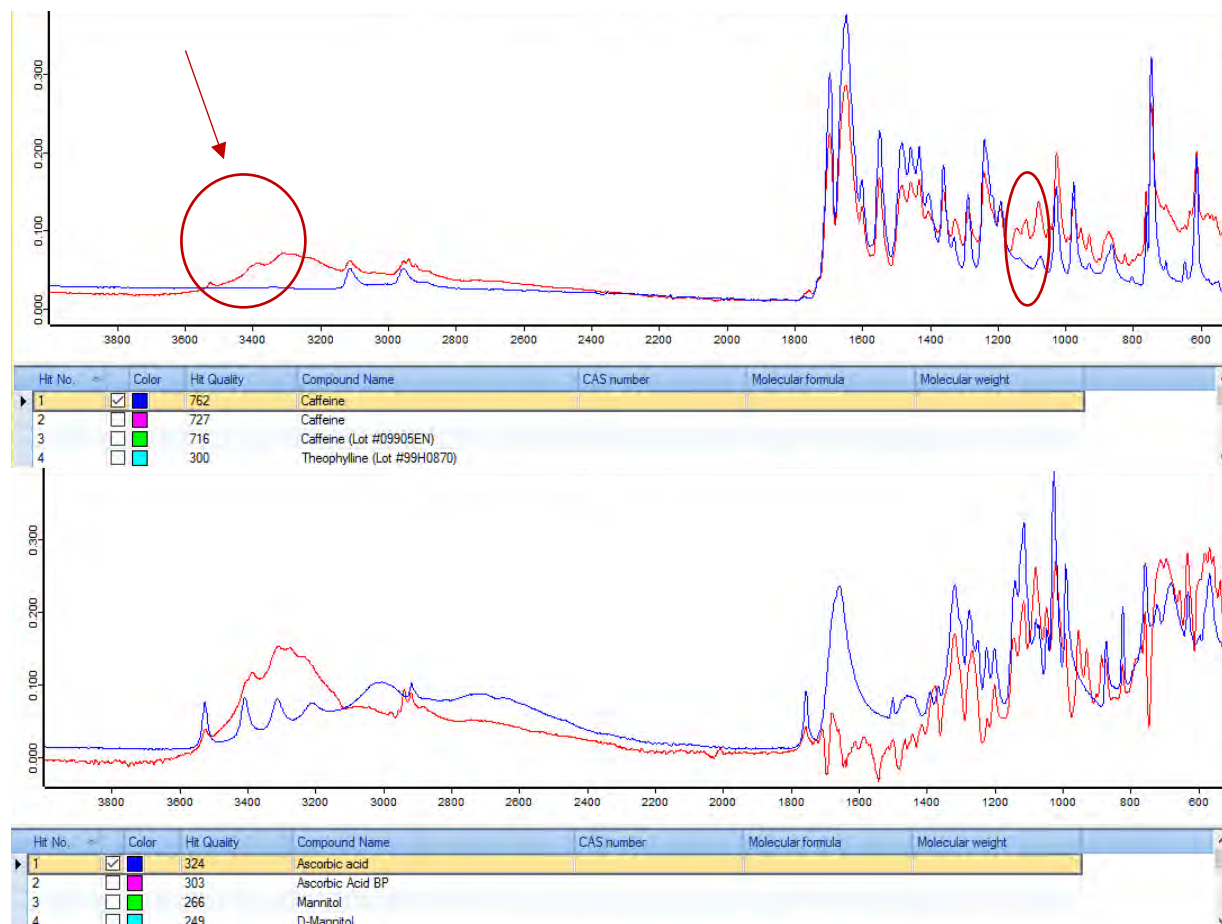
Background

- Vitamin naturally produced in fruits and vegetables
- Commonly used to treat and prevent the common cold and several infections
- Seen in street opioid samples due to its wide availability
- Generally nontoxic, but when taken in doses higher than 2g/day, it may cause nausea, headaches, stomach cramps, and kidney stones

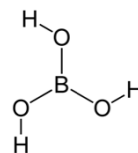
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Ascorbic acid	3637-2905 cm^{-1} 1159-969 cm^{-1}
SWGDRUG	N/A	
TICTAC	Ascorbic Acid BP	
Georgia Crime Lab	ASCORBIC ACID IN KBR	
Bruker Pharma	L-ASCORBIC ACID, D-ASCORBIC ACID	



Boric acid



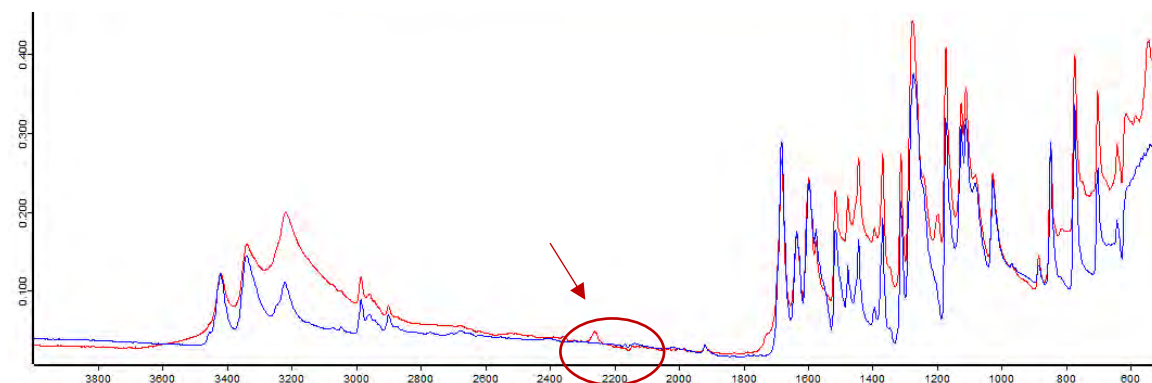
Background

- Used in insecticides and rat poisons. It can be very toxic and cause death if ingested in high quantities. Considered to be one of the most dangerous cuts in cocaine
- It may heighten the local anesthetic effect of cocaine

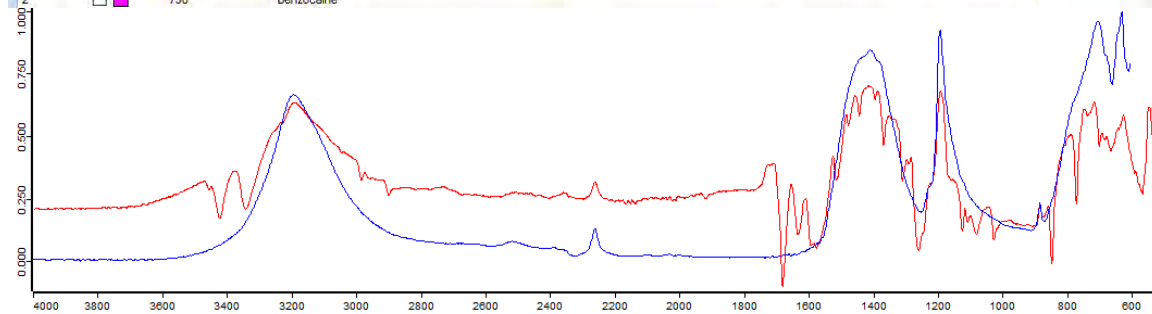
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
Bruker Pharma	ORTHOBORIC ACID	3343-2986 cm ⁻¹
Georgia Crime Lab	BORIC ACID IN KBR	1574-1107 cm ⁻¹

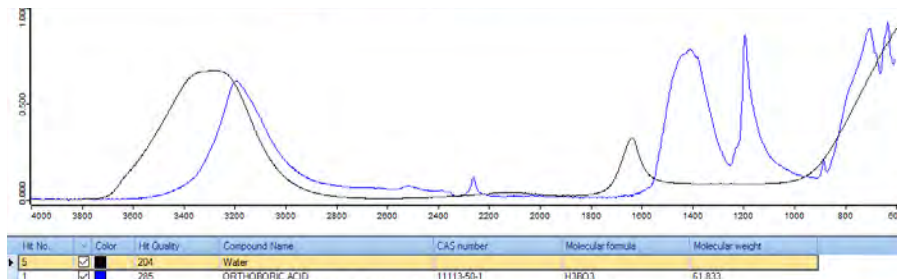


Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	Blue	819	Benzocaine			
2	Pink	798	Benzocaine			



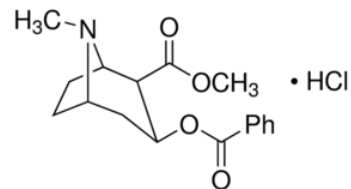
Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	Blue	285	ORTHOBORIC ACID	11113-50-1	H3BO3	61.833

Note: Boric acid may be easily confused as water:



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
5	Black	204	Water			
1	Blue	285	ORTHOBORIC ACID	11113-50-1	H3BO3	61.833

Cocaine HCl



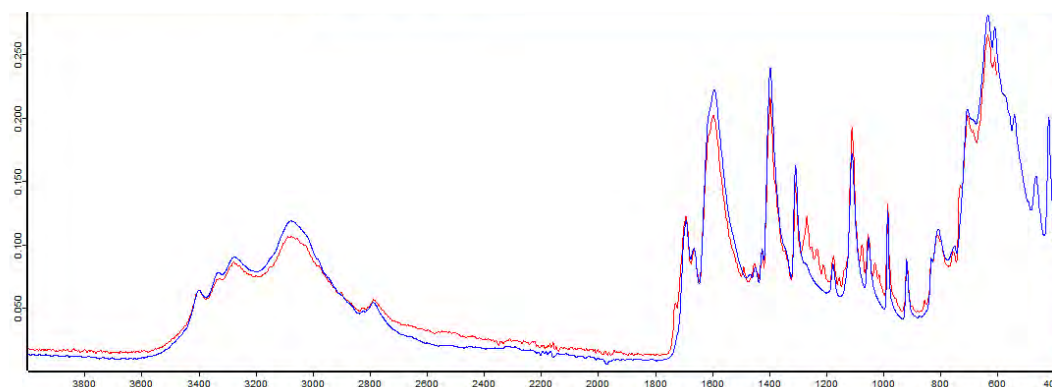
Background

- AKA coke, blow, powder. Stimulant extracted from the leaves of the South American coca plant
- It increases the levels of dopamine in the brain affecting reward pathways inducing euphoria

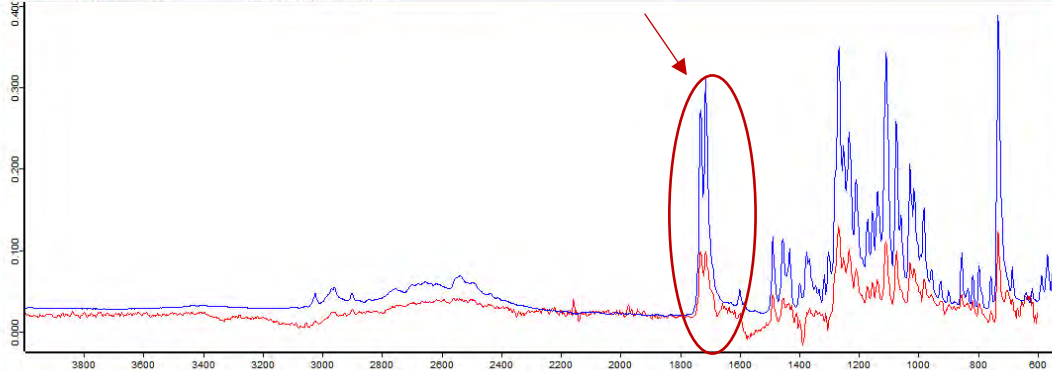
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Cocaine HCl	1782-1659 cm ⁻¹ 1289-1043 cm ⁻¹
SWGDRUG	Cocaine HCl	
TICTAC	Cocaine HCl	
Georgia Crime Lab	COCAINE HCL IN KBR, COCAINE HCL (ANHYDROUS) IN KBR	
Bruker Pharma	COCAINE.HCL, COCAINE HYDROCHLORIDE	

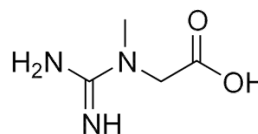


Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	762	creatine			
2	<input type="checkbox"/>	751	Creatine hydrate (Lot #042K0085)			
3	<input type="checkbox"/>	723	Creatine			
4	<input type="checkbox"/>	280	Cocaine HCl (Lot #N16-P57A-2)			



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	716	Cocaine HCl			
2	<input type="checkbox"/>	703	Cocaine HCl (Lot #N16-P57A-2)			
3	<input type="checkbox"/>	701	Cocaine HCl			
4	<input type="checkbox"/>	257	Dimethyl terephthalate (Lot #07201H)			

Creatine



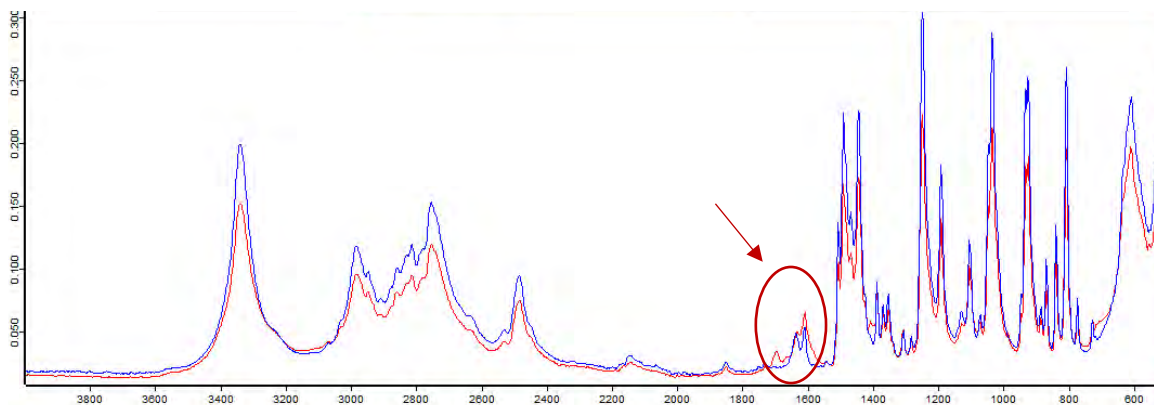
Background

- Supplement used by bodybuilders and athletes. It increases muscle mass and exercise performance
- Common cut seen in cocaine, sometimes MDMA or ketamine

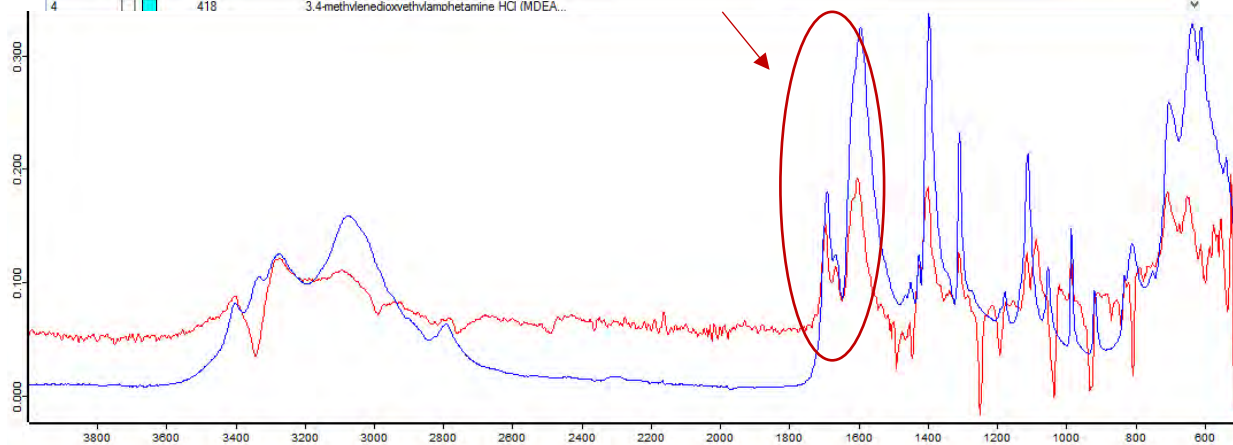
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region (cm ⁻¹)
BCCSU	Creatine	1747-1505 cm ⁻¹ 1436-1257 cm ⁻¹
SWGDRUG	Creatine hydrate	
TICTAC	Creatinine (anhydrous), Creatinine	
Bruker Pharma	CREATINE	

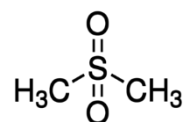


Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	914	MDMA			
2	<input type="checkbox"/>	893	Crystal MDMA			
3	<input type="checkbox"/>	504	N-Hydroxy-3,4-methylenedioxyamphetamine HCl (...)			
4	<input type="checkbox"/>	418	3,4-methylenedioxyethylamphetamine HCl (MDEA...)			



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	259	Creatine			
2	<input type="checkbox"/>	245	creatine			
3	<input type="checkbox"/>	233	Creatine hydrate (Lot #042K0085)			
4	<input type="checkbox"/>	180	5-MeO-MIPT Base (Lot #SF1797)			

Dimethyl sulfone



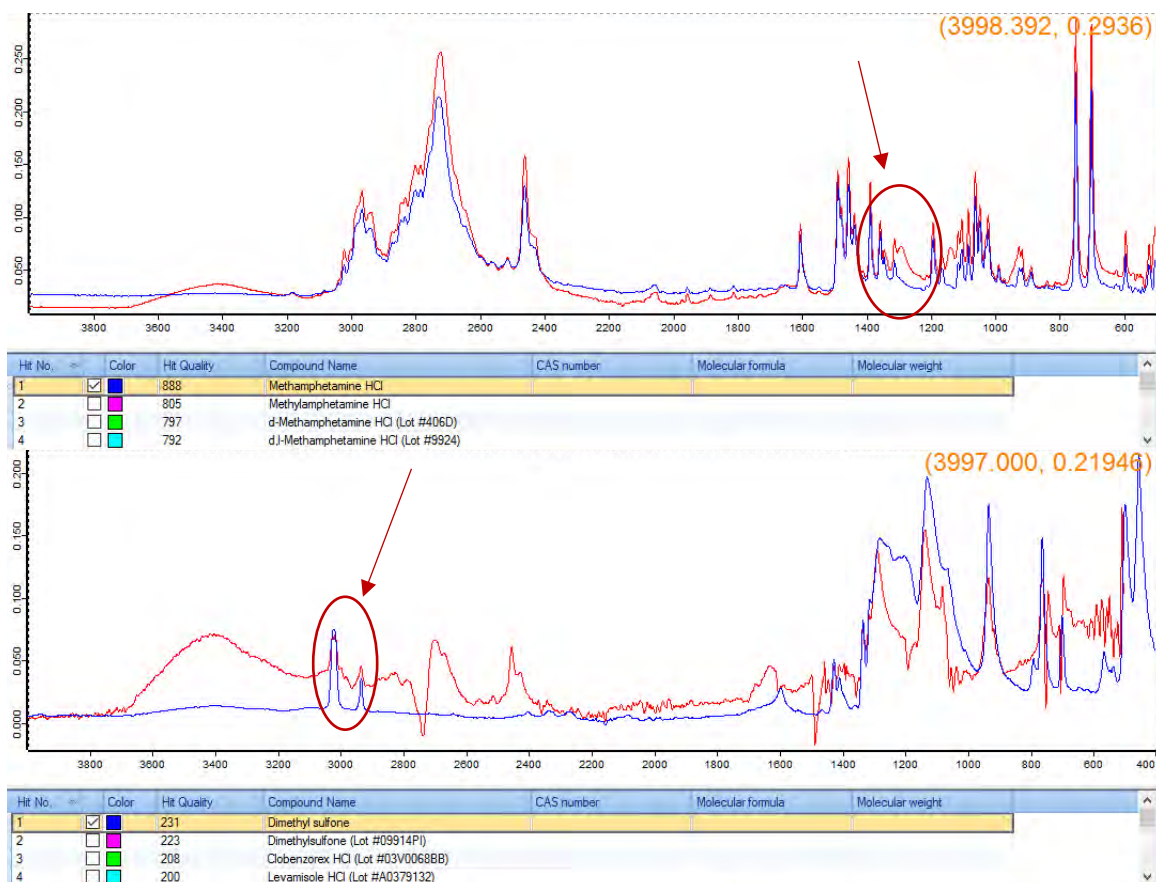
Background

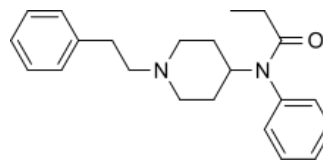
- AKA MSM
- Supplement naturally occurring in small amounts in some foods
- Used to treat muscle damage and arthritic pain. Generally nontoxic when taken orally, but it may cause nausea and headaches in high doses
- Commonly added to meth because it bulks out the size of a whole crystal

FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Dimethyl Sulfone (MSM)	3074-2907 cm^{-1} 1321-969 cm^{-1}
SWGDRUG	Dimethylsufone	
TICTAC	Dimethyl sulfone	





Fentanyl (and analogues)

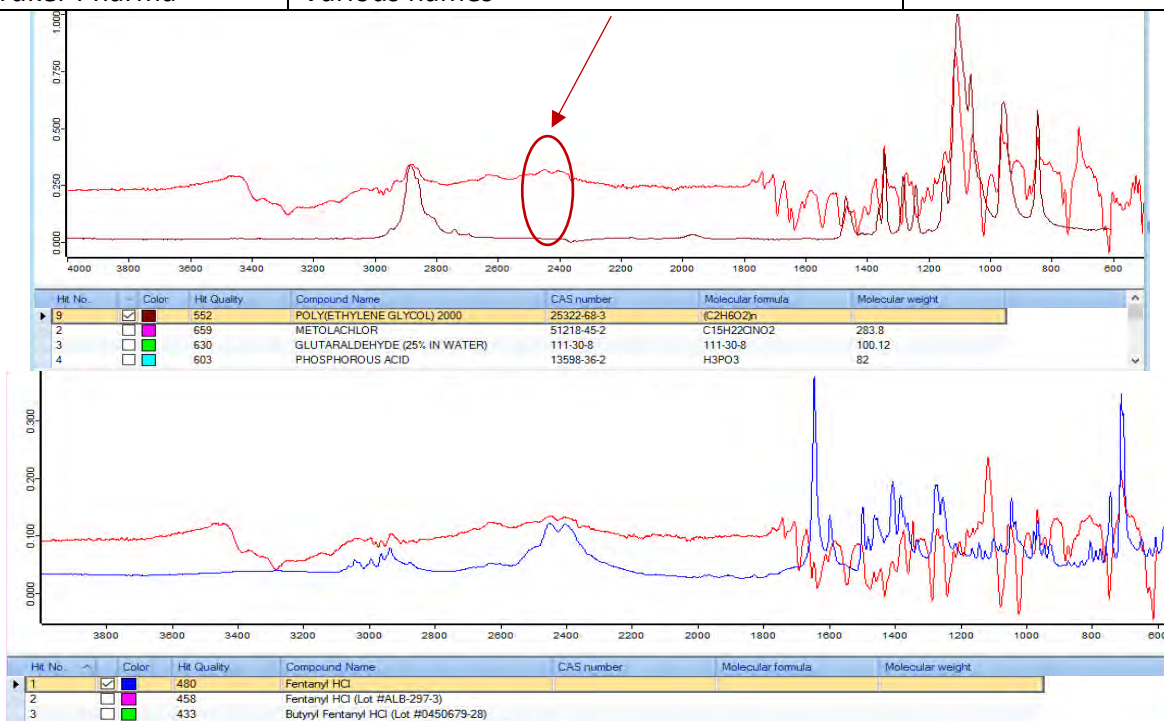
Background

- Powerful synthetic opioid. 50-100 times stronger than morphine
- Typically used to treat patients with severe pain
- The high potency of fentanyl greatly increases risk of overdose, especially when the dose is unknown and combined with other depressants
- Important: determining which analogue of fentanyl is present in a *down* sample is very difficult or impossible by FTIR analysis. This is because fentanyl concentration is low (~5%), slightly above the detection limit of the device

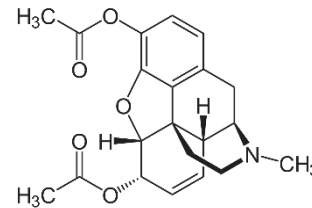
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Fentanyl HCl	2571-2260 cm ⁻¹
SWGDRUG	Fentanyl HCl, Acetylfentanyl HCl, Butyryl Fentanyl HCl, ortho-Fluorofentanyl HCl, Valeryl fentanyl HCl, various analogues	
TICTAC	Fentanyl HCl, Fentanyl citrate, Fentanyl free base, various analogues	
Georgia Crime Lab	FENTANYL IN KBR, PARA-FLUOROFENTANYL IN KBR, 3-FLUOROFENTANYL ANALOG IN KBR, Various others	
Bruker Pharma	Various names	



Note: These tips are for identifying fentanyl when co-occurring with caffeine



Heroin

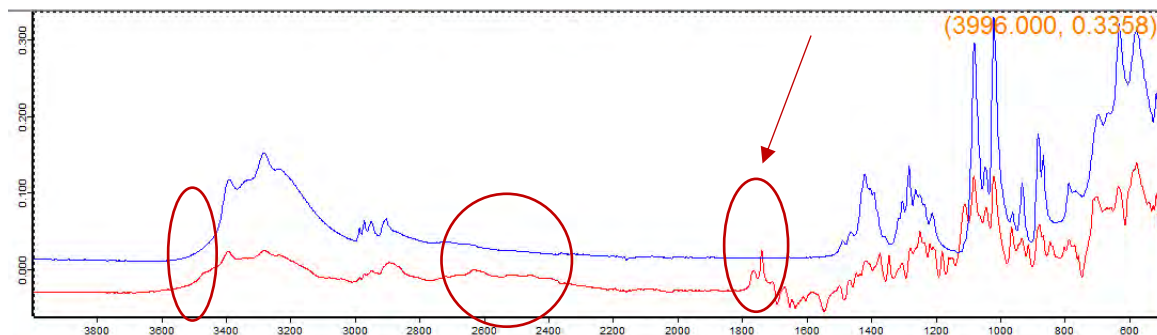
Background

- AKA diacetylmorphine, diamorphine, dope, or down
- Semi-synthetic opioid, made from processed morphine
- Twice as strong as intravenous morphine if injected
- There are several forms of heroin (base, salt, and raw). The purified hydrochloride salt is a white powder that can be easily dissolved and injected; the purified base is used for smoking

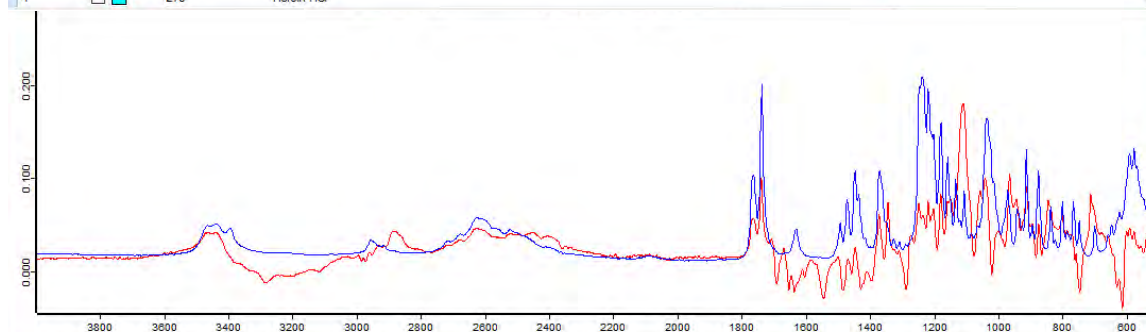
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Heroin HCl	2791-1724 cm ⁻¹ 3524-3368 cm ⁻¹
SWGDRUG	Heroin base, Heroin Hydrochloride Monohydrate	
TICTAC	Heroin base	
Georgia Crime Lab	HEROIN IN KBR, HEROIN HCL IN KBR	
Bruker Pharma	HEROIN, HEROIN HCL	

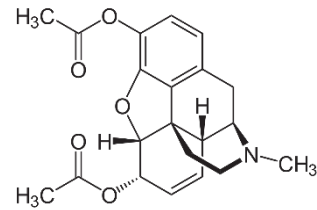


Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	Blue	418	Mannitol			
2	Purple	417	Mannitol (Lot #5438)			
3	Green	415	D-Mannitol			
4	Cyan	273	Heroin HCl			

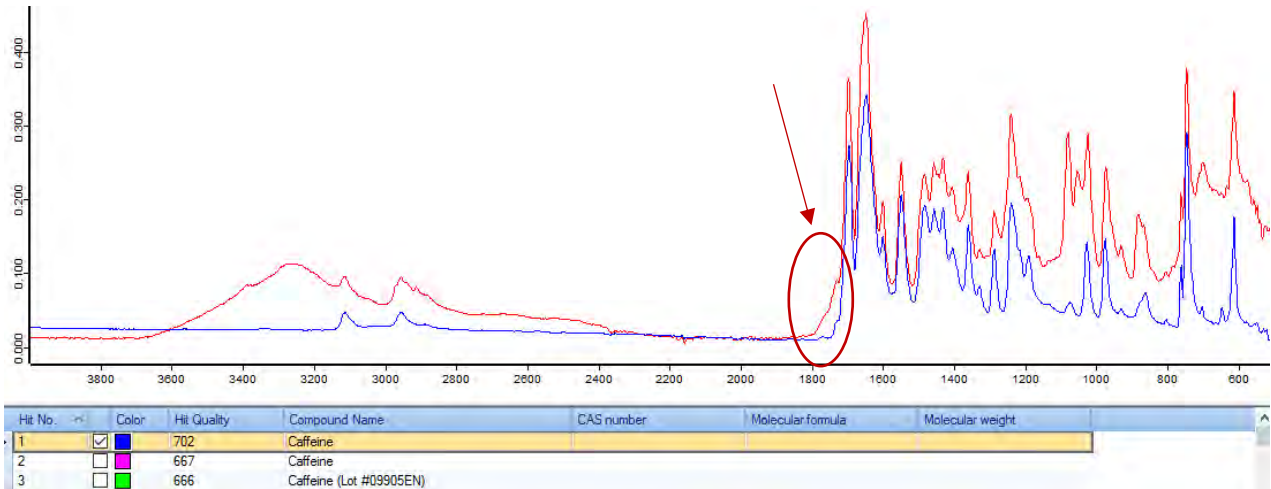


Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	Blue	349	Heroin HCl			
2	Purple	320	Heroin Hydrochloride Monohydrate (Lot #N16-P2...			
3	Green	222	06-Monoacetylmorphine HCl Trihydrate (Lot #N17...			
4	Cyan	193	Taurine			

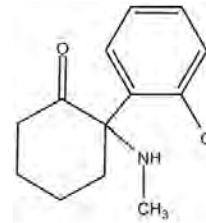
Heroin- continued



- Small quantities of heroin (1-5%) present in “down” can be identified in FTIR spectra as shoulder peaks in caffeine’s characteristic carbonyl stretch.



Ketamine



Background

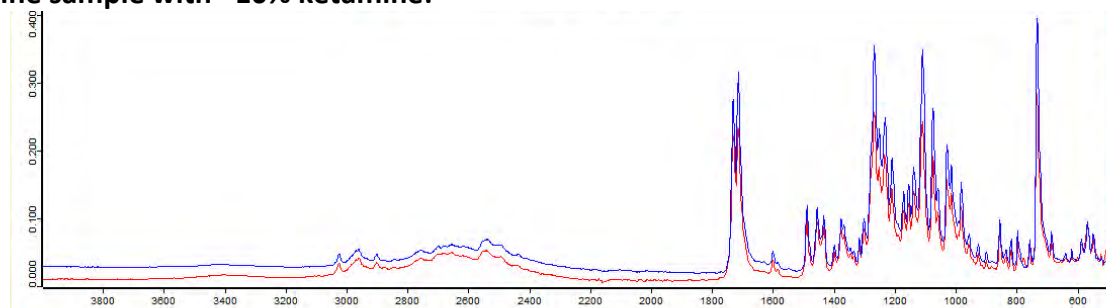
- AKA K or Special K. Anesthetic and painkiller used primarily in animals but increasingly for various reasons in humans including as an antidepressant and anesthetic
- Produces a feeling of dissociation between mind and body and often causes hallucinations
- The strength of its effects is proportional with the dose taken and it can last for up to 90 minutes. High doses of ketamine are associated with the K-hole which is a state of high disassociation where the person may be unable to move (temporary paralysis)

FTIR Analysis

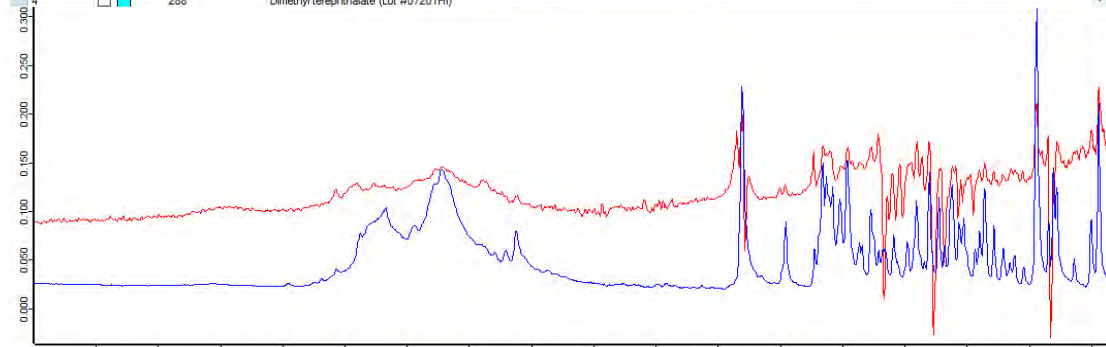
Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Ketamine HCl	3074-2371 cm ⁻¹
SWGDRUG	Ketamine HCl	
TICTAC	Ketamine	
Georgia Crime Lab	KETAMINE IN KBR	
Bruker Pharma	KETAMINE HCL	

Cocaine sample with ~10% ketamine:

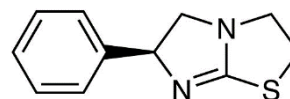


Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	885	Cocaine HCl			
2	<input type="checkbox"/>	856	Cocaine HCl (Lot #N16-P57A-2)			
3	<input type="checkbox"/>	812	Cocaine HCl			
4	<input type="checkbox"/>	288	Dimethyl terephthalate (Lot #07201HI)			



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	294	Ketamine HCl			
2	<input type="checkbox"/>	278	Ketamine HCl (Lot #120M1210V)			
3	<input type="checkbox"/>	274	Ketamine			
4	<input type="checkbox"/>	193	Deschloro-N-ethyl-ketamine HCl (Lot #0455833-25)			

Levamisole



• HCl

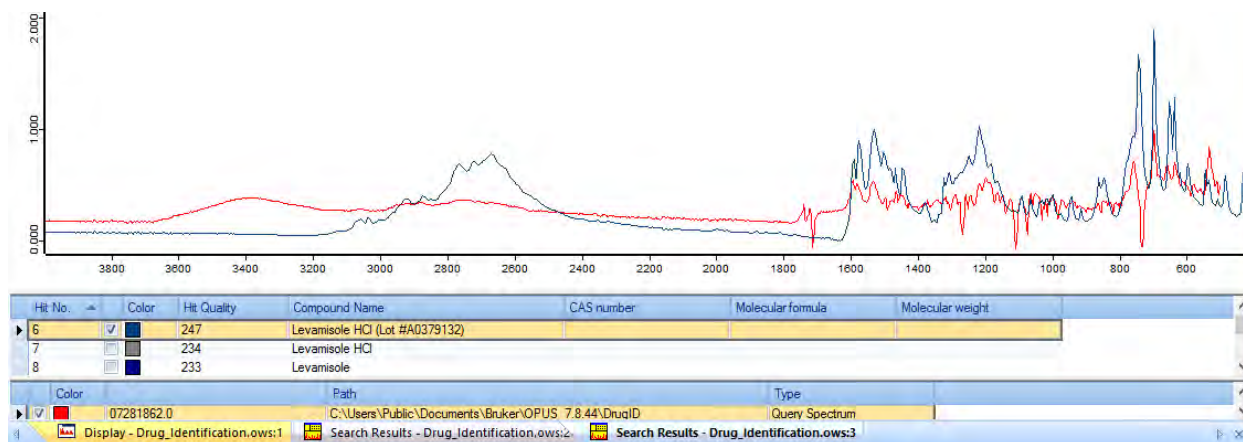
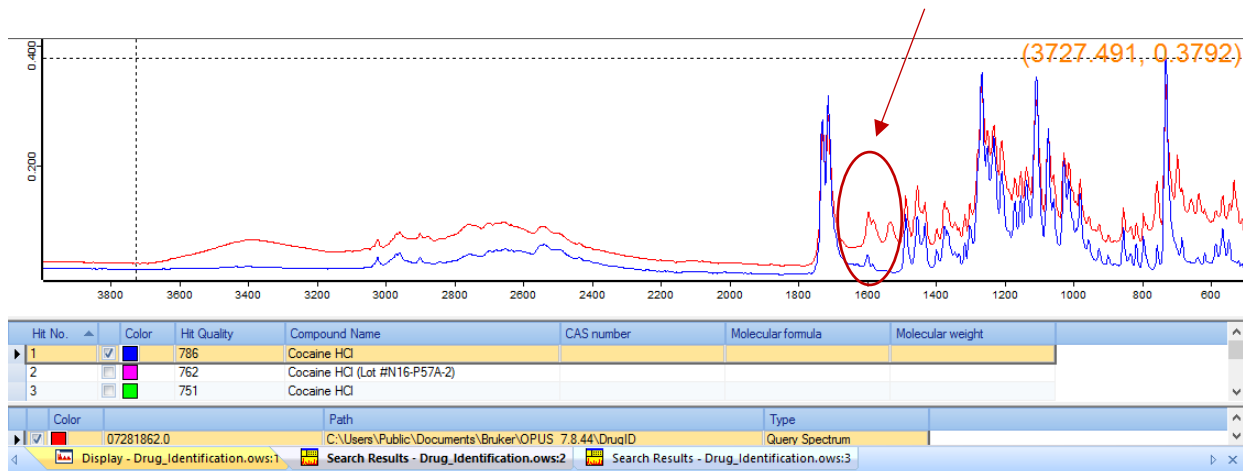
Background

- Cocaine adulterant (i.e. not present in other drugs)
- Levamisole (AKA tetramisole) is a medication used to treat parasitic worm infections in animals and humans (rarely)
- Can cause agranulocytosis/neutropenia (low white blood cell count) with prolonged use in certain people
- Was very common in cocaine around 2010, much less common now but still present in drug supply

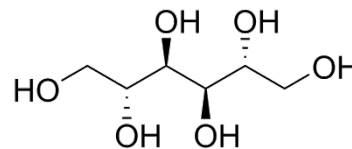
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Levamisole HCl	1678-1505 cm ⁻¹
SWGDRUG	Levamisole HCl	
TICTAC	Levamisole HCl; (-)-tetramisole HCl	
Georgia Crime Lab	LEVAMISOLE HCL IN KBR	



Mannitol



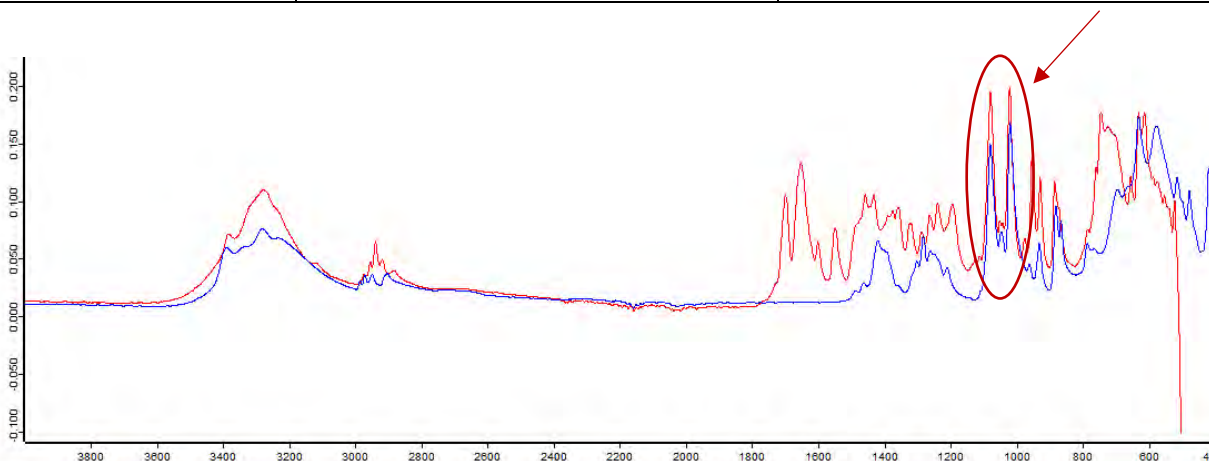
Background

- Sugar or sweetener, common buff in street drugs. Rarely referred to as 'baby lax'
- Rapidly excreted in urine when injected or taken orally
- Commonly used as sweeter in diabetic-friendly foods. Also injected as medication (diuretic) to treat kidney failure (by increasing urine flow) and reduce swelling in eyes and brain (by drawing water out of the brain)
- May cause mild dehydration when taken in high amounts

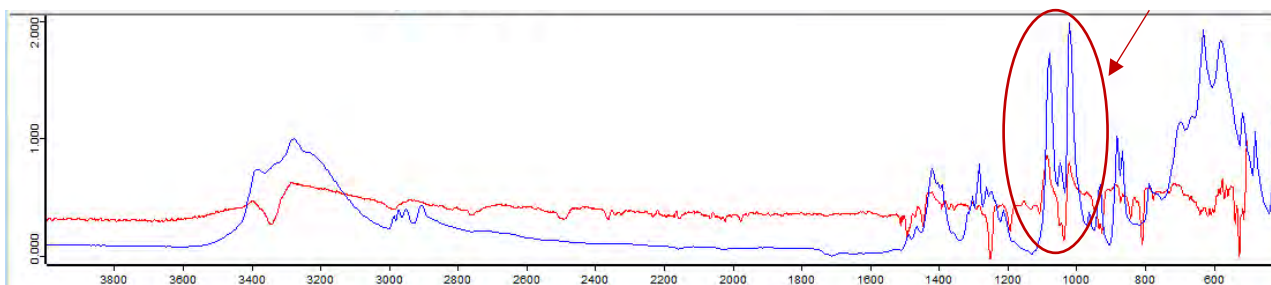
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Mannitol	1100-973 cm^{-1} 3457-3034 cm^{-1}
SWGDRUG	Mannitol	
TICTAC	D-Mannitol	
Georgia Crime Lab	MANNITOL IN KBR	
Bruker Pharma	D-Mannitol, Mannitol NS	

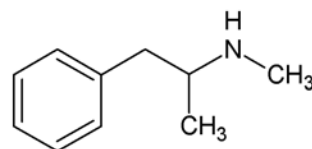


Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	Blue	388	D-Mannitol			
2	Purple	386	Mannitol			
3	Green	382	Mannitol (Lot #5438)			



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	Blue	296	Mannitol (Lot #5438)			
2	Purple	246	Mannitol			
3	Green	221	FDU-PB-22 (Lot #RM-140311-01)			

Methamphetamine



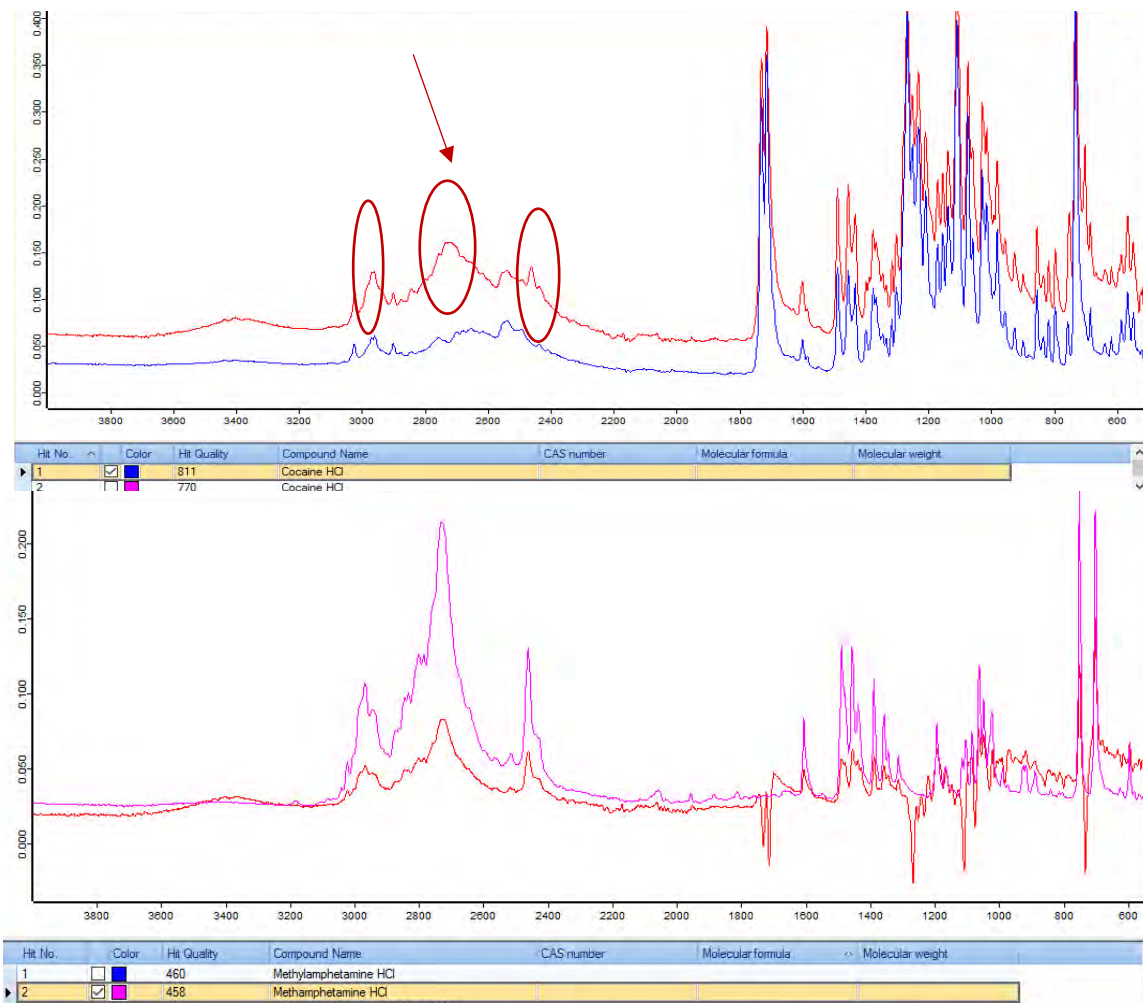
Background

- AKA side, jib, tina, crystal meth. Powerful stimulant
- It increases the levels of dopamine in the brain, causing feelings of motivation, alertness, euphoria, and wakefulness
- The effects can last for up to 12 hours

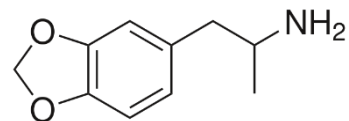
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Methamphetamine HCl	3061-2346 cm ⁻¹
SWGDRUG	d-Methamphetamine HCl, d,l-Methamphetamine HCl	
TICTAC	Methylamphetamine HCl	
Georgia Crime Lab	METHAMPHETAMINE HCL IN KBR	
Bruker Pharma	METHAMPHETAMINE HCL	



3,4-Methylenedioxyamphetamine (MDA)



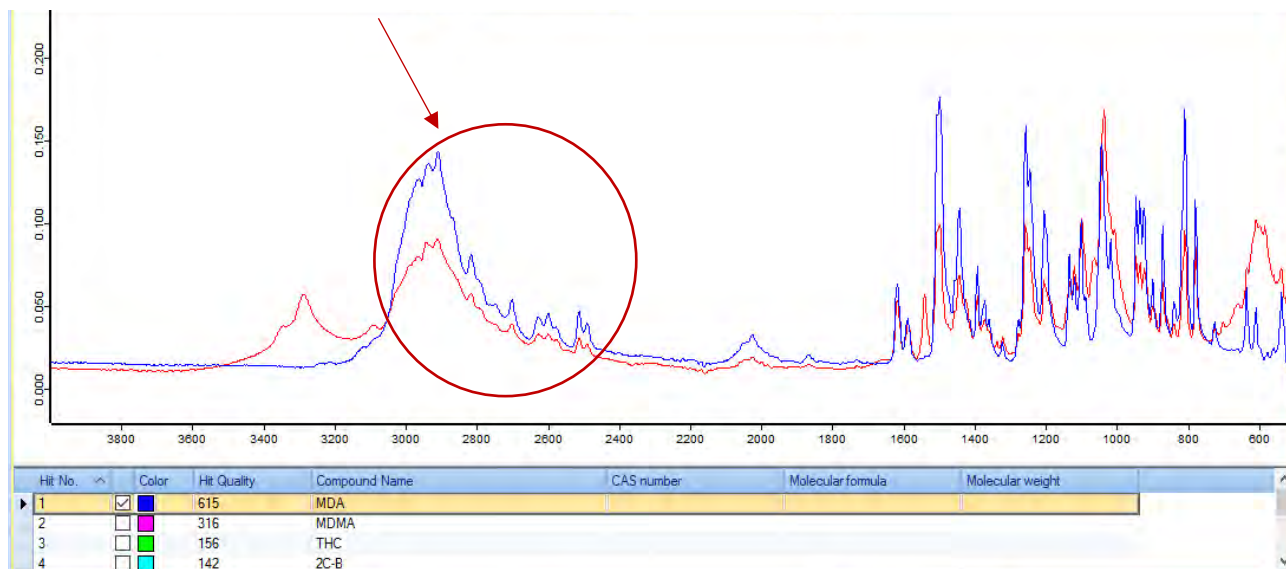
Background

- AKA Sally or Sass. Stimulant and mild psychedelic
- It is more potent than MDMA and the effects tend to last longer
- MDA is much more likely than MDMA to produce visual hallucinations
- Like MDMA, MDA increases the release of serotonin, dopamine and norepinephrine, which produce a feeling of euphoria
- Be careful when reading FTIR matches as the name is similar to methylenedioxy[meth]amphetamine

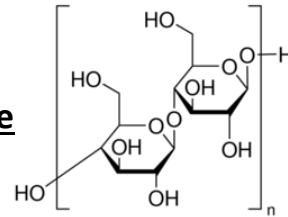
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	MDA	3162-2658 cm ⁻¹ 1639-1562 cm ⁻¹
SWGDRUG	3,4-Methylenedioxyamphetamine	
TICTAC	N/A	
Georgia Crime Lab	3,4-Methylenedioxyamphetamine	
Bruker Pharma	N/A	



Microcrystalline cellulose



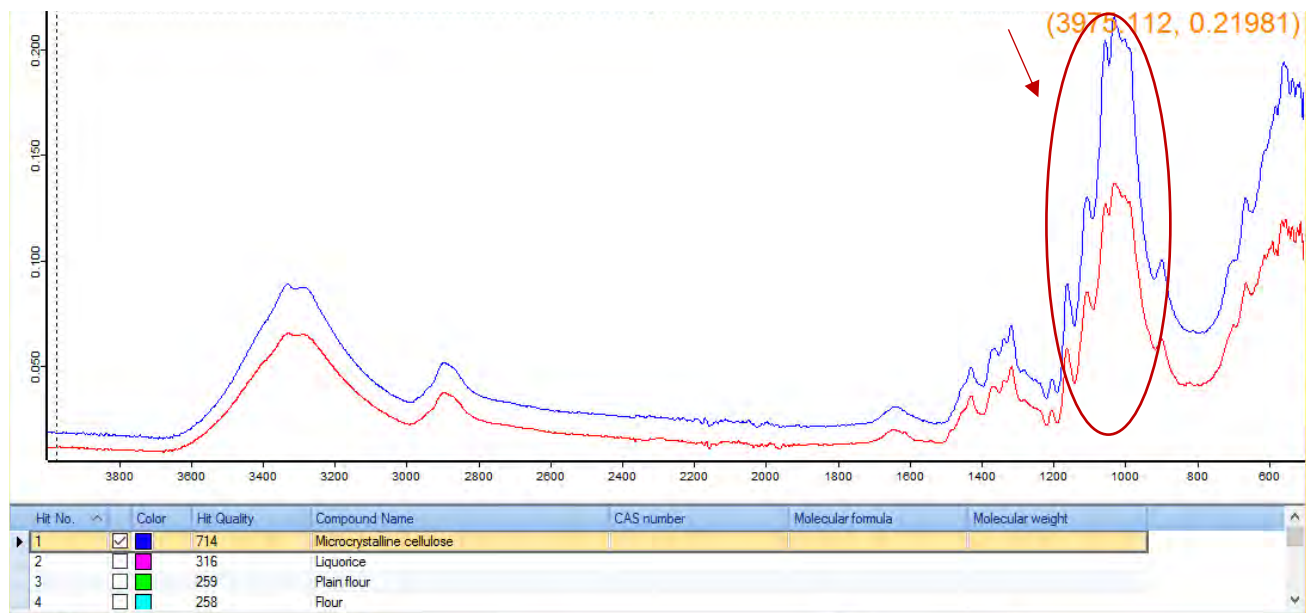
Background

- AKA MCC. Common filler in pharmaceuticals and pressed tablets
- Obtained from purified plant material
- Generally nontoxic, but may harm the digestive system and interfere with nutrient absorption when ingested in high doses

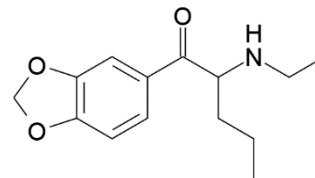
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	Microcrystalline cellulose	1200-843 cm ⁻¹
SWGDRUG	N/A	
TICTAC	N/A	
Georgia Crime Lab	N/A	
Bruker Pharma	CELLULOSE MICROCRYSTALLINE (AVICEL)	



N-Ethylpentylone



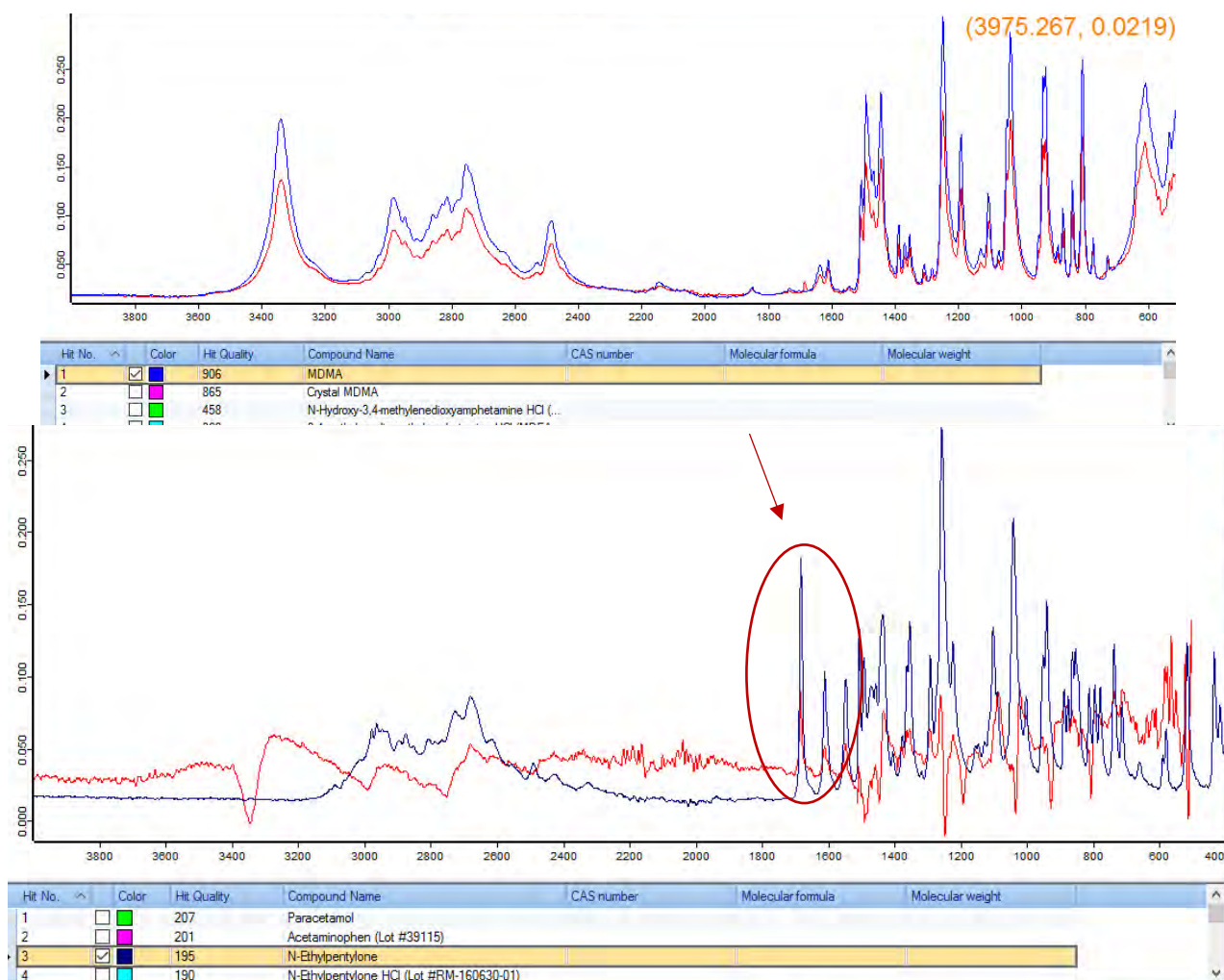
Background

- AKA ephylone. Developed in the 1960s but first seen in the USA in 2016
- Synthetic cathinone and stimulant, often mis-sold as MDMA but can be cut into MDMA
- Significantly more potent than MDMA. Linked to numerous overdoses and deaths. Little is known about its long-term side effects

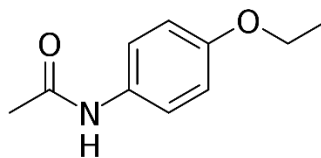
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	N-ethylpentylone	1715-1523 cm ⁻¹
SWGDRUG	N-Ethylpentylone HCl	
TICTAC	N-Ethylpentylone	



Phenacetin



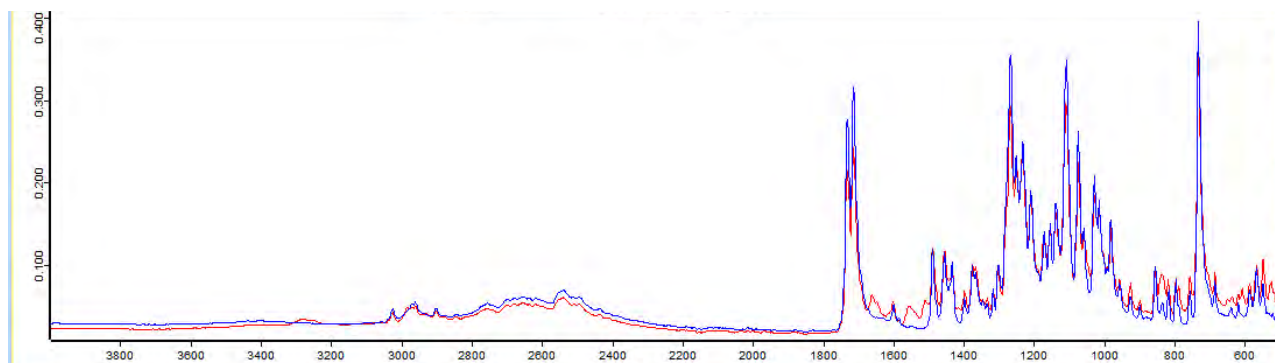
Background

- AKA Super buff. Common cut found in cocaine.
- Pharmaceutical drug. Formerly used as an analgesic and to treat fever before acetaminophen was invented
- Taken off the market in 1978 because it was shown to cause kidney cancer

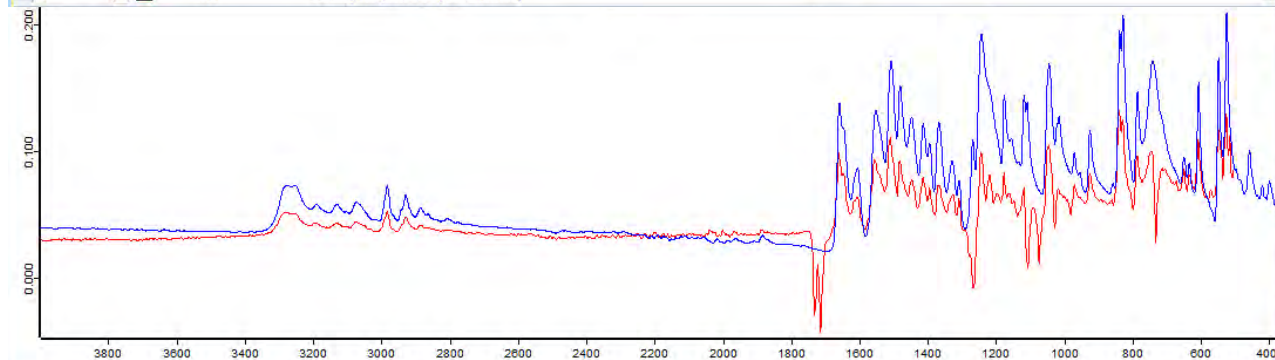
FTIR Analysis

Library Information

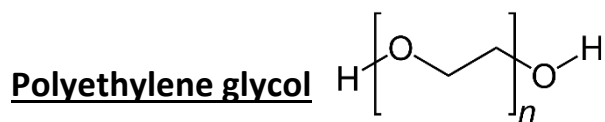
Library	Entry Names	Searchable Wavelength Region
BCCSU	Phenacetin	1677-1388 cm^{-1} 3325-2837 cm^{-1}
SWGDRUG	Phenacetin	
TICTAC	Phenacetin	
Georgia Crime Lab	PHENACETIN IN KBR	
Bruker Pharma	PHENACETIN	



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	892	Cocaine HCl			
2	<input type="checkbox"/>	872	Cocaine HCl (Lot #N16-P57A-2)			
3	<input type="checkbox"/>	842	Cocaine HCl			
4	<input type="checkbox"/>	285	Dimethyl terephthalate (Lot #07201HI)			



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	459	Phenacetin			
2	<input type="checkbox"/>	449	Phenacetin (Lot #01211CU)			
3	<input type="checkbox"/>	217	para-fluorobutyl fentanyl HCl (Lot #0487736-10)			
4	<input type="checkbox"/>	212	4-Chlorobutylcathinone HCl (Lot #RM-160811-01)			



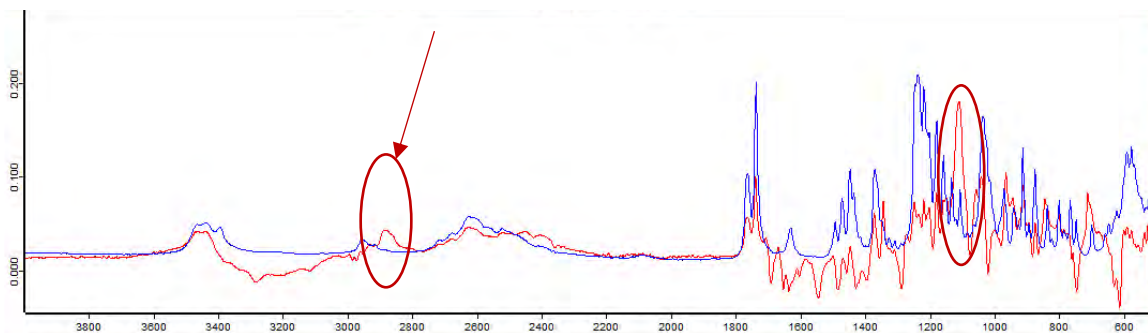
Background

- AKA PEG
- Common osmotic laxative and filler, found as a buff in street opioids (also found in fentanyl when sold as 'pure' or 'raw')
- When taken orally in high doses it may cause nausea and abdominal pain. When administered intravenously it is excreted almost completely in the urine.

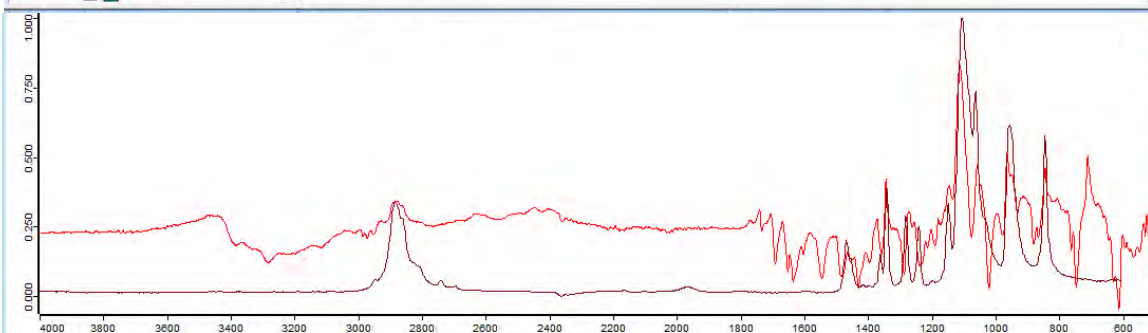
FTIR Analysis

Library Information

Library	Entry Names	Searchable Wavelength Region
BCCSU	N/A	2911-2784 cm^{-1}
SWGDRUG	N/A	
TICTAC	N/A	
Georgia Crime Lab	N/A	
Bruker Pharma	POLY(ETHYLENE GLYCOL) 4000, POLY(ETHYLENE GLYCOL) 2000, POLY(ETHYLENE GLYCOL) 300, POLYETHYLENE GLYCOL 200 DIBENZOATE, PEG-200 GLYCERYL TALLOWATE	



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
1	<input checked="" type="checkbox"/>	349	Heroin HCl			
2	<input type="checkbox"/>	320	Heroin Hydrochloride Monohydrate (Lot #N16-P2...			
3	<input type="checkbox"/>	222	06-Monoacetylmorphine HCl Trihydrate (Lot #N17...			
4	<input type="checkbox"/>	193	Taurine			



Hit No.	Color	Hit Quality	Compound Name	CAS number	Molecular formula	Molecular weight
9	<input checked="" type="checkbox"/>	552	POLY(ETHYLENE GLYCOL) 2000	25322-68-3	(C2H6O2)n	
2	<input type="checkbox"/>	659	METOLACHLOR	51218-45-2	C15H22ClNO2	283.8
3	<input type="checkbox"/>	630	GLUTARALDEHYDE (25% IN WATER)	111-30-8	C5H8O3	100.12
4	<input type="checkbox"/>	603	PHOSPHOROUS ACID	13598-36-2	H3PO3	82