

# Drug Testing and Dilutes





# Forensic Toxicology

- Toxicology is a science that deals with poisons and their effect.
- Forensic toxicology is the application of toxicology as it applies to law.





# Different Subgroups of Toxicology

- Postmortem Forensic Toxicology
- Human Performance Toxicology
- Forensic Drug Testing





# Testing Approach

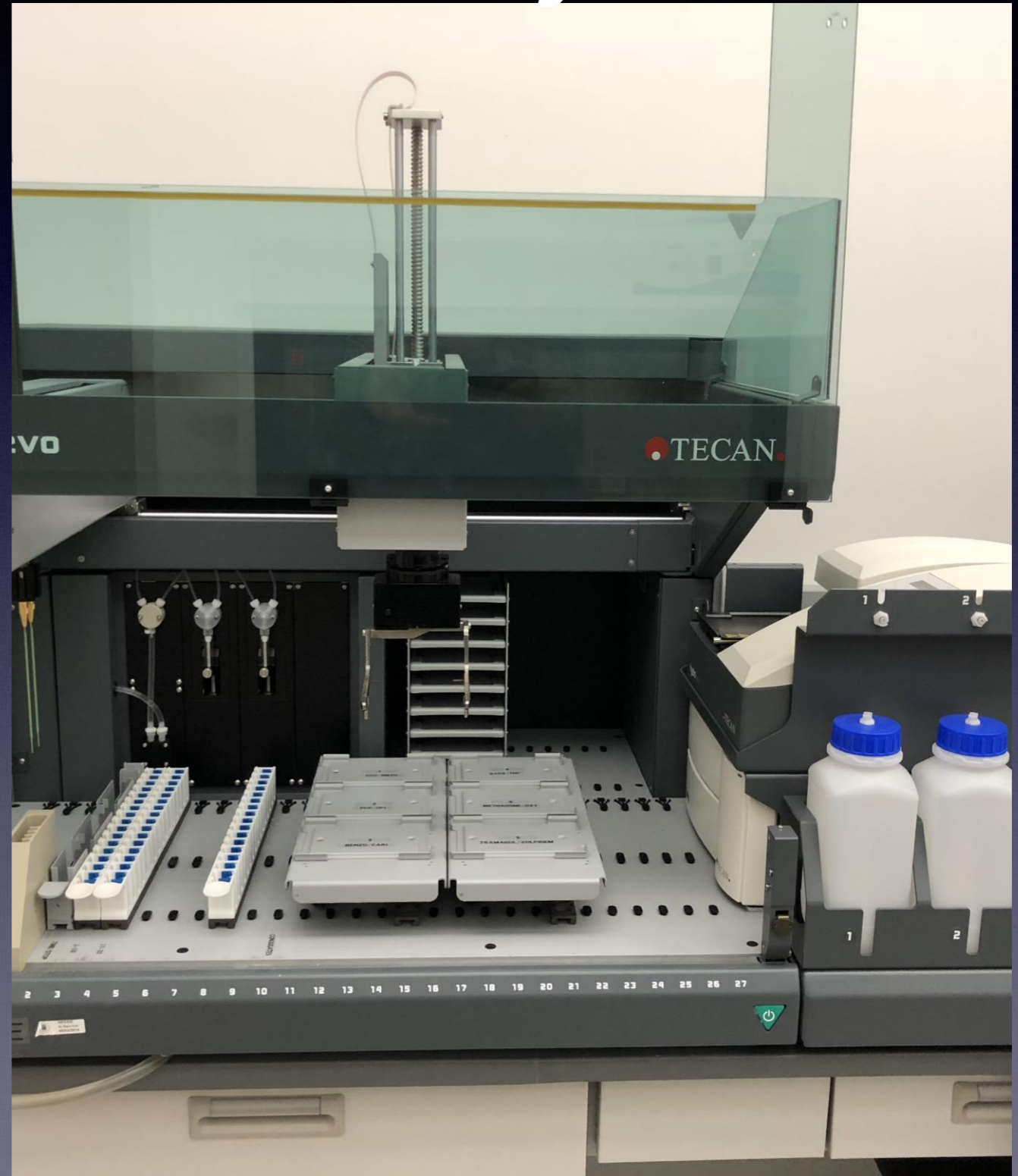
- Screening



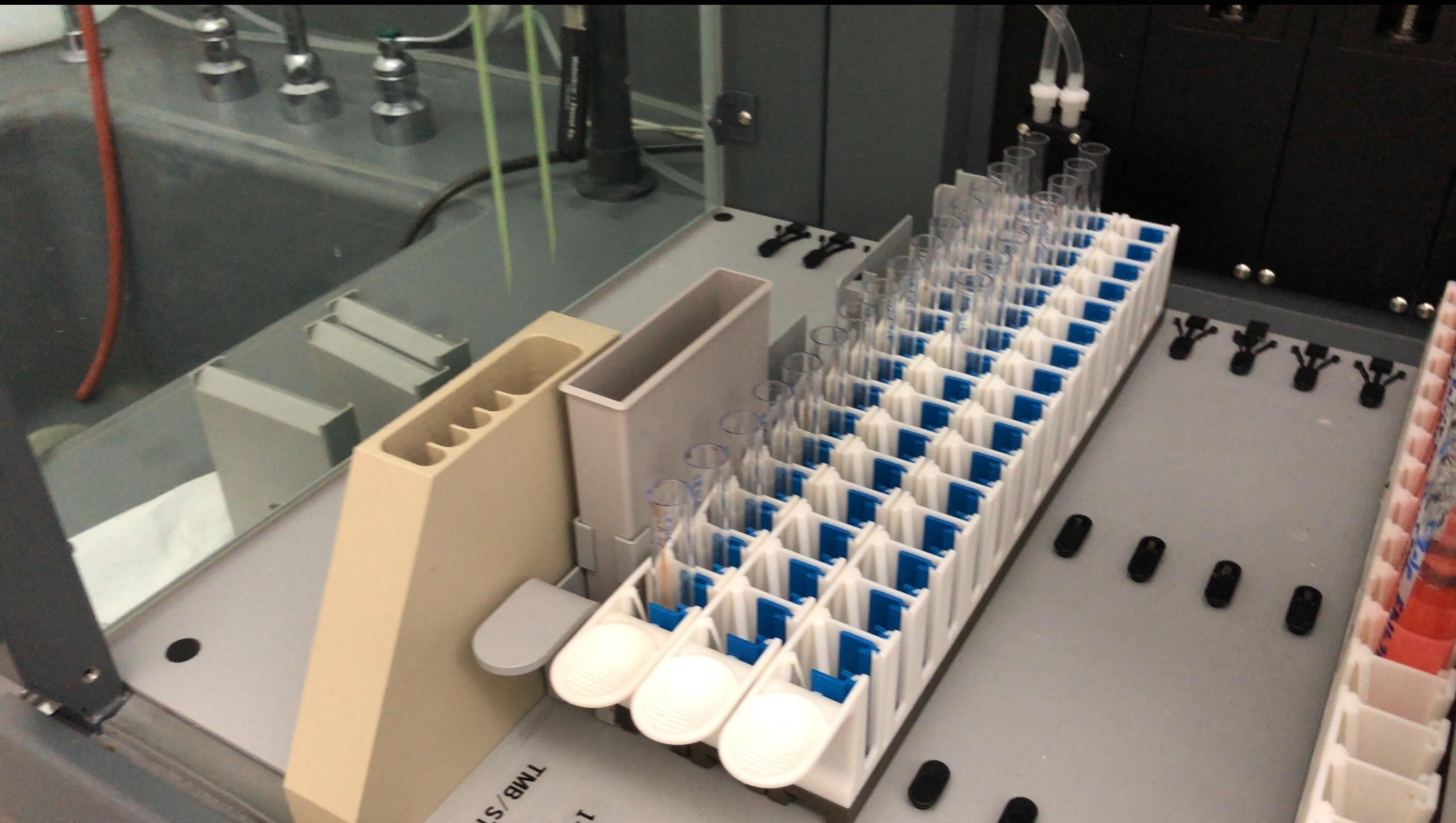


# Immunoassay

- Presumptive screening for the following drug/drug classes:
- Methamphetamines
- Benzodiazepines
- Barbiturates
- Cannabinoids
- Carisoprodol
- Cocaine
- Opiates
- Phencyclidine
- Zolpidem
- Methadone
- Tramadol
- Oxycodone
- Amphetamine
- Fentanyl









# Accurate and Reliable Testing Procedures

# Step One – Screening

- often based on immunoassay technology
- more drug – more binding - more “color” produced – more instrument detector response
- numerous commercial manufacturers
- designed for high throughput instrumentation or on-site devices



# Immunoassay



Immunoassay Analyzer | AIA-60...  
trademed.com



Abbott Prism Immunoassay analyzer fro...  
news-medical.net



Multiplexing immunoassay analyzer - ...  
medicalexpo.com



Immunoassay Analyzer Access 2 ...  
beckmancoulter.com



Diesse Chorus Trio Immunoassay An...  
indiamart.com



Chemiluminescence Immunoass...  
alibaba.com



Immunoassay Systems - Siemens ...  
usa.healthcare.siemens.com



AQT90 FLEX Immunoassay An...  
news-medical.net



New & Used Immunoassay Analyzer, Enzyme ...  
medwow.com



CL-1200i Immunoassay Analyzer - ...  
indiamart.com



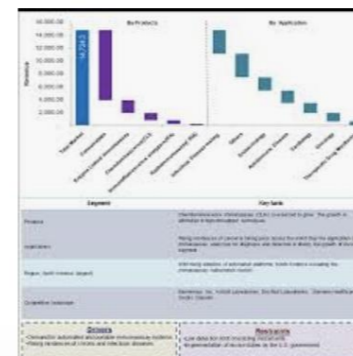
Chemiluminescence Immuno...



Bench-top immunoassay an...



Immunoassay Analyzers ...



Immunoassay Analyzers Indu...



ARCHITECT i1000SR Imv...



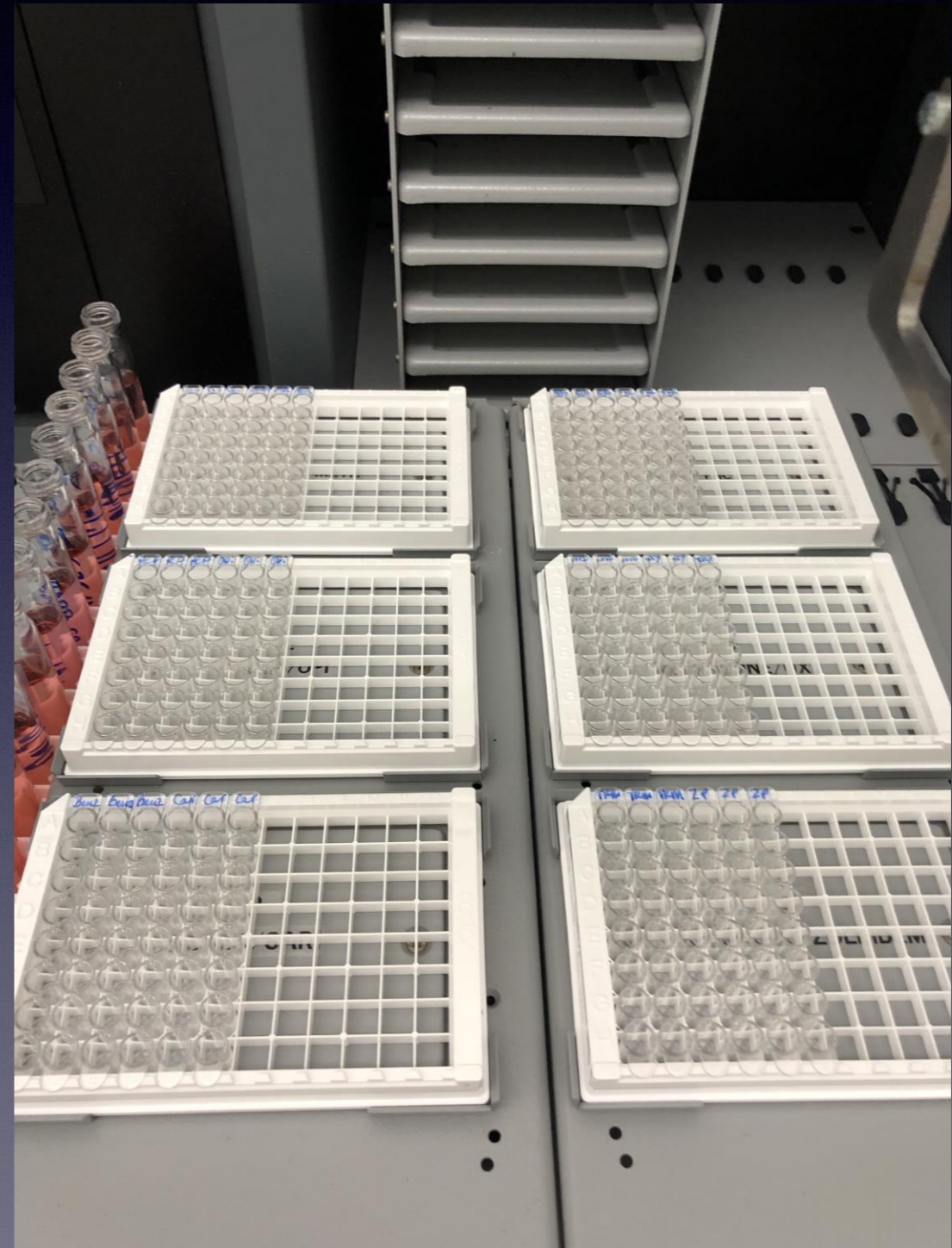
Chemiluminescence Immunoassa...

Screenshot

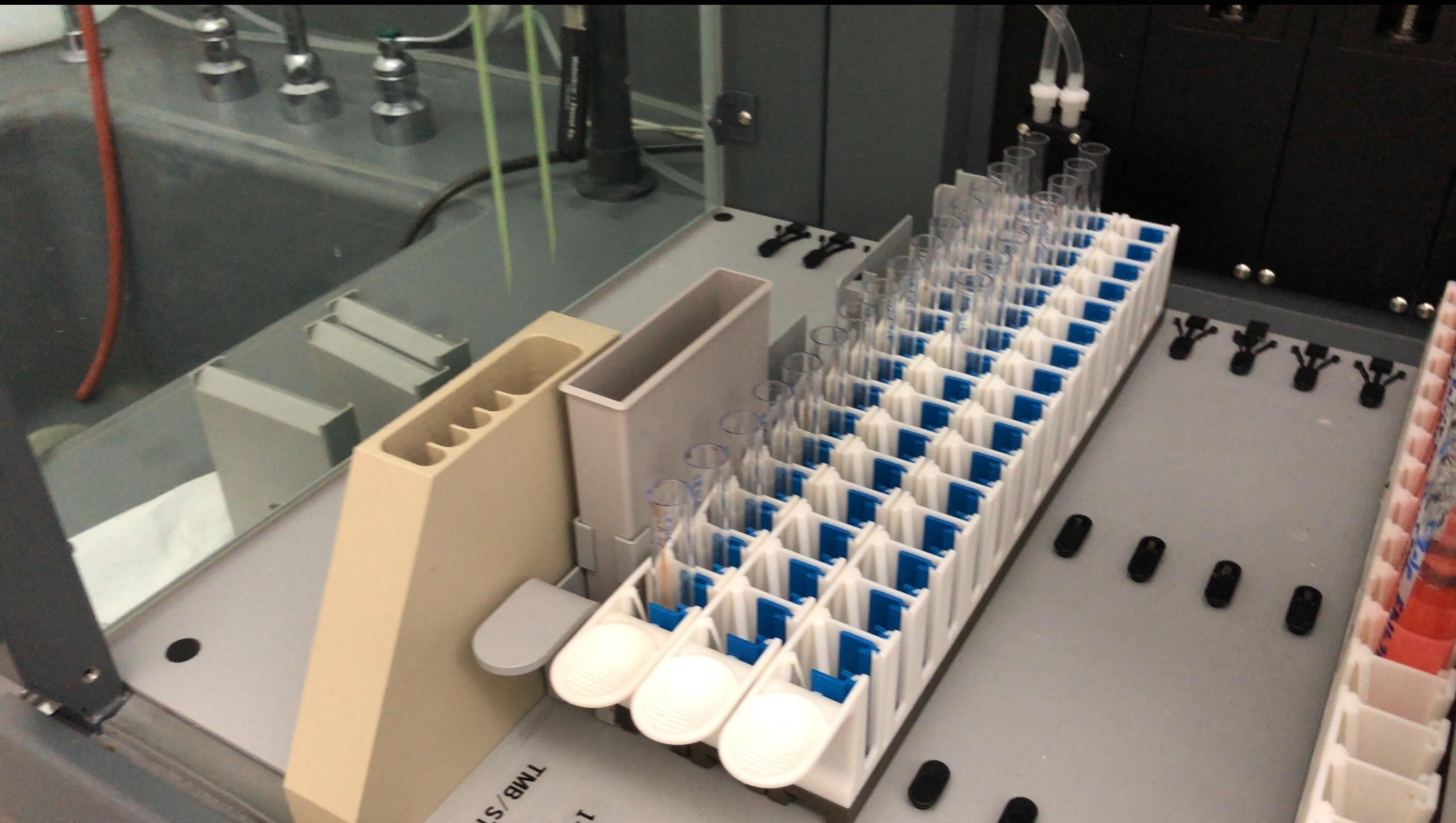


# Drug Screening

- **Blank Plates**



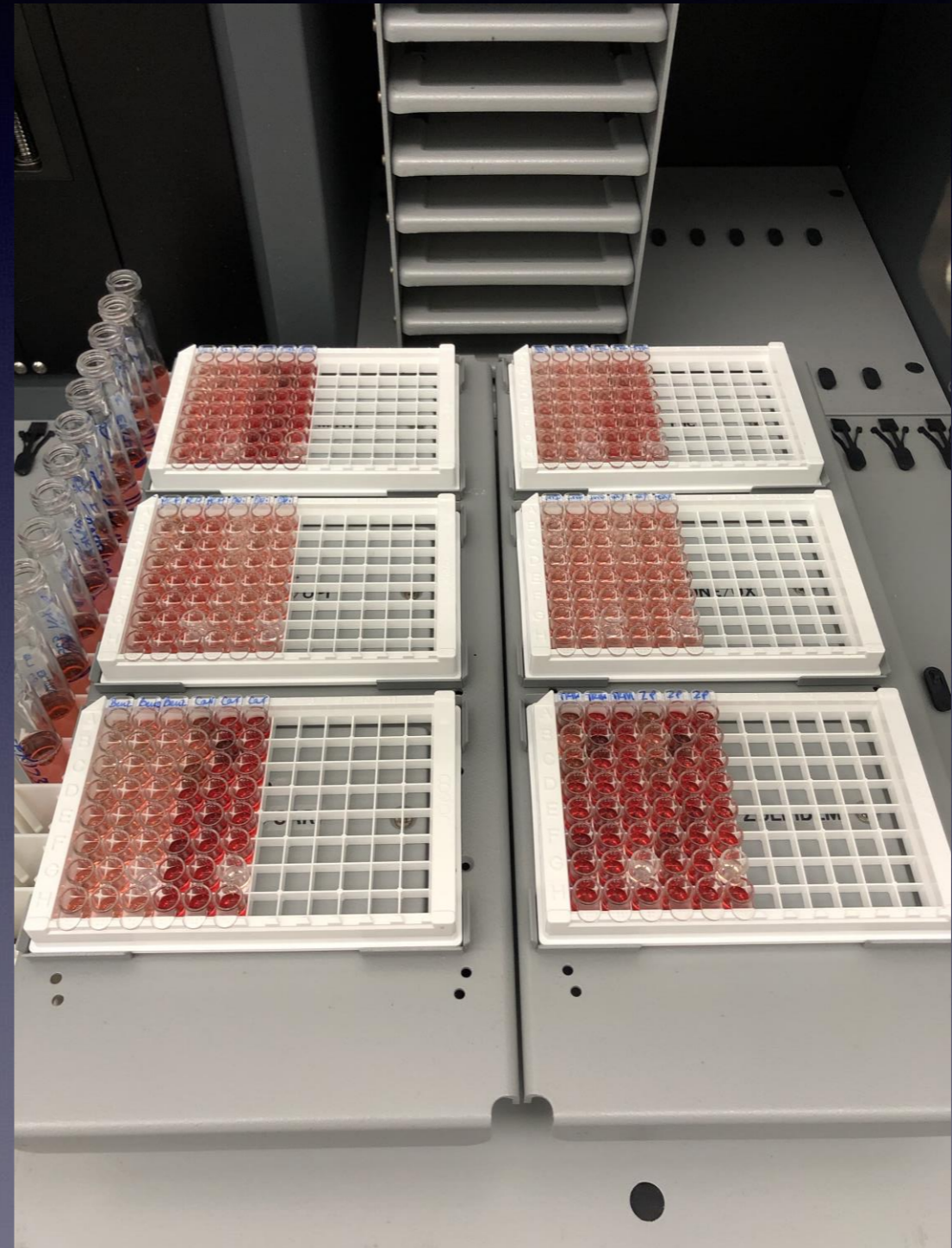






# Drug Screening

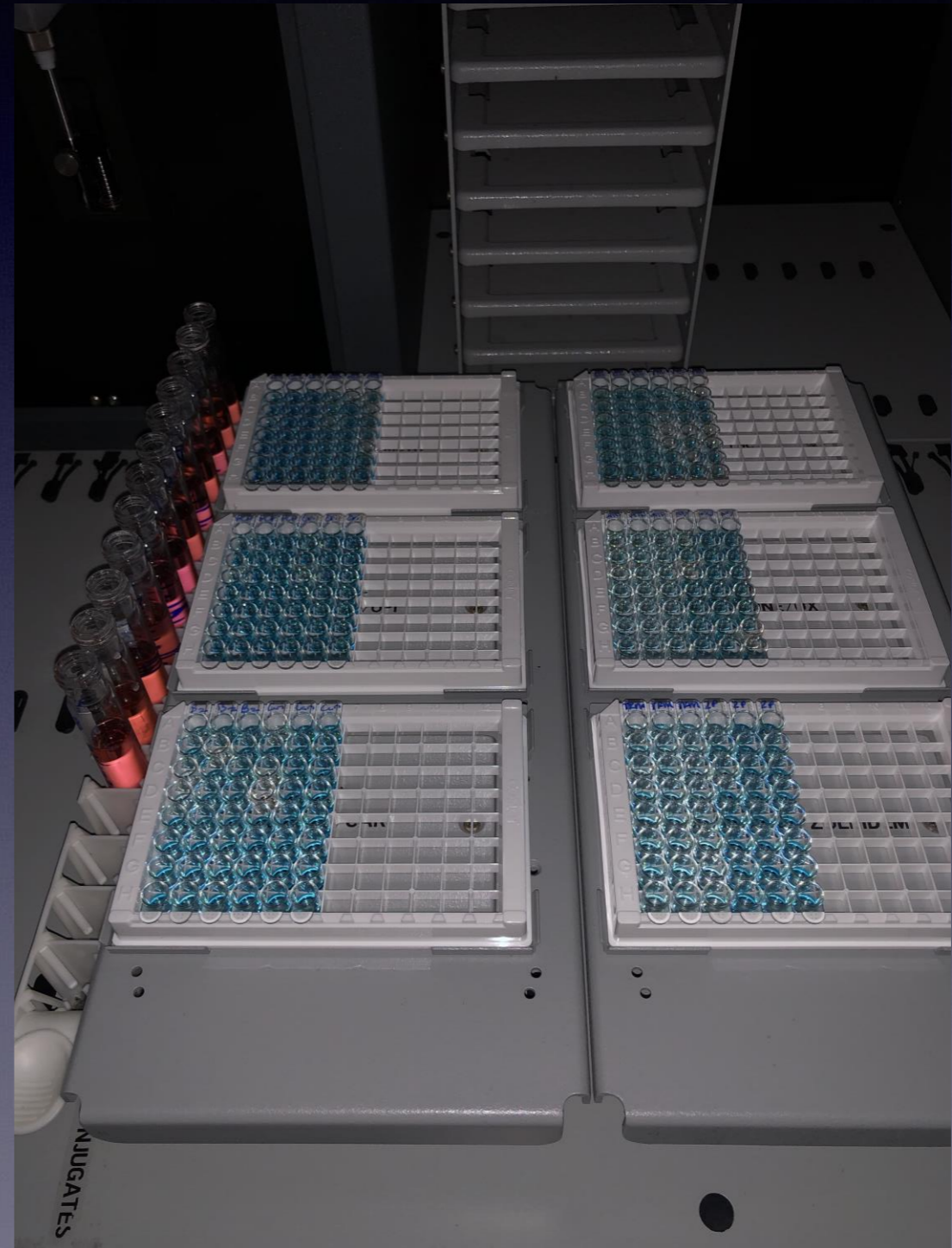
- Addition of conjugate





# Drug Screening

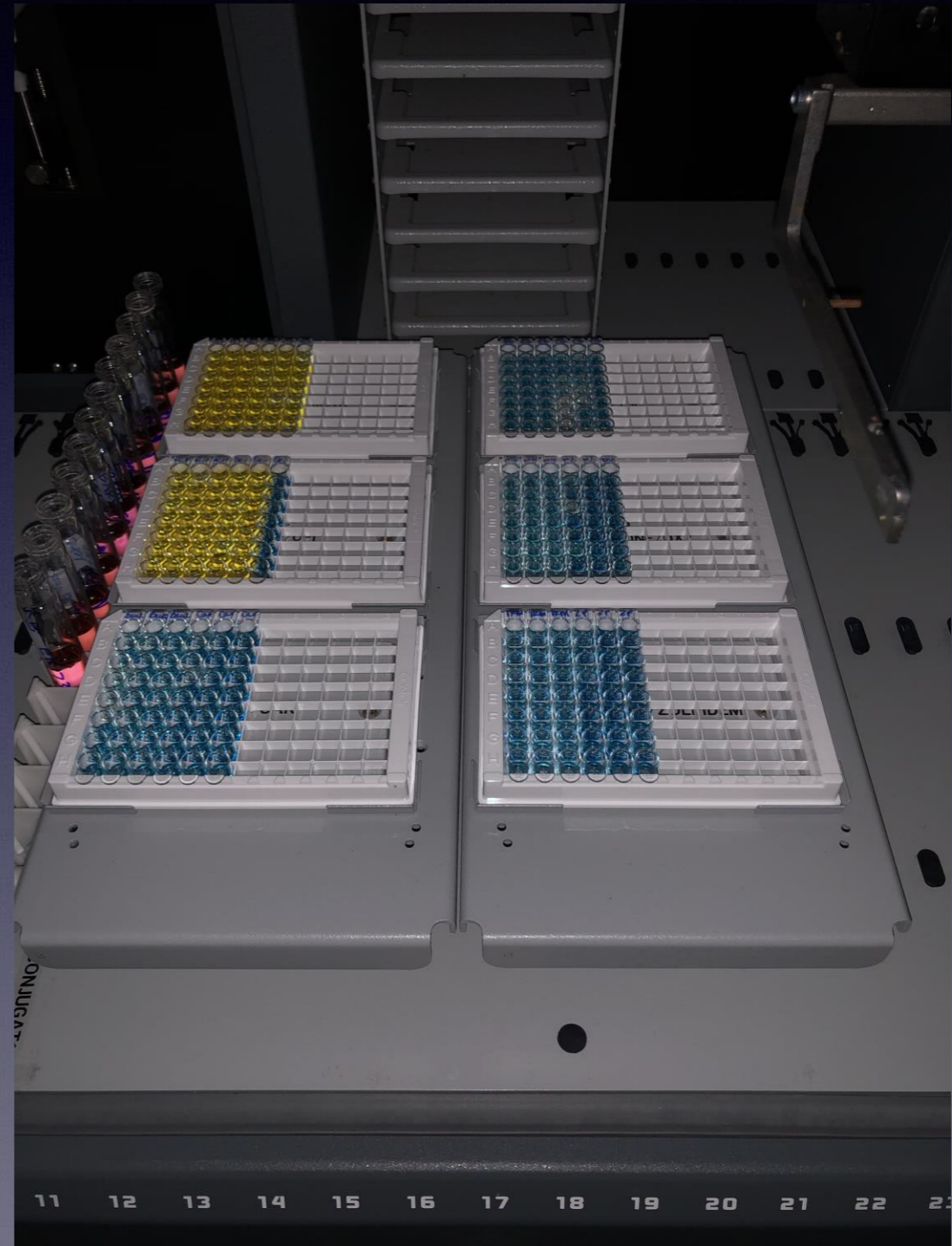
- **Addition of color reagent**





# Drug Screening

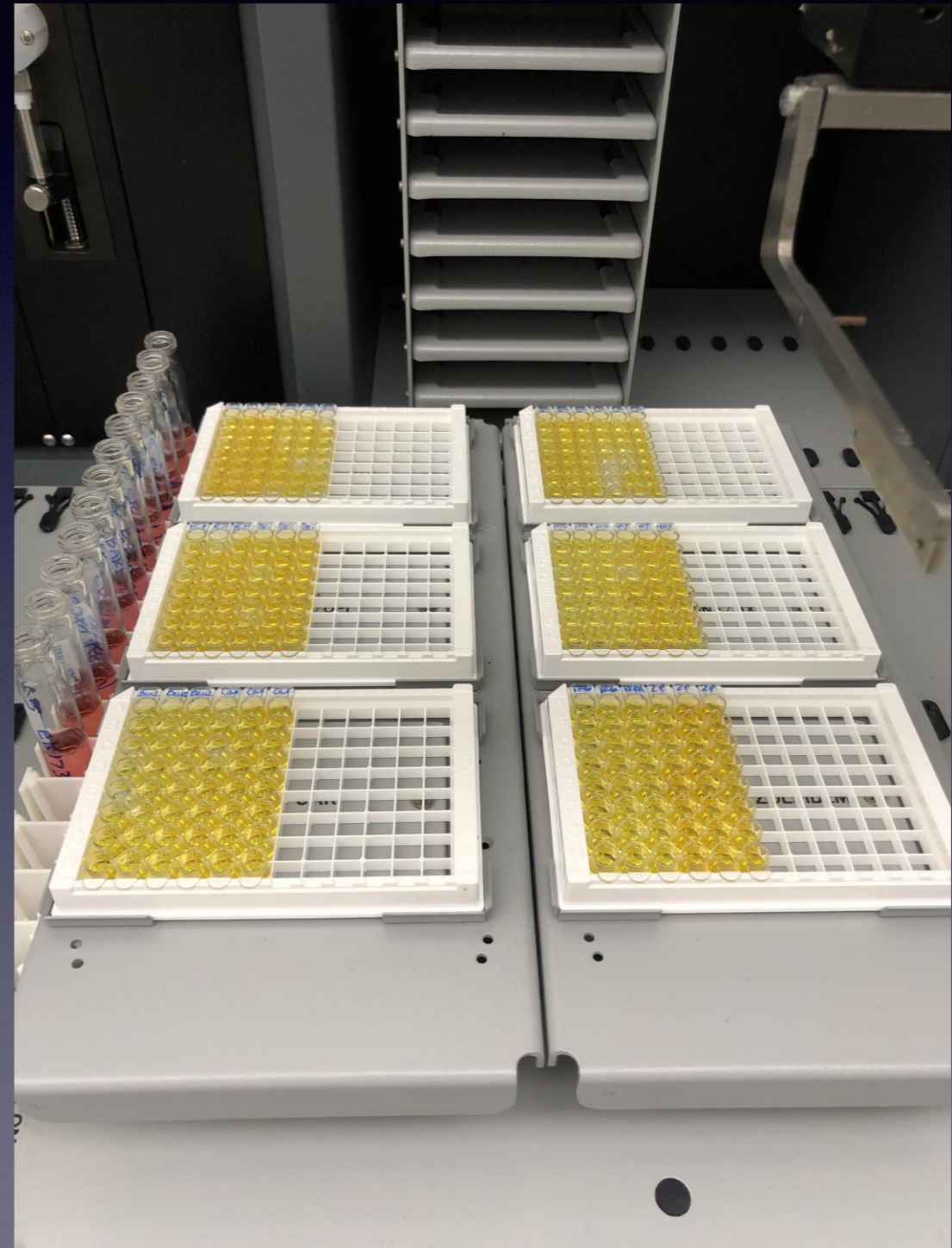
- Addition of stop reagent





# Drug Screening

- Reading the plates





# Drug Screening

## Immunoassay Drug Screening Report

Control ID	Barbiturates		Benzodiazepines		Cannabinoids		Carisoprodol		Cocaine/BE		Methamphetamine	
	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0
PC	100ng/ml	51	50ng/ml	51	10ng/ml	65	500ng/ml	26	50ng/ml	37	20ng/ml	37
NC	Blank	100	Blank	100	Blank	100	Blank	100	Blank	100	Blank	100
HPC	200ng/ml	36	200ng/ml	23	50ng/ml	35	1000ng/ml	19	100ng/ml	29	50ng/ml	24
<b>% B/B0</b>	<b>112</b>		<b>75</b>		<b>22</b>		<b>108</b>		<b>111</b>		<b>5</b>	
<b>Result</b>	<b>ND</b>		<b>ND</b>		<b>POSITIVE</b>		<b>ND</b>		<b>ND</b>		<b>POSITIVE</b>	

Control ID	Opiates		PCP		Methadone		Oxyc/M		Tramadol		Zolpidem	
	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0	Conc	% b/b0
PC	10ng/ml	53	5ng/ml	41	50ng/ml	54	10ng/ml	27	50ng/ml	62	10ng/ml	60
NC	Blank	100	Blank	100	Blank	100	Blank	100	Blank	100	Blank	100
HPC	50ng/ml	21	10ng/ml	29	100ng/ml	38	50ng/ml	9	100ng/ml	48	20ng/ml	45
<b>% B/B0</b>	<b>95</b>		<b>108</b>		<b>131</b>		<b>109</b>		<b>109</b>		<b>110</b>	
<b>Result</b>	<b>ND</b>		<b>ND</b>		<b>ND</b>		<b>ND</b>		<b>ND</b>		<b>ND</b>	

None Detected (ND)

- Sample report



# Step Two - Confirmation



- gas chromatography-mass spectrometry (GC/MS) or LC/MS or LC/MS/MS
  - drug molecules separated by physical characteristics
  - identified based on chemical “finger-print”
  - considered “gold standard”
- other chromatographic techniques



# Why confirm ?

- Is it really necessary to confirm drugs that tested positive by initial screening tests?
- Why can't the court adjudicate cases based on the screening test results?
- FALSE POSITIVES



# Drug tests & cross reactivity:

- screening tests can and do react to “non-target” compounds
  - amphetamines
  - benzodiazepines
- obtain list of interfering compounds from lab or on-site test vendor
- initial screening (“instant” tests) may only be 60-70% accurate
- confirm positive results





# Drug Confirmation

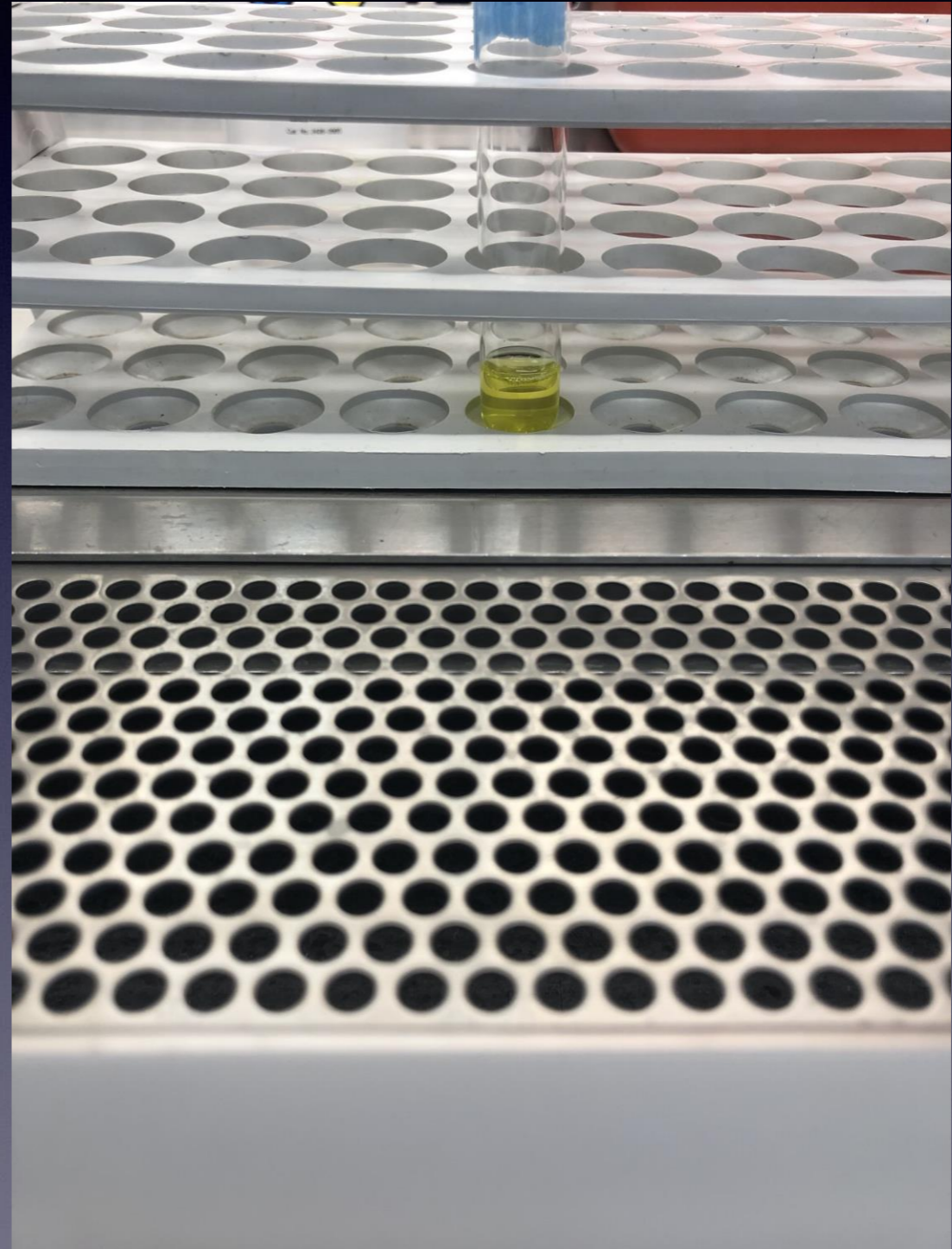
- **Extraction**
- GC/MS and LC/MS
- Separation
- Identification
- Confirmation
- Various drugs classes





# Drug Confirmation

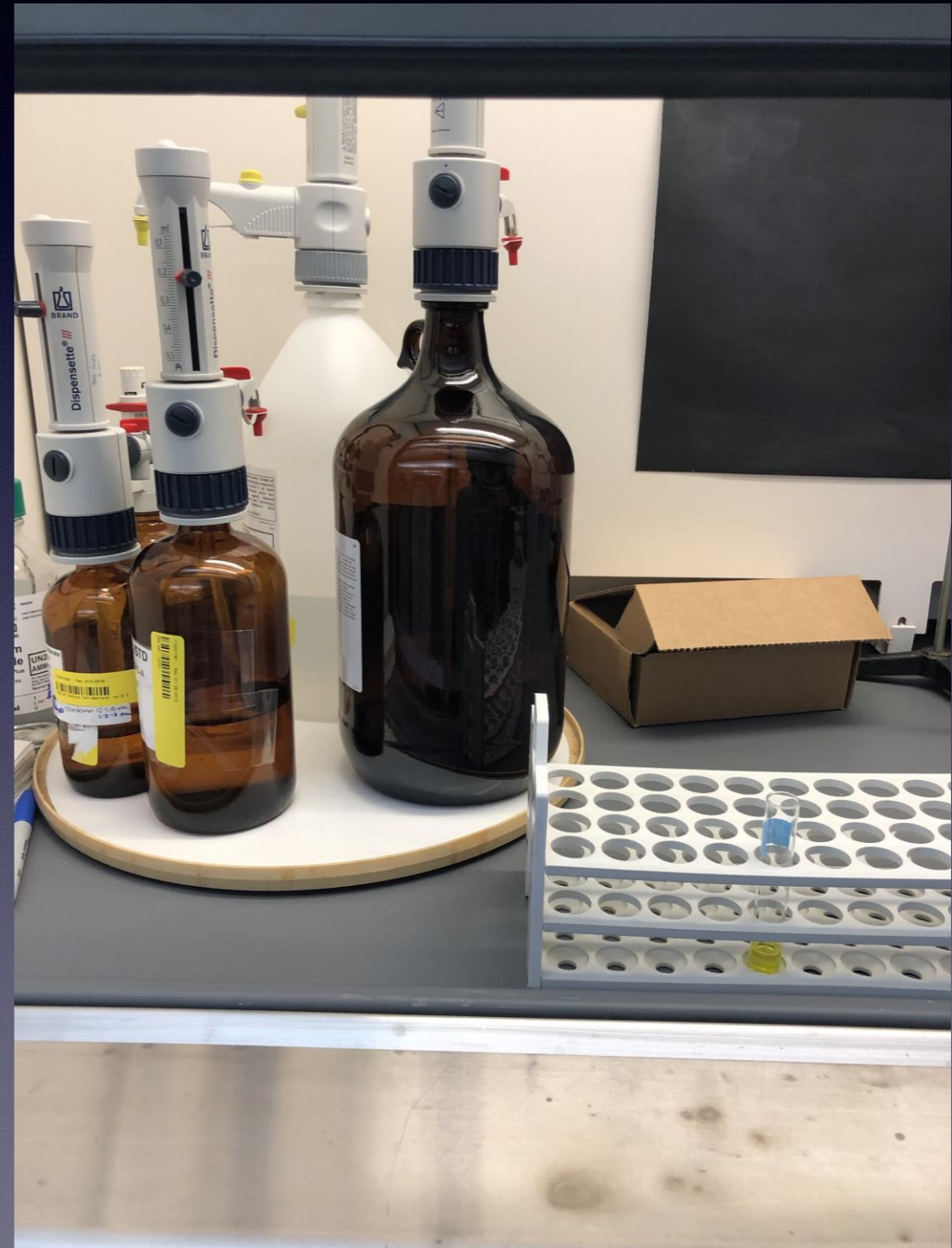
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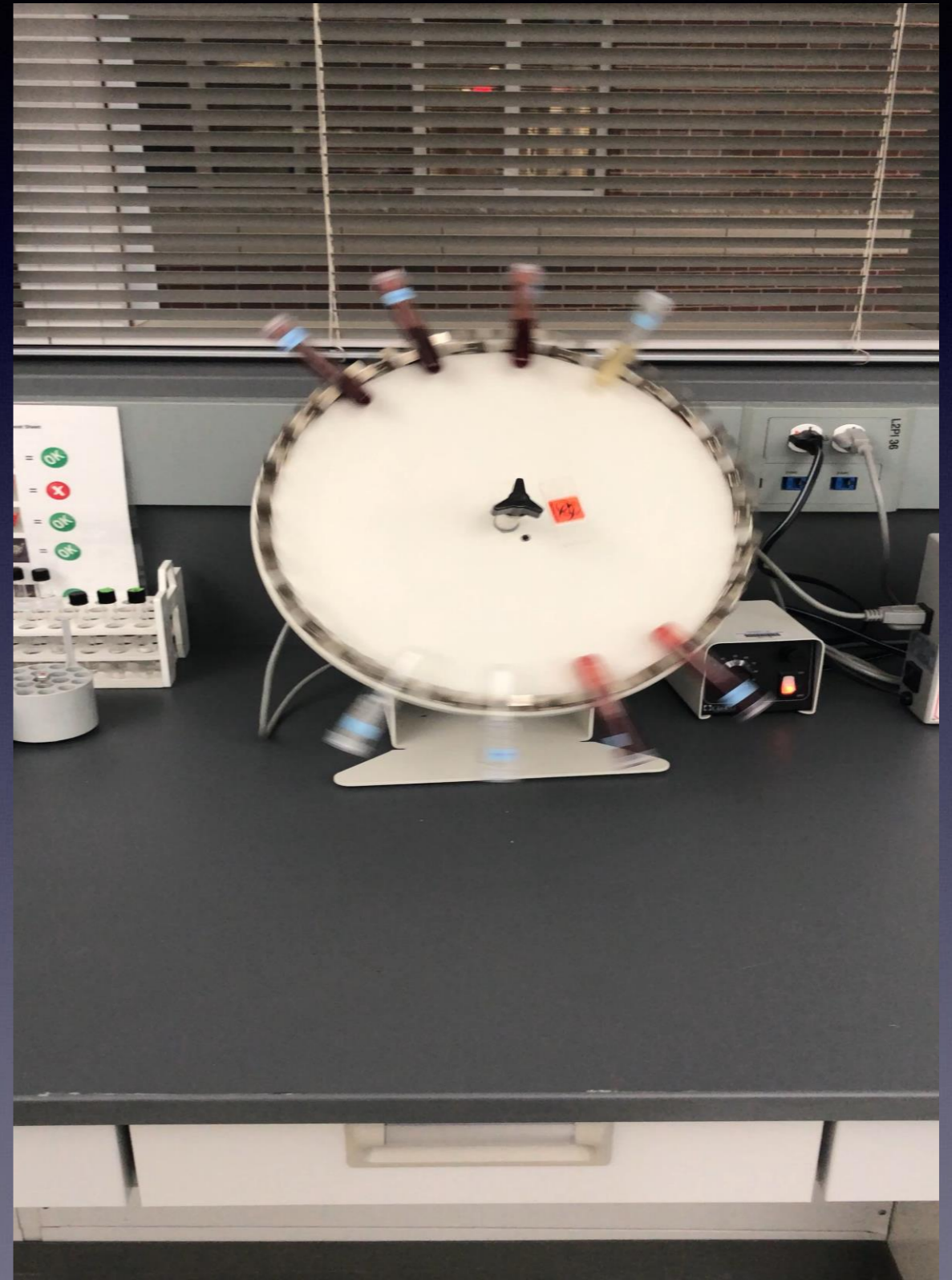
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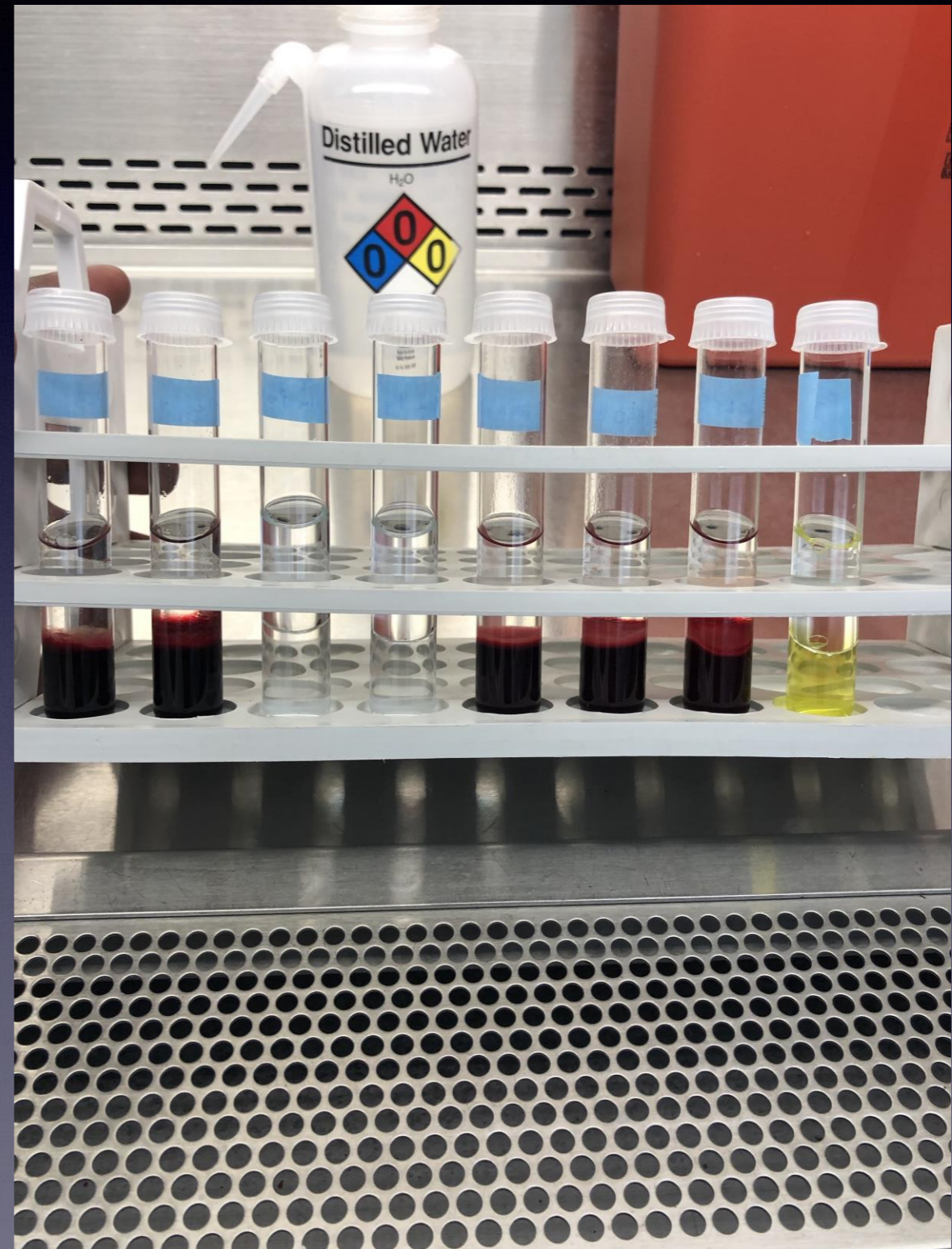
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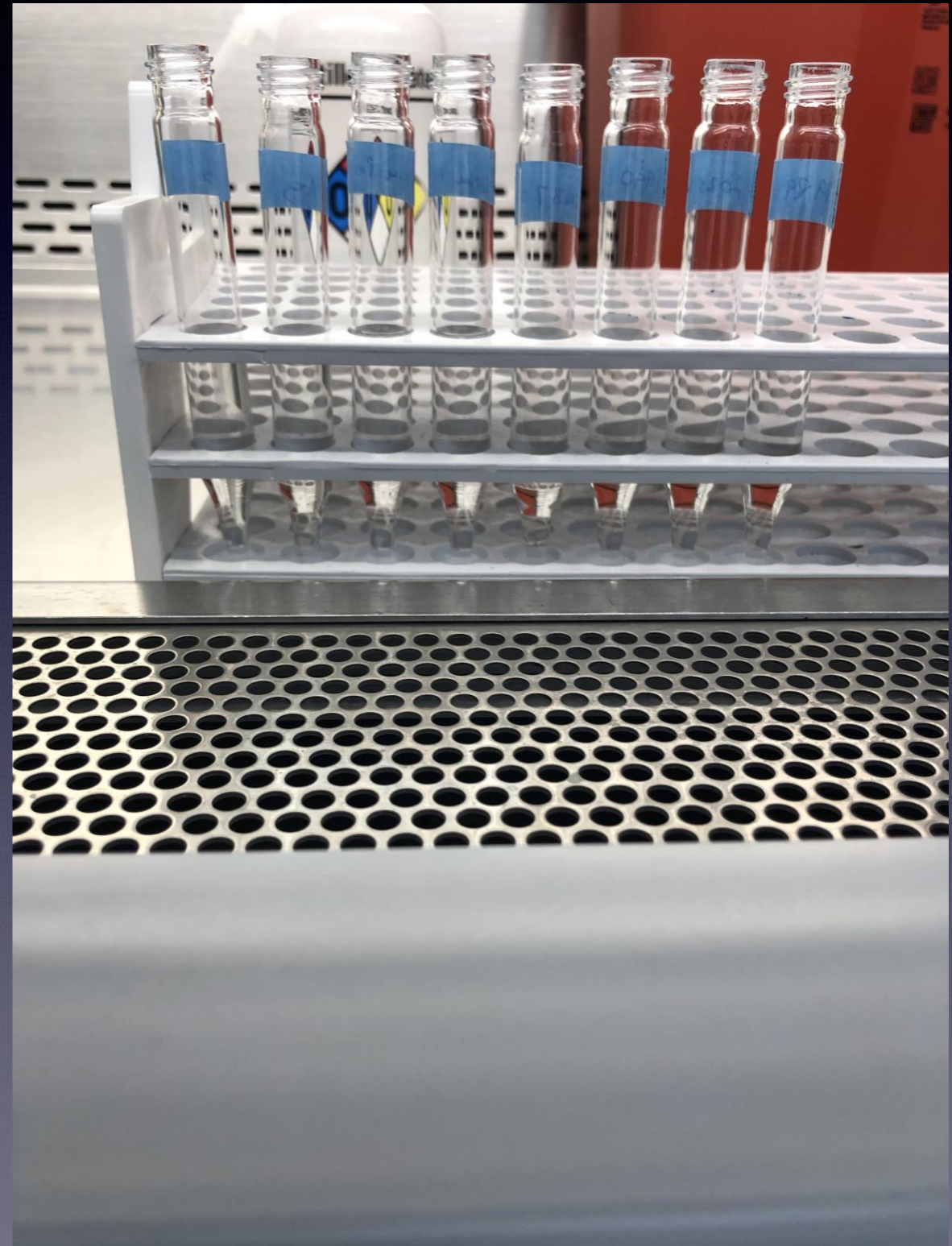
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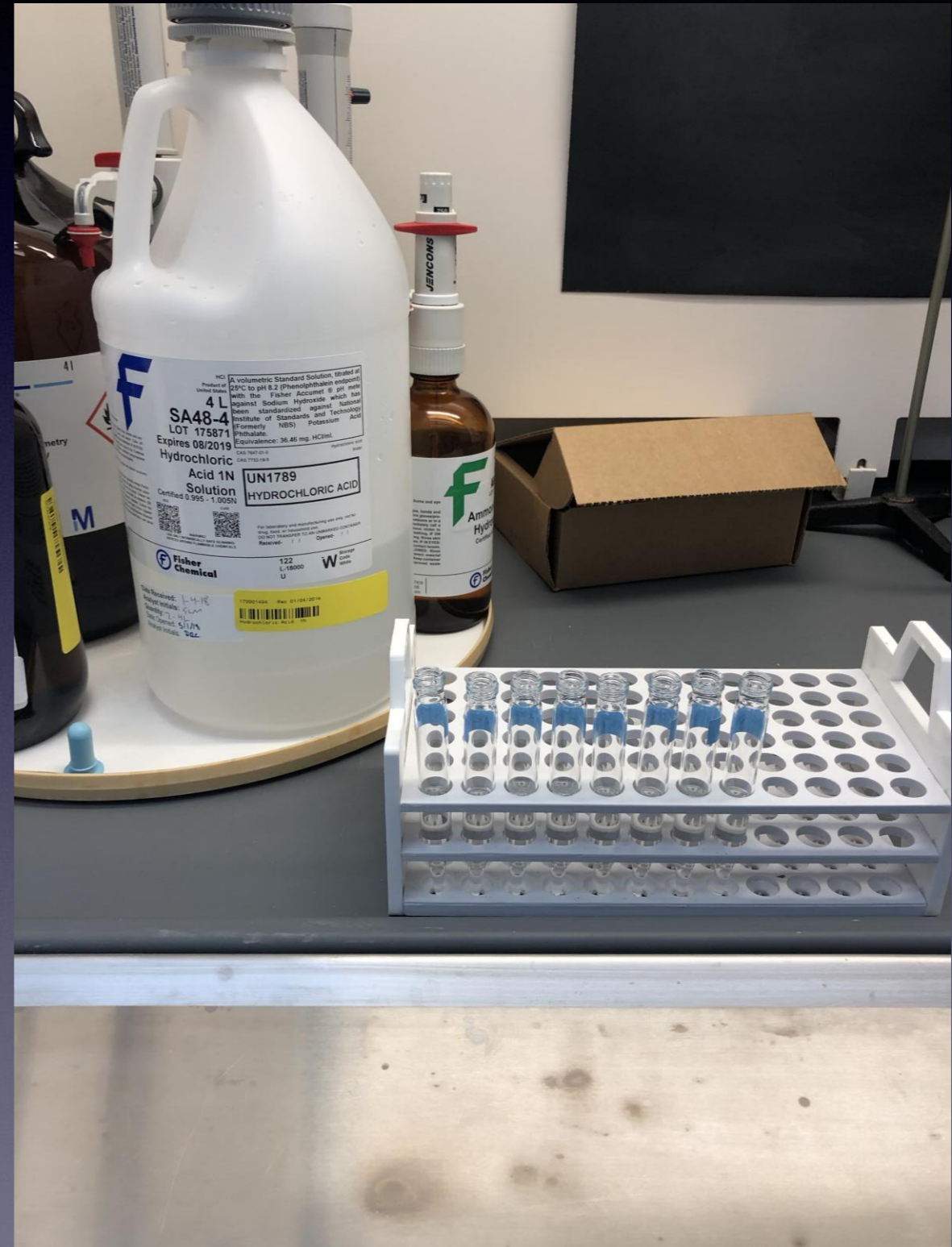
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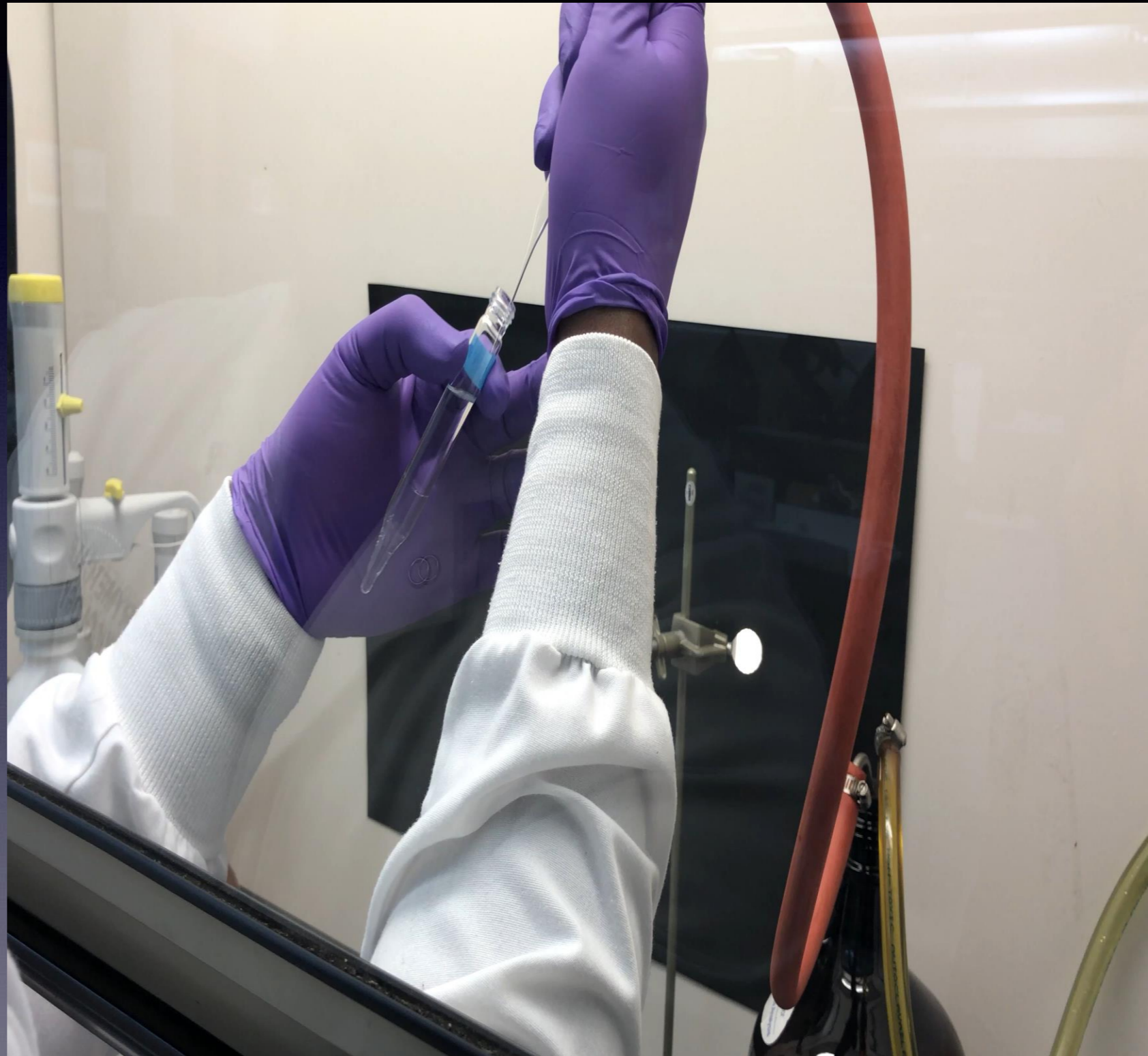
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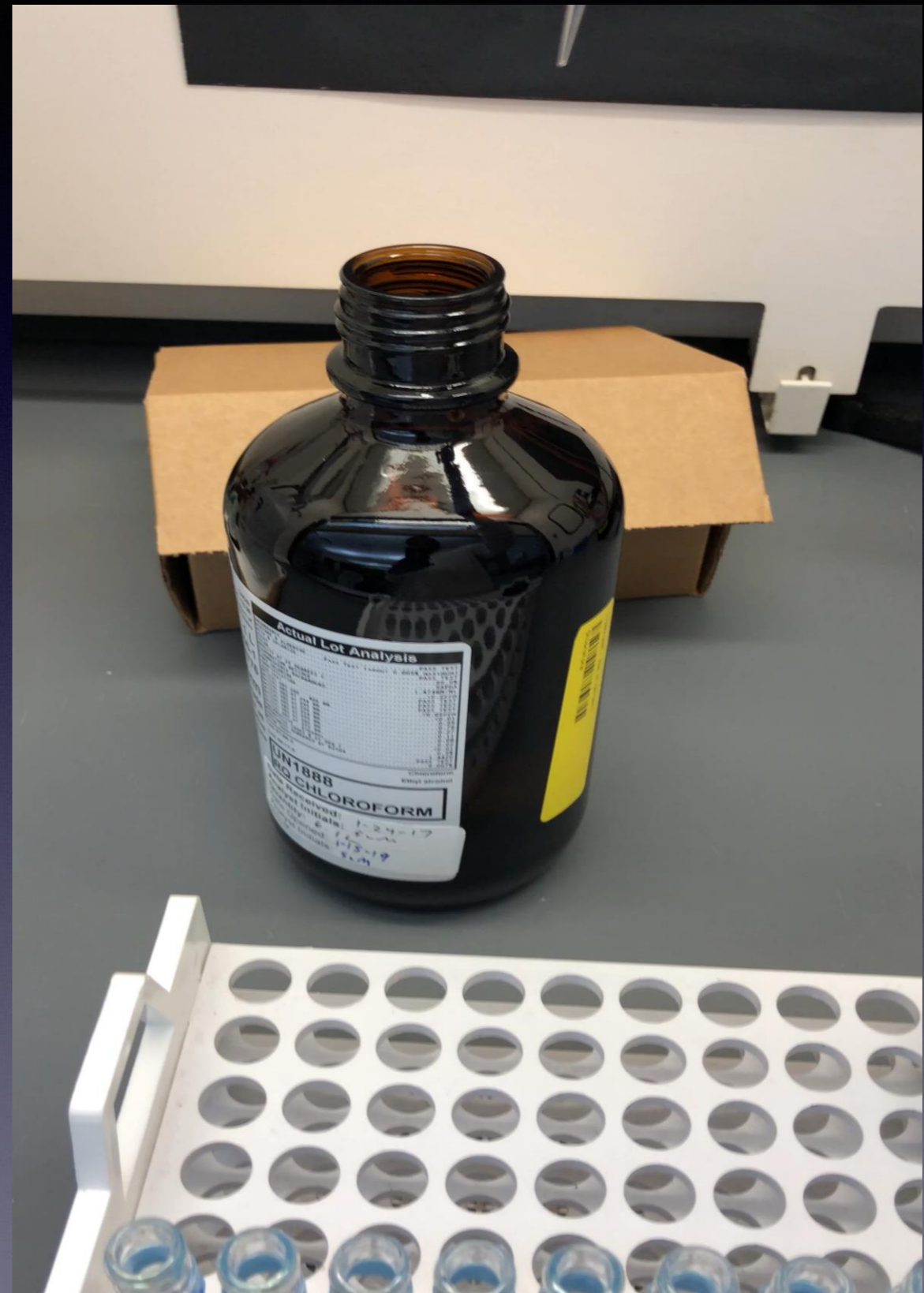
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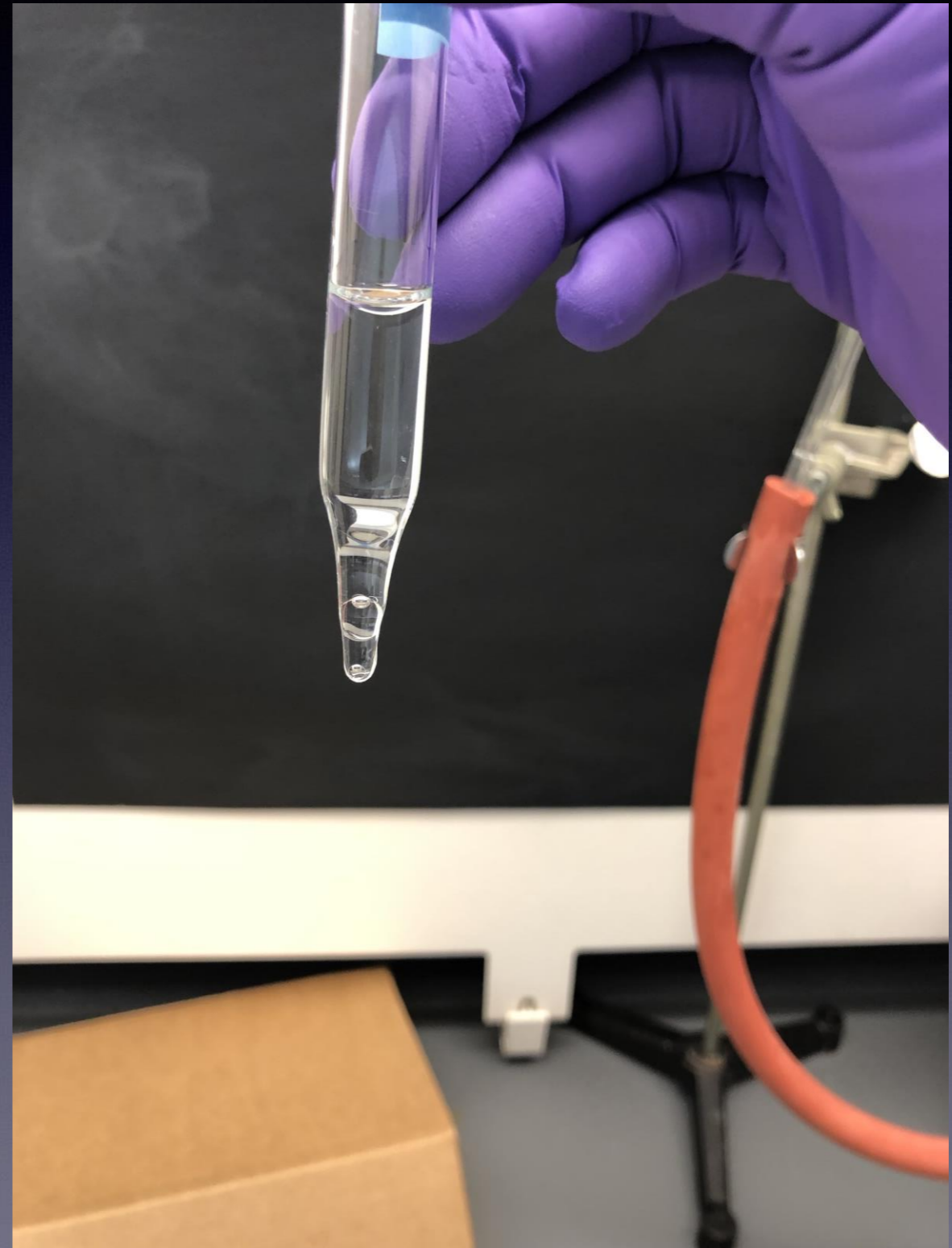
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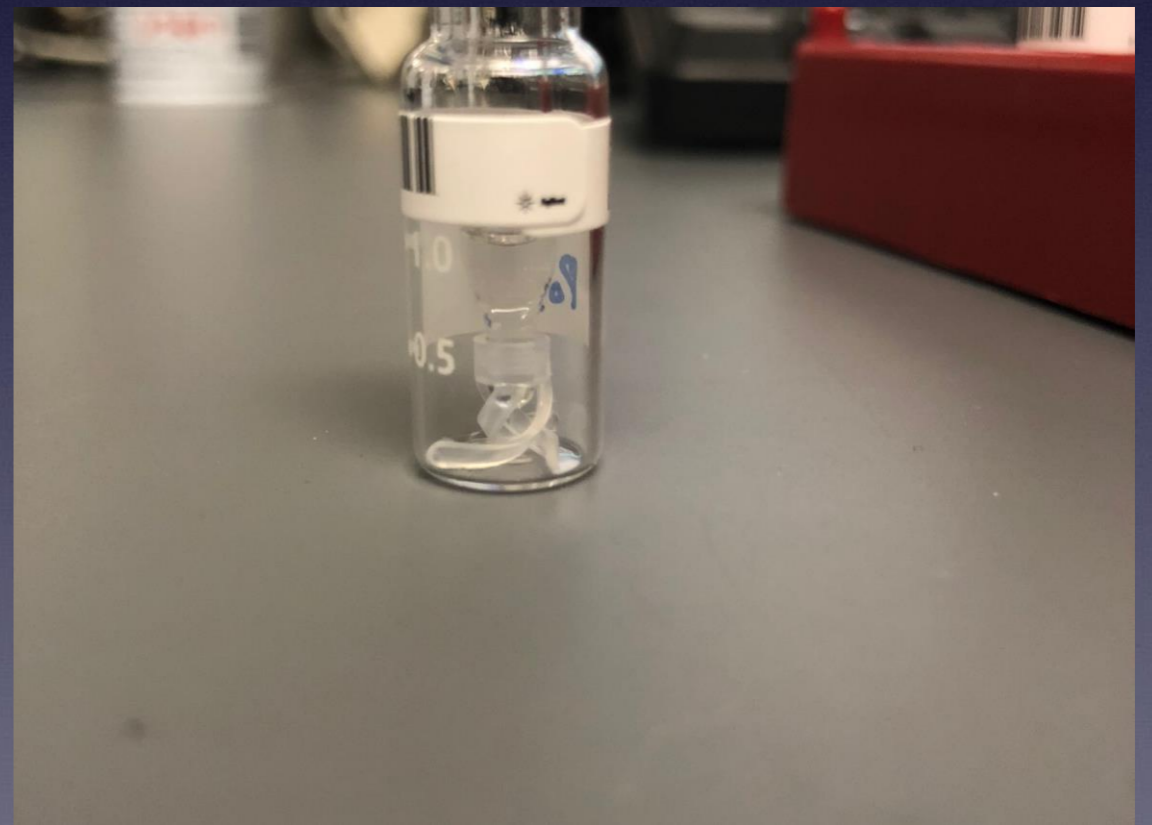
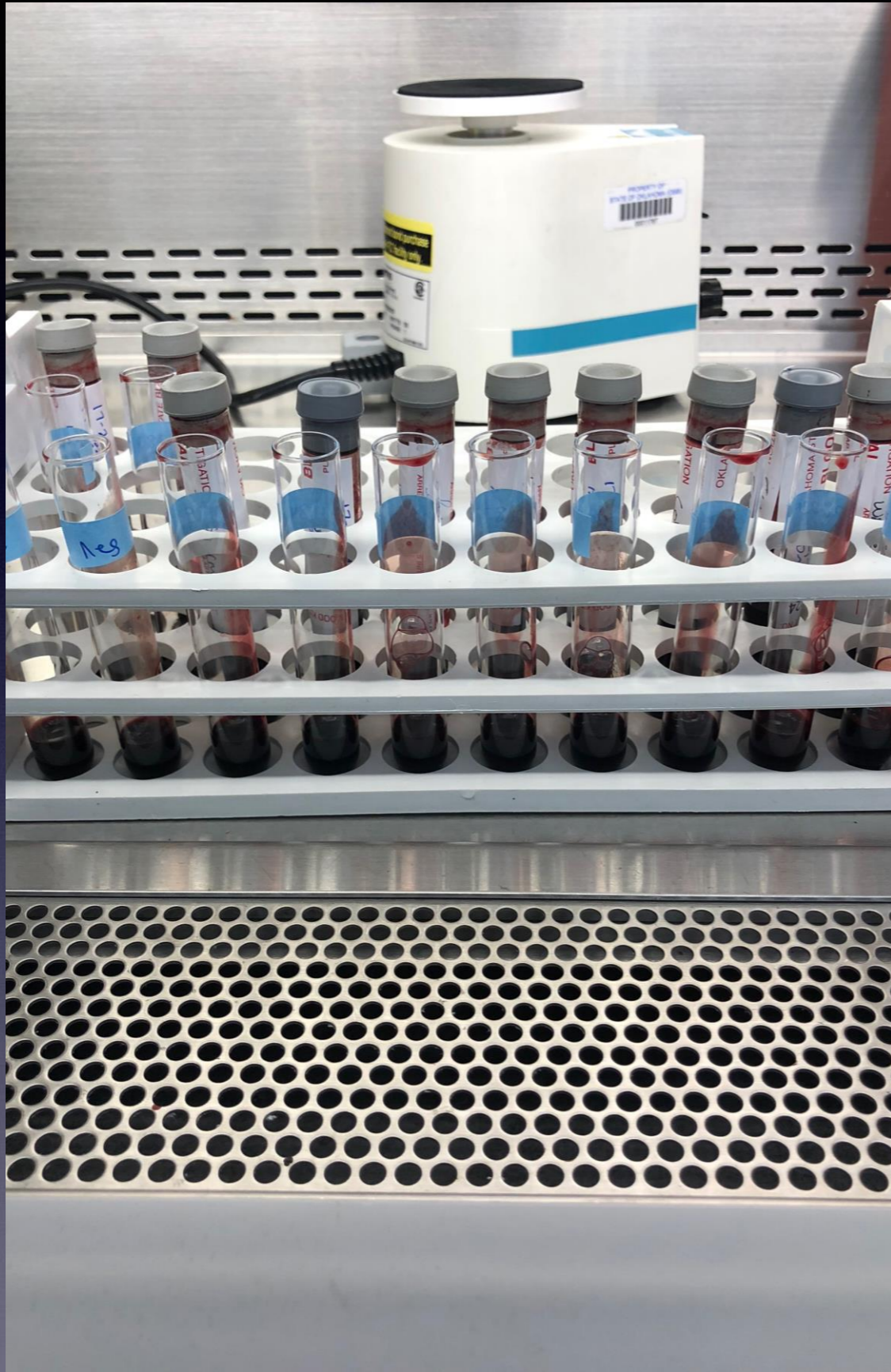


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- **Extraction**
- GC/MS and LC/MS
- Separation
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- Various drugs classes









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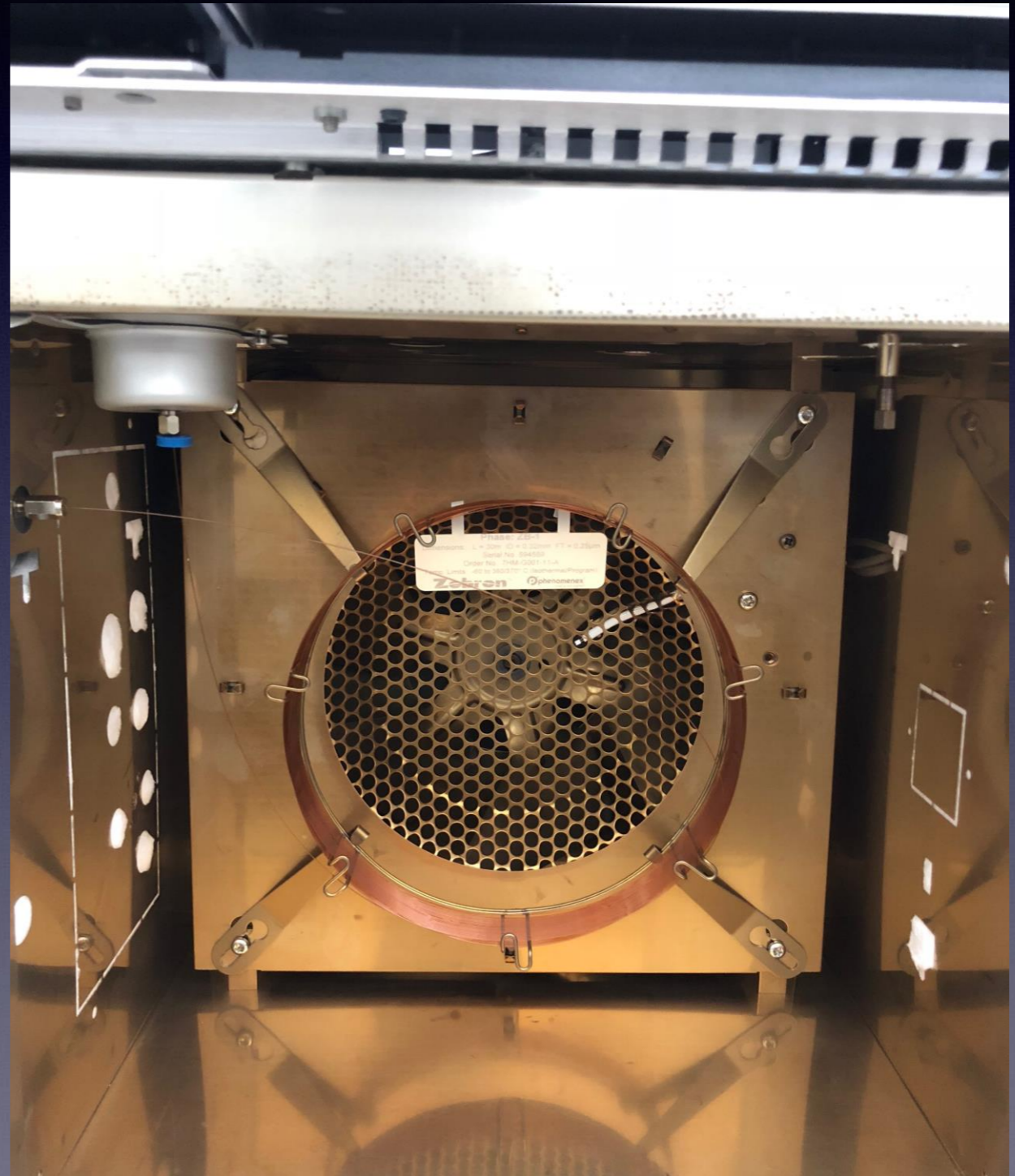
- Extraction
- **GC/MS and LC/MS**
- Separation
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- Confirmation





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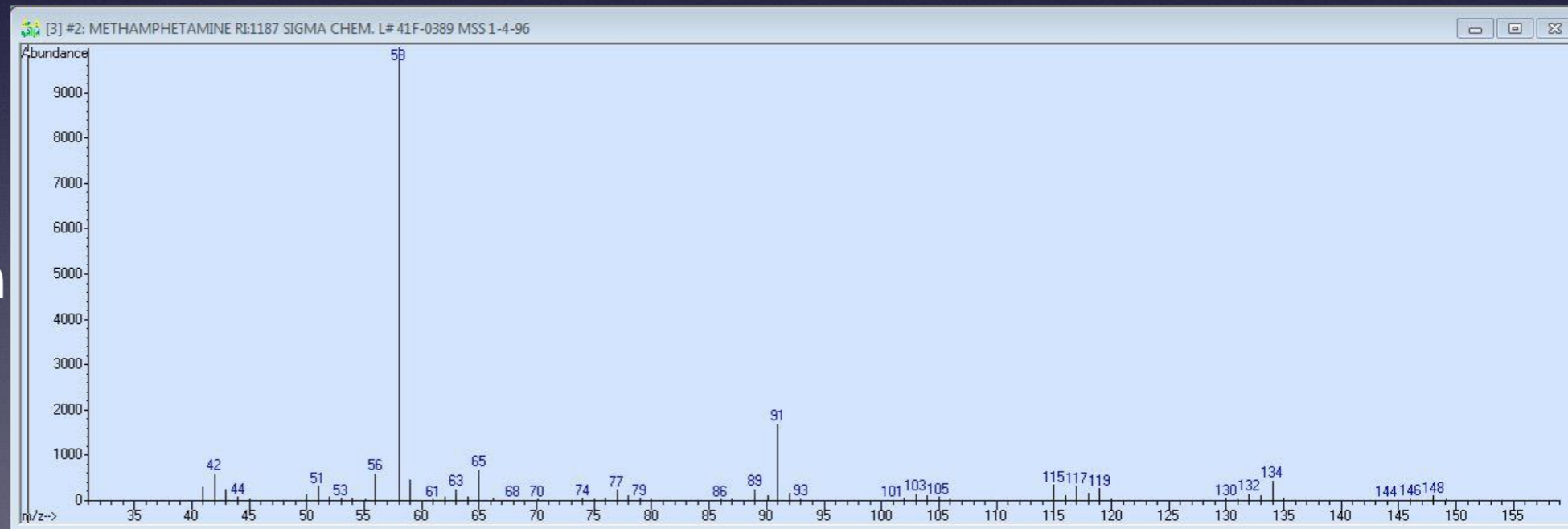
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- Separation
- **Identification**
- Confirmation





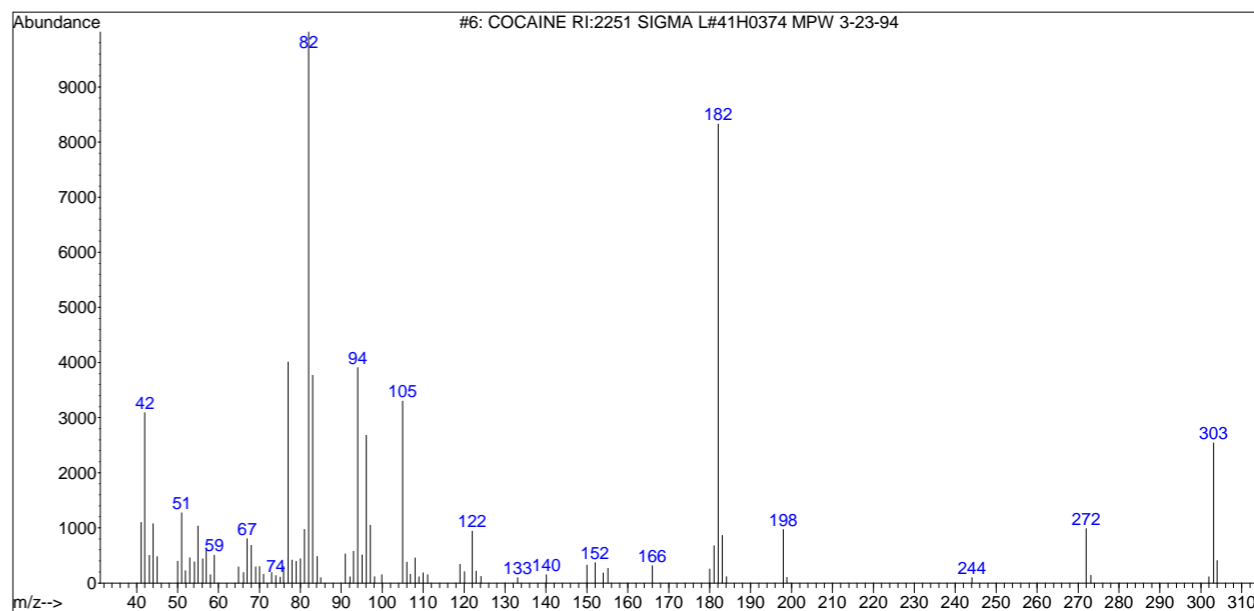
# Drug Identification

COCAINE RI:2251 SIGMA L#41H0374 MPW 3-23-94

Entry Number	6	from	C:\Database\
CAS	1000128-22-2		
Melting Point	96		
Boiling Point	-300		
Retention Index	0		
Mol Formula	C17H21NO4		
Mol Weight	303.15		
Company ID	SIGMA		

Miscellaneous Information  
Cocaine

- Extraction
- GC/MS and LC/MS
- Separation
- **Identification**
- Confirmation



No structure available for 1000128-22-2



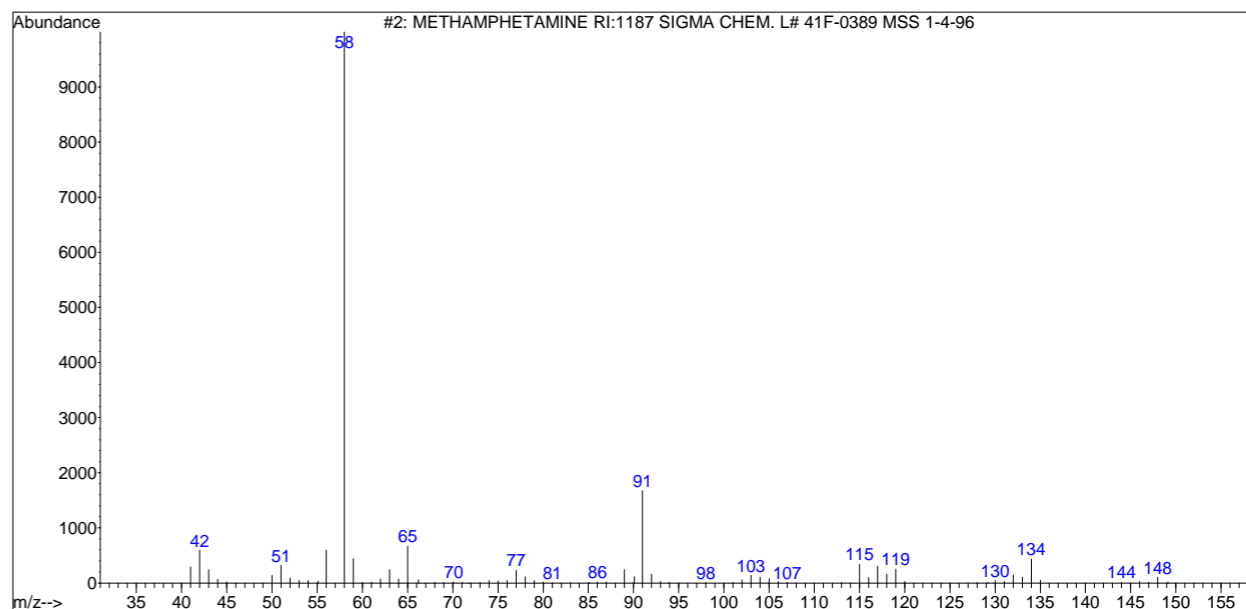
# Drug Identification

METHAMPHETAMINE RI:1187 SIGMA CHEM. L# 41F-0389 MSS 1-4-96

Entry Number 2 from C:\Database\  
CAS 007632-10-2  
Melting Point 172  
Boiling Point -300  
Retention Index 0  
Mol Formula C10H15N  
Mol Weight 149.12  
Company ID SIGMA

Miscellaneous Information  
Methamphetamine

- Extraction
- GC/MS and LC/MS
- Separation
- **Identification**
- Confirmation



No structure available for 007632-10-2



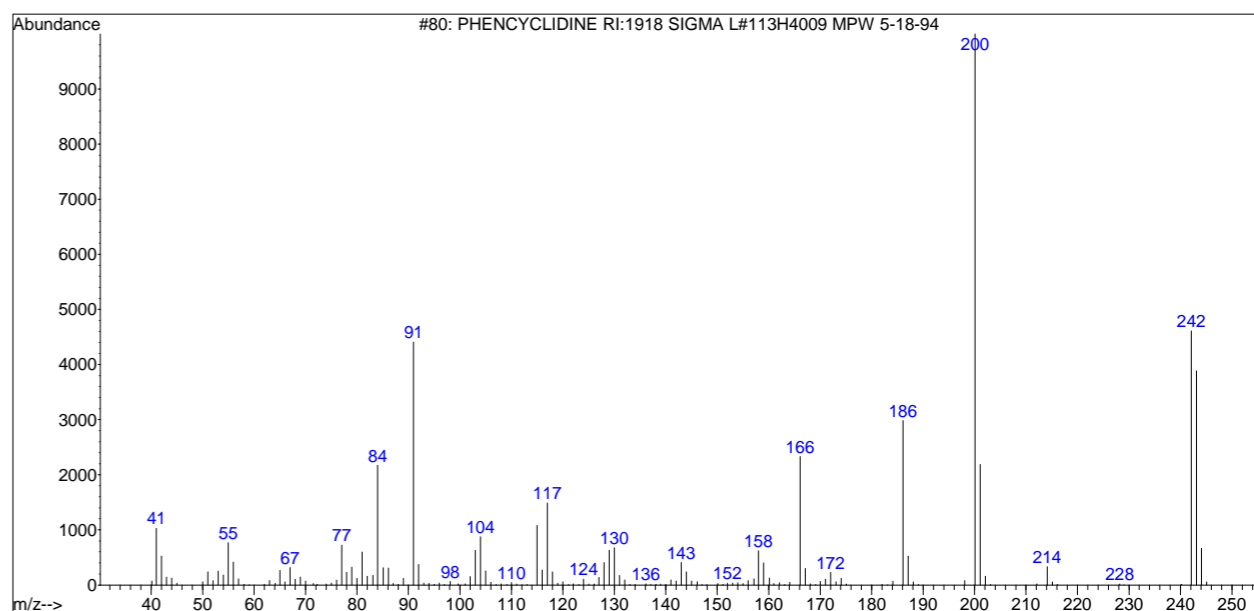
# Drug Identification

-----  
PHENCYCLIDINE RI:1918 SIGMA L#113H4009 MPW 5-18-94

Entry Number 80 from C:\Database\  
CAS 000077-10-1  
Melting Point -300  
Boiling Point -300  
Retention Index 0  
Mol Formula C17H25N  
Mol Weight 243.2  
Company ID SIGMA

Miscellaneous Information  
Phencyclidine

- Extraction
- GC/MS and LC/MS
- Separation
- **Identification**
- Confirmation



No structure available for 000077-10-1



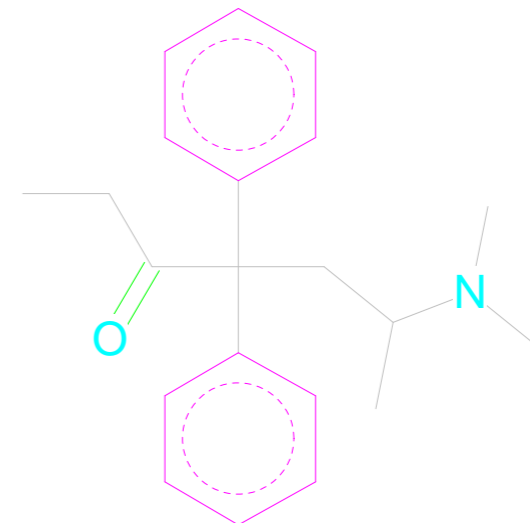
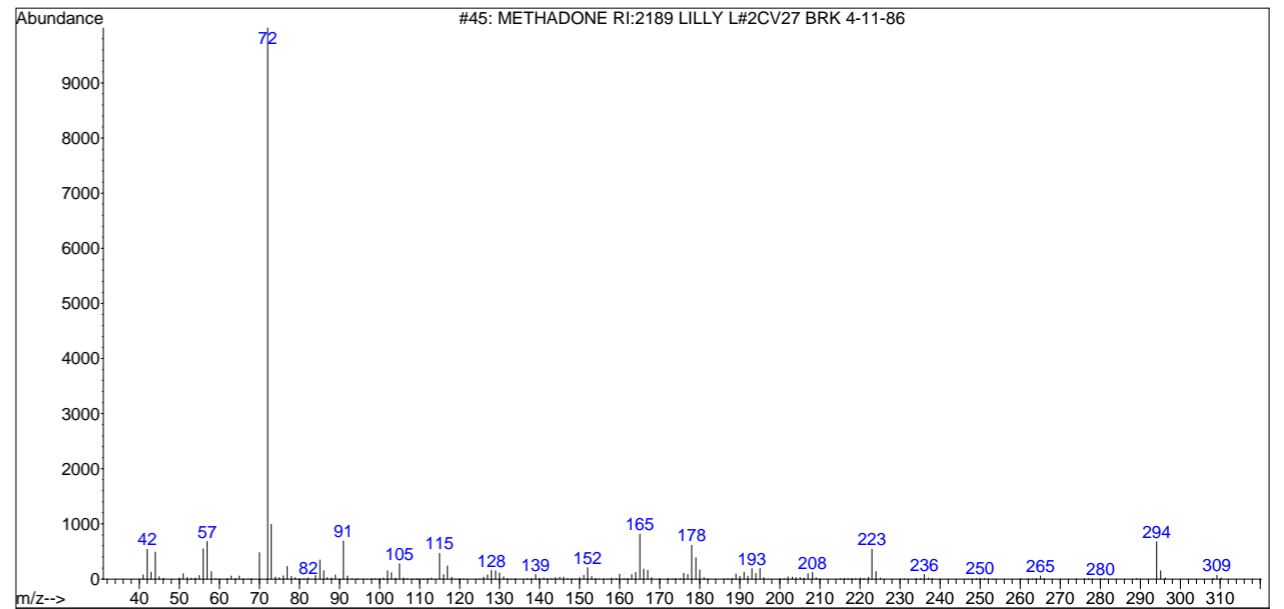
# Drug Identification

METHADONE RI:2189 LILLY L#2CV27 BRK 4-11-86

Entry Number 45 from C:\Database\  
CAS 000076-99-3  
Melting Point -300  
Boiling Point -300  
Retention Index 2189  
Mol Formula C<sub>21</sub>H<sub>27</sub>NO  
Mol Weight 309.21  
Company ID LILLY

Miscellaneous Information  
Methadone

- Extraction
- GC/MS and LC/MS
- Separation
- **Identification**
- Confirmation





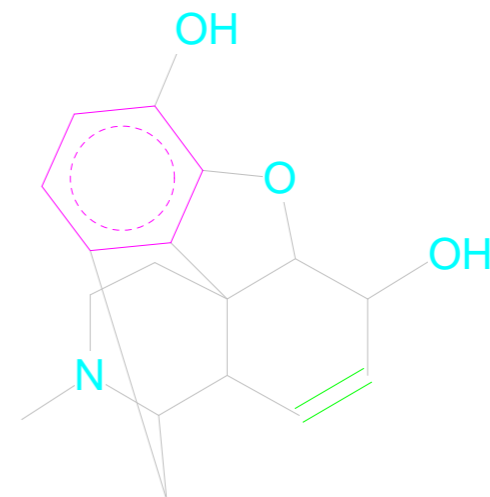
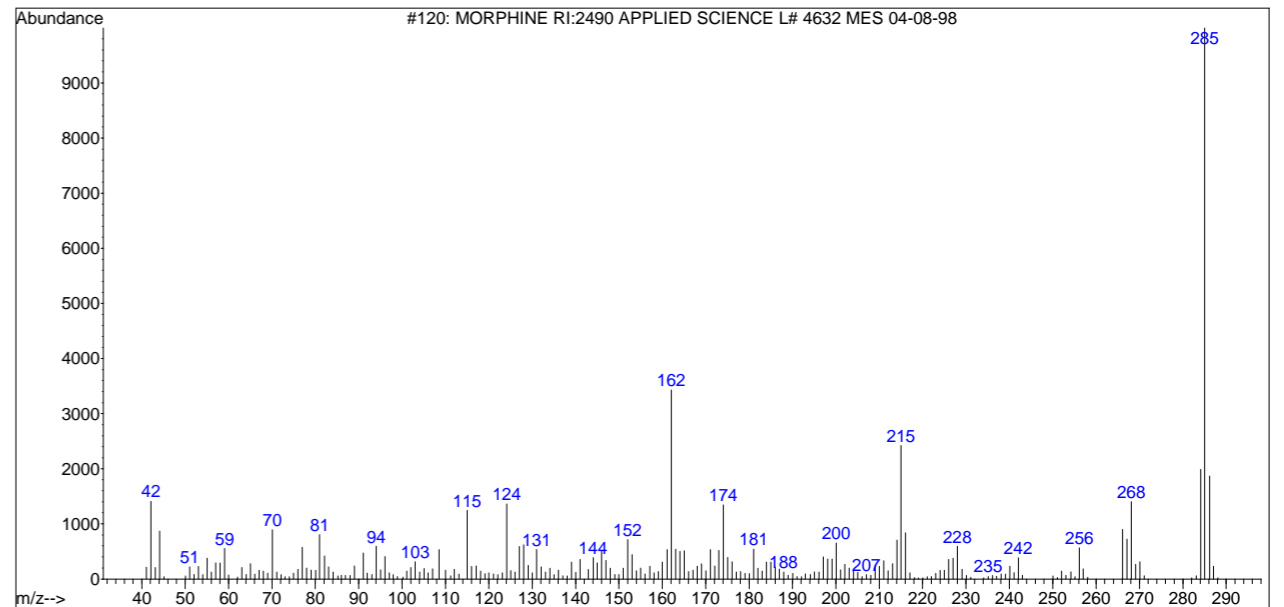
# Drug Identification

MORPHINE RI:2490 APPLIED SCIENCE L# 4632 MES 04-08-98

Entry Number 120 from C:\Database\  
CAS 000057-27-2  
Melting Point -300  
Boiling Point -300  
Retention Index 0  
Mol Formula C17H19NO3  
Mol Weight 285.14  
Company ID APPLIED SC

Miscellaneous Information  
Morphine

- Extraction
- GC/MS and LC/MS
- Separation
- **Identification**
- Confirmation





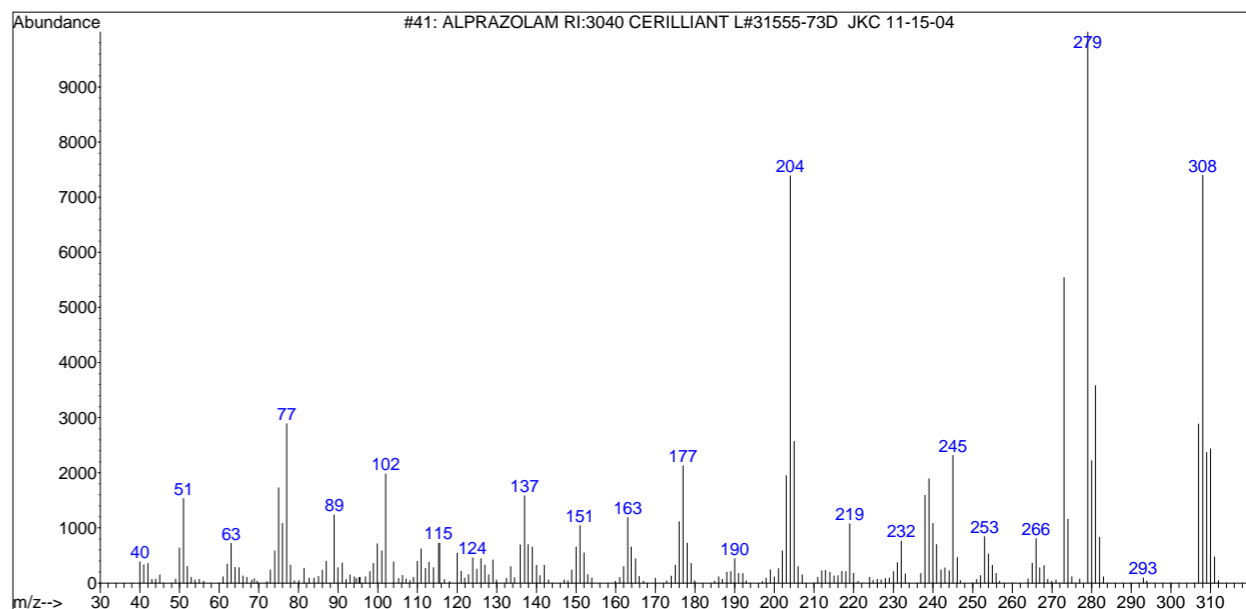
# Drug Identification

ALPRAZOLAM RI:3040 CERILLIANT L#31555-73D JKC 11-15-04

Entry Number 41 from C:\Database\  
CAS 028981-97-7  
Melting Point -300  
Boiling Point -300  
Retention Index 0  
Mol Formula C17H13ClN4  
Mol Weight 308.08  
Company ID CERILLIANT

Miscellaneous Information  
Alprazolam

- Extraction
- GC/MS and LC/MS
- Separation
- **Identification**
- Confirmation



No structure available for 028981-97-7

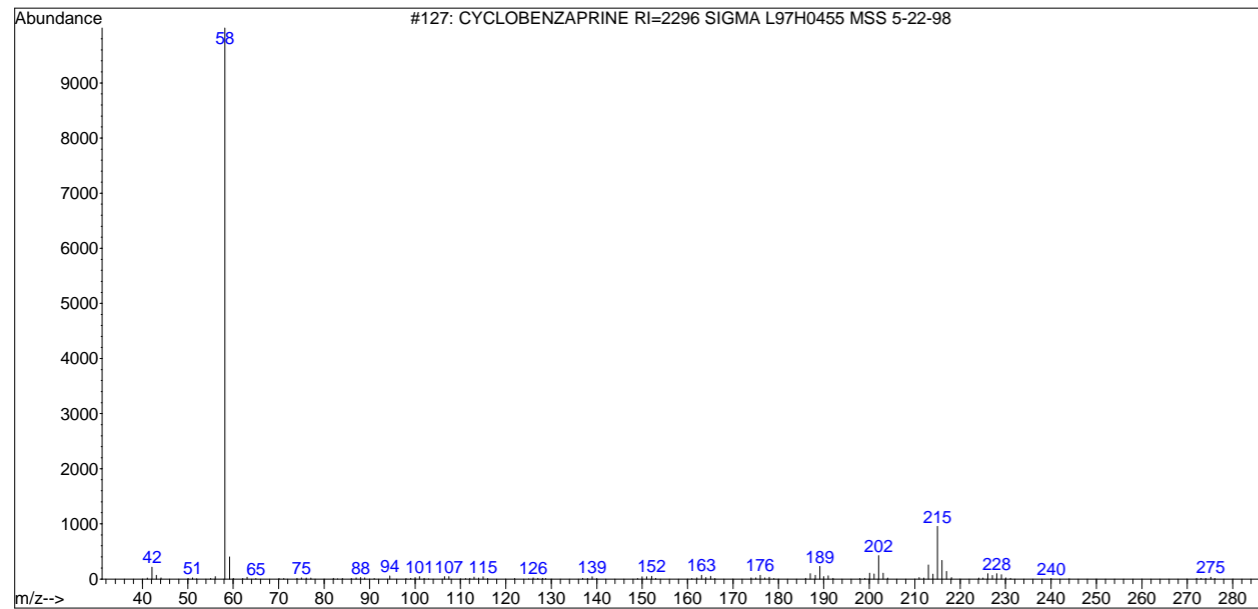


# Drug Identification

-----  
CYCLOBENZAPRINE RI=2296 SIGMA L97H0455 MSS 5-22-98

Entry Number 127 from C:\Database\  
CAS 000303-53-7  
Melting Point 1  
Boiling Point 1  
Retention Index 0  
Mol Formula C20H21N  
Mol Weight 275.17  
Company ID SIGMA

Miscellaneous Information  
Cyclobenzaprine

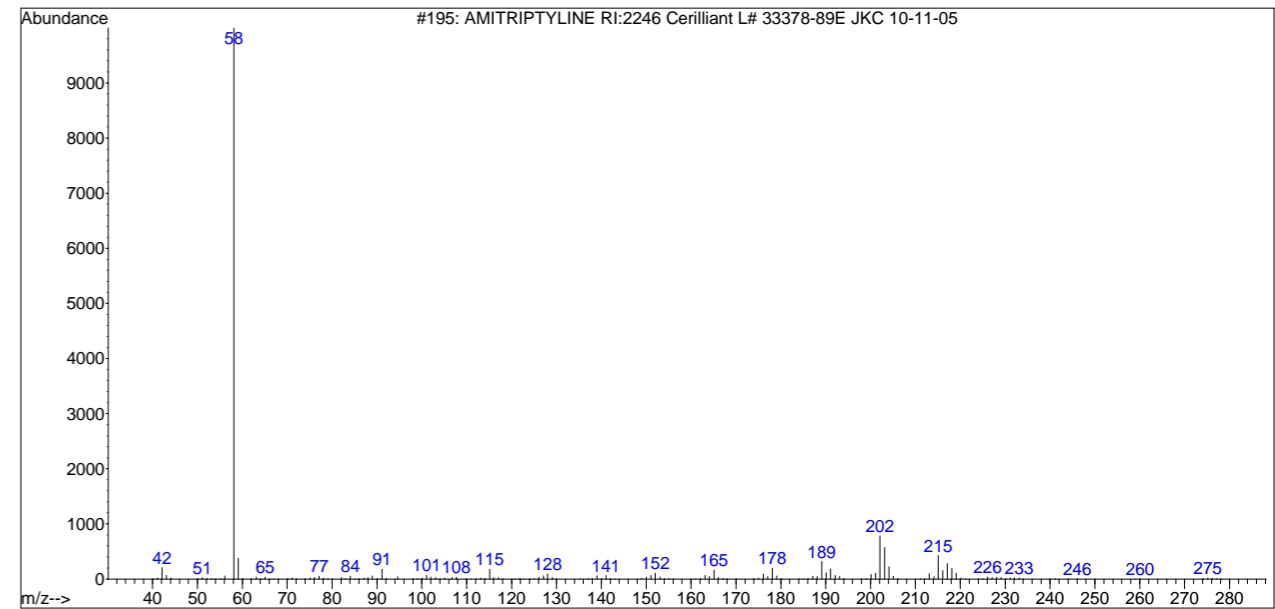


No structure available for 000303-53-7

-----  
AMITRIPTYLINE RI:2246 Cerilliant L# 33378-89E JKC 10-11-05

Entry Number 195 from C:\Database\  
CAS 000050-48-6  
Melting Point -300  
Boiling Point -300  
Retention Index 0  
Mol Formula C20H23N  
Mol Weight 277.18  
Company ID Cerilliant

Miscellaneous Information  
Amitriptyline



No structure available for 000050-48-6

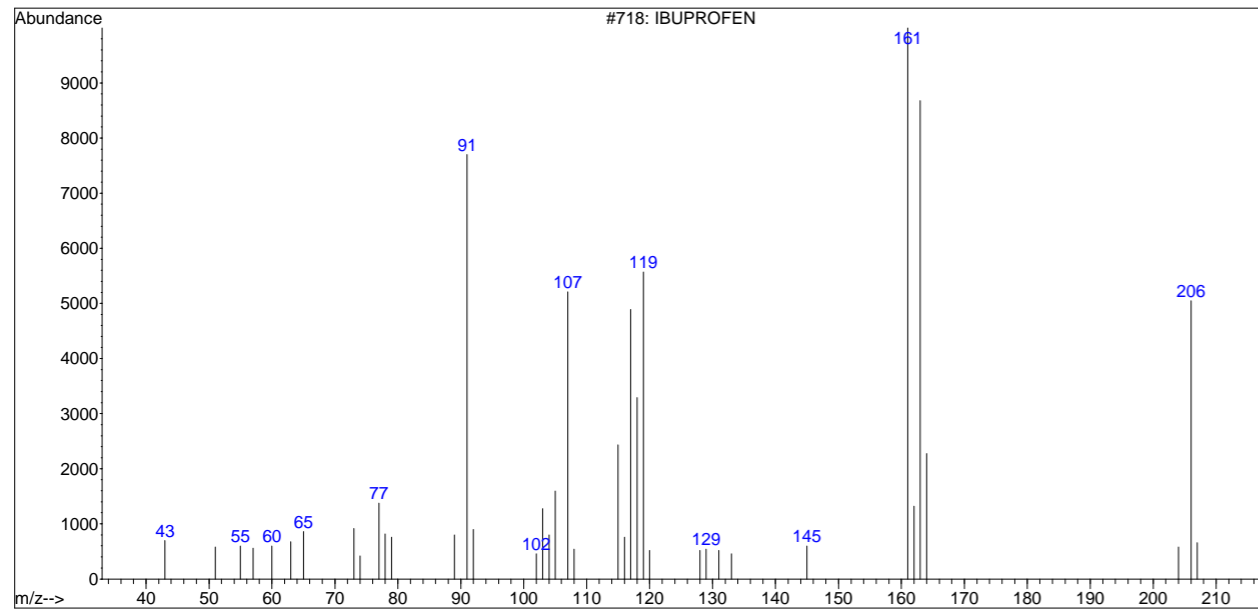


# Drug Identification

## IBUPROFEN

Entry Number 718 from C:\Database\  
CAS 000000-54-4  
Melting Point -300  
Boiling Point -300  
Retention Index 0  
Mol Formula C13H18O2  
Mol Weight 206.131  
Company ID

Miscellaneous Information  
Probability Based Matching Data Base Entry.

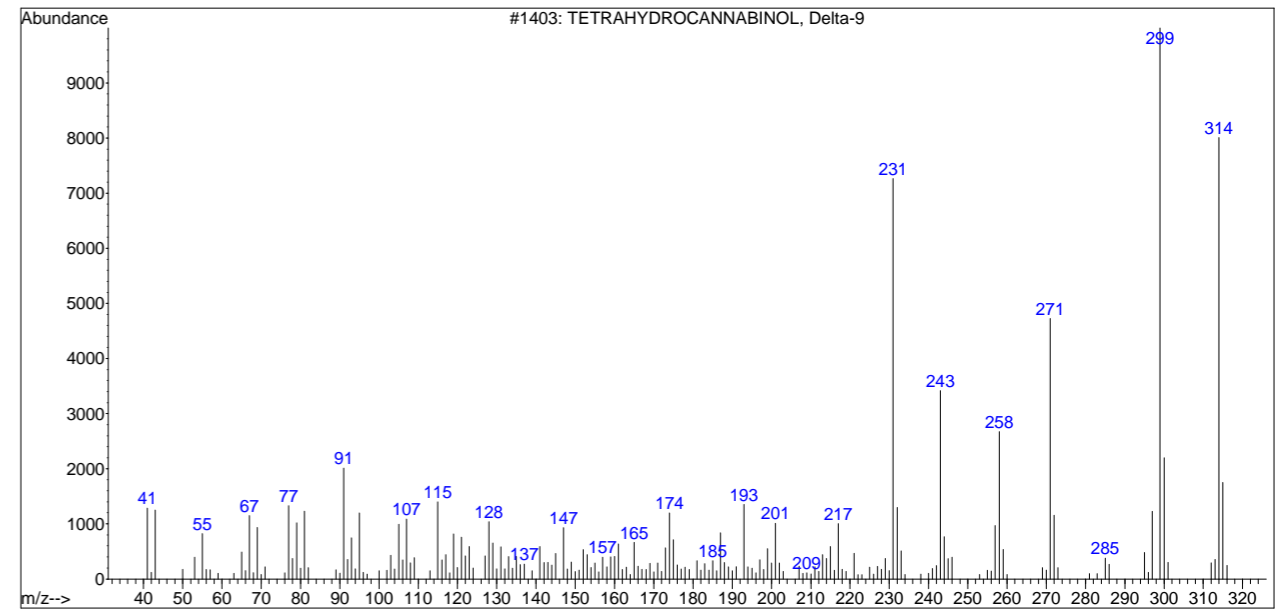


No structure available for 000000-54-4

## TETRAHYDROCANNABINOL, Delta-9

Entry Number 1403 from C:\Database\  
CAS 000001-58-9  
Melting Point -300  
Boiling Point -300  
Retention Index 0  
Mol Formula C21H30O2  
Mol Weight 314.225  
Company ID

Miscellaneous Information  
Probability Based Matching Data Base Entry.



No structure available for 000001-58-9

# Drug Confirmation

- Extraction
- GC/MS and LC/MS
- Separation
- Identification
- **Confirmation**



# ETG/ETS Testing

- EtG is a direct metabolite of ethanol.
- In addition to EtG, recent scientific studies have identified ethyl sulfate (EtS) as a second specific metabolite or biomarker of ethanol.
- The detection of EtG and EtS offers greater sensitivity and accuracy for determination of recent ethanol ingestion, than by detection of either biomarker alone.

# Benefits of ETG/ETS Testing

- Accurate
- Greater sensitivity and accuracy
- Concurrent with drugs



# Challenging Urine Collection Strategies



# Sample Collection

Pre-collection Preparation:

- Site Selection
- Prepare Ahead
- Remove Outer Clothing

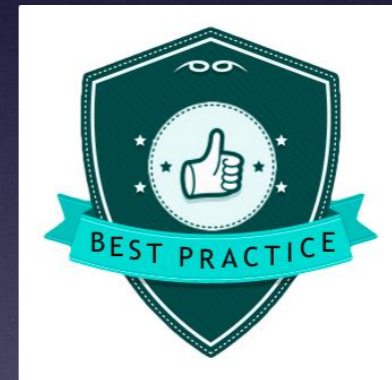


# Sample Collection

- Wash Hands
- Witness
- Chain of Custody (label)

# Sample Collection

- Accept sample and inspect
- Temperature, color, odor
- Labeled and proper storage
- Proper chain of custody





- Developing control strategies to prevent sample tampering is critical.
- Once clients understand that they cannot beat the system, they are more likely to engage in the therapeutic process towards recovery.

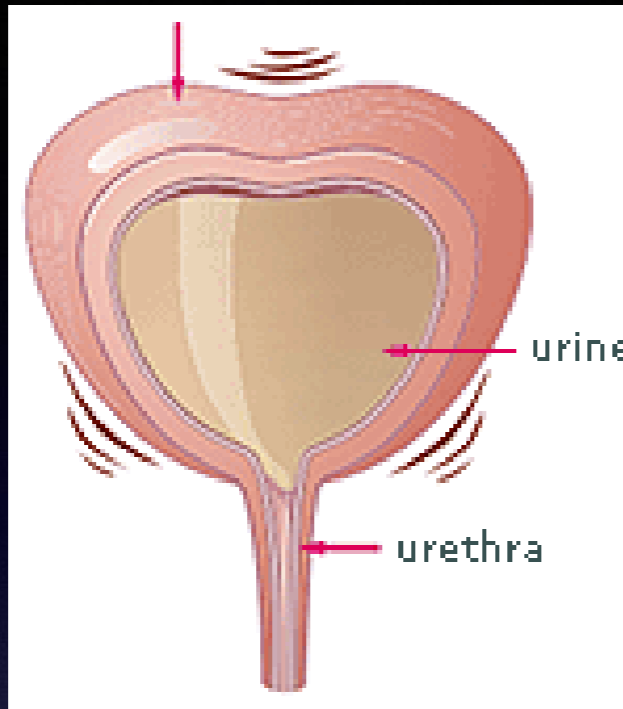
# Valid Specimens

The Effective Use of Urine Creatinine Measurements in  
Abstinence Monitoring





- EVERY urine sample collected for drug detection should be tested for creatinine



## DILUTION GOAL

Client has a bladder full of urine with a drug concentration of greater than the cutoff level of the test - thus producing a positive result.



Urine in the bladder is diluted by the consumption of large amounts of non-drug containing fluid; which results in a drug concentration that is less than the cutoff level of the test - thus producing a negative result.



# Water contains no drugs!

- easiest, cheapest, simplest
- urine with a creatinines of less than 20 mg/dL are considered “dilute” and rarely reflect an accurate picture of recent drug use
- dilute samples are more like water than like urine
- incidence of low creatinines in a population undergoing random drug testing is significantly (up to 10 times) greater than a non-drug tested population

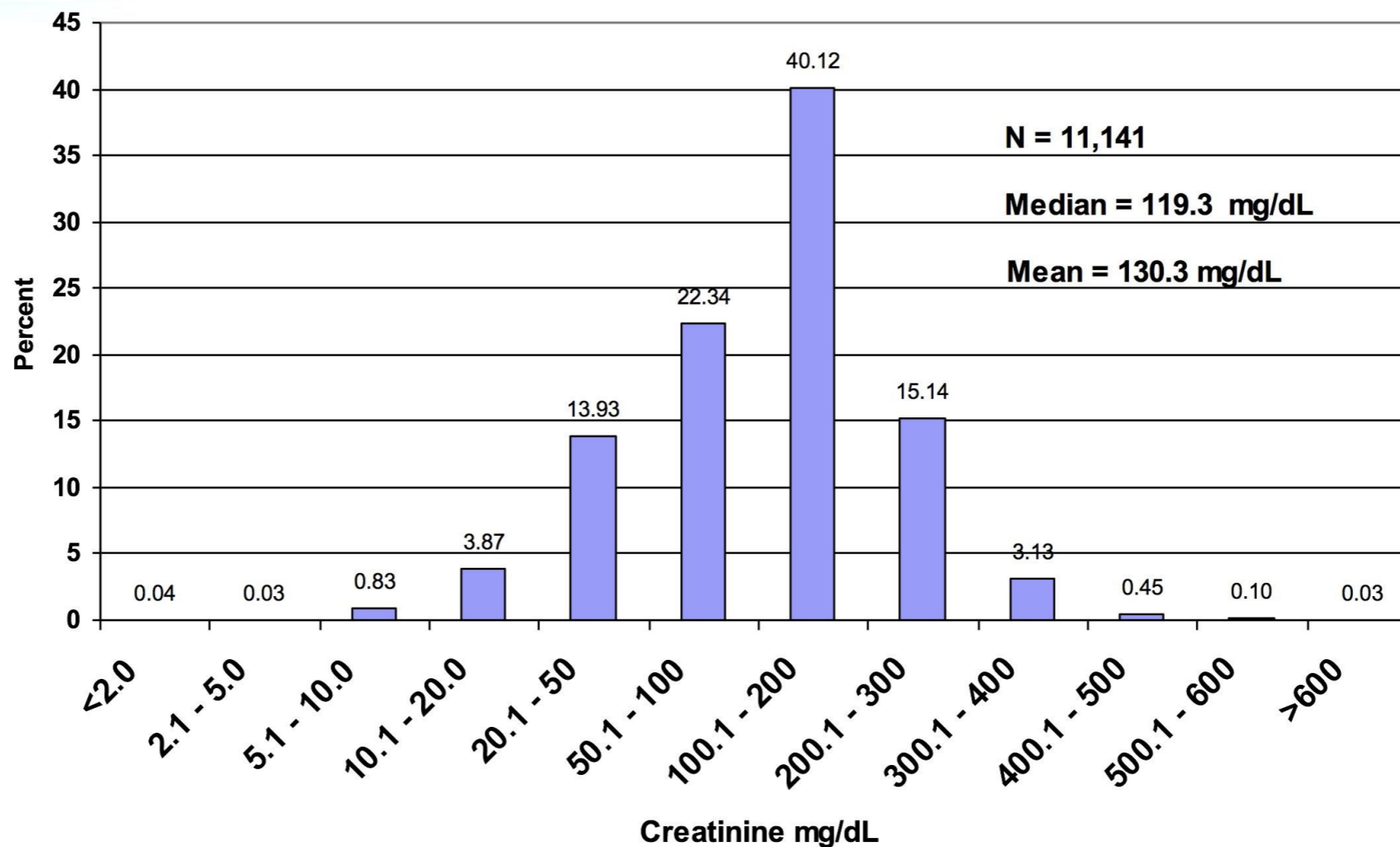
# The “Normal” Urine Creatinine

- normal urine creatinine: 2005 study “Urinary Creatinine Concentrations in the U.S. Population” determine the mean (based upon 22,245 participants) was 130 mg/dL
- study was not associated with drug testing
- subjects came from a variety of ethnic groups
- samples were collected AM, mid-day, and PM
- less than 1% below 20 mg/dL
- less than 1% greater than 400 mg/dL



# Creatinine Distribution

Creatinine Distribution



# More Creatinine Issues

- n rapid ingestion (90 minutes) of 2-4 quarts of fluid will almost always produce low creatinines & negative urine drug tests within one hour
- n recovery time of urine creatinine and drug concentrations can take up to 10 hours



# “Dilute” Result Interpretation:

- n negative or none detected results should never be interpreted as indicating no drug use (abstinence), because if, in fact, drugs were present, they probably could not be detected by the test
- n positive drug test results from a dilute sample however, are considered valid (donor was not able to dilute the sample sufficiently to deceive the test)

# Creatinine Sanctions

- verbal warning
- community service
- write paper on how the kidney works
- increased surveillance (therapeutic response)
- loss of privileges
- jail time



# Dilutes & Therapeutic Goals

- Honesty – touchstone concept
- Dishonesty is a learned behavior
- Honesty is a proximal goal
- Honesty is a behavior that your clients can control
- Honesty should be a critical goal for phase advancement

## Two final thoughts about dilute urine samples . . . . .

- n a creatinine of less than 20 mg/dL (associated with a drug test) is nearly always an attempt by the donor to avoid drug use detection - REGARDLESS of how much liquid was consumed in order to achieve this result
- n place a dilute sample prohibition in your client contract and sanction for repeat dilute samples





# Paint Roadmap for Success

- n Upon entering the Drug Court, participants receive a clear and comprehensive explanation of their rights and responsibilities related to drug and alcohol testing
- n outcomes are significantly better when Drug Courts specify their policies and procedures clearly
- n participants significantly more likely to react favorably to an adverse judgment if they are given advance notice about how such judgments are made



# The Importance of “Specificity” in a Client Contract:

- “I understand . . . . .”
- I will be tested for the presence of drugs in my system on a random basis according to procedures established by the Drug Court Team and/or my treatment provider.
- I understand that I will be given a location and time to report for my drug test.
- I understand that it is my responsibility to report to the assigned location at the time given for the test.

# The Importance of “Specificity” in a Client Contract:

- I understand that if I am late for a test, or miss a test, it will be considered as a positive test for drugs/alcohol and that I may be sanctioned.
- I understand that if I fail to produce a urine specimen or if the sample provided is not of sufficient quantity, it will be considered as a positive test for drugs/alcohol and that I may be sanctioned.
- I understand that if I produce a dilute urine sample it will be considered as a positive test for drugs/alcohol and that I may be sanctioned.



# The Importance of “Specificity” in a Client Contract:

- I have been informed that the ingestion of excessive amounts of fluids can result in a diluted urine sample and I understand that my urine sample will be tested to ensure the sample is not dilute.
- I understand that substituting or altering my specimen or trying in any way to modify my body fluids for the purposes of changing the drug testing results will be considered as a positive test for drugs/alcohol and will result in sanctioning and may be grounds for immediate termination from drug court.

# Specimen Tampering



# Basics of Specimen Tampering - The Three Approaches

- dilution
- adulteration
- substitution

# Urine Specimen Adulteration

- addition of foreign substances designed to “mask” drug presence
- post-collection tampering
- low-tech adulterants that cause “pH shift” (lime, vinegar, bleach, ammonia, lemon, drano)
- low-tech adulterants that disrupt testing chemistry (salt, methanol, detergent)
- “high-tech” adulterants



# Urine Specimen Substitution

- replacing donor urine sample with another drug-free specimen
- biological substitution - someone else's "clean" urine
- non-biological substitution - replacing urine with urine "look-a-like" sample (diet Mountain Dew, water with food coloring)
- non-biologicals can be detected with creatinine testing

# Payspi.org (Weedinmypocket.com)

HOW TO PASS A DRUG TEST 2019

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DETOX PRODUCT REVIEWS ▾

SYNTHETIC URINE ▾

KRATOM ▾

CBD ▾

HERBS ▾

of date.

If you want to buy Sub Solution, then the only place I recommend you buy it is [testnegative.com](http://testnegative.com). It's \$75 on there, but it's the company who make it, and you know you're getting quality product.

Yes it's expensive, and so I want to tell you a way you can actually lower the cost of buying Sub Solution to pass a urine drug test.

Testnegative have actually just launched a new synthetic urine called [Quick Luck urine](#).



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Get 1  
FREE**

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**NEW RELEASE**

- 100% Effective
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Kit Includes: Instructions, Heat Activator and 3 Fl. oz. / 89 ml

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**Disposable Heat Pad  
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Air Activated • Lasts Up to 10 Hours

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# Quickfixurine.com




## Quick Fix Synthetic 2oz

\$29.95

Need accessories? You might also like:

-  **Synthetic Urine Belt**  
\$34.95
-  **The Stash Leg Strap**  
\$19.95
-  **Sticky Hand Warmers**  
\$1.95

 Add to Cart

Place your order in the next  
**4 hours, 10 minutes, 10 seconds** and receive it **Monday**  
if you select **Overnight Shipping!**

Don't forget to check the Stash products to stash you Quick Fix, like our [Stash Undies](#) and [Stash Strap](#). If you need a life like urinating penis, check out the [Piss Perfect](#) Urination Device.

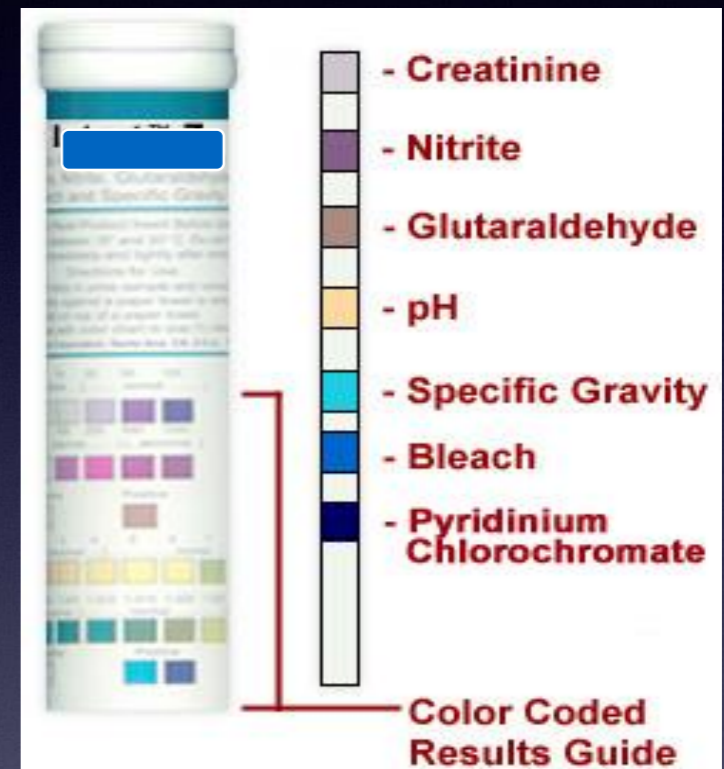
The Quick Fix Synthetic Urine 6.2 formulation is the #1 selling patented synthetic urine kit created for Spectrum Labs 25 years ago. Since its creation, Quick Fix Synthetic urine has stayed ahead of the curve to be the best synthetic urine on the market by keeping its formulations current with testing standards and it's been so effective of a product it's been adopted by the wet sex community as fake urine alternative for real urine and various labs and universities use it since it mimics human urine perfectly.

This laboratory designed synthetic urine creates a toxin free clean urine that can be used by males and females and is balanced for pH, specific gravity, creatinine, urea, and several other urine characteristics.

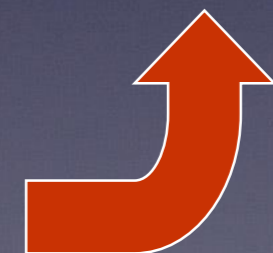
With this premixed synthetic urine, you don't have to worry about mixing, it's as simple to use in four easy step:

# Specimen Validity Tests (SVT)

- creatinine, UUN
- specific gravity
  - pH
  - nitrites
- gluteraldehyde
  - pyridine
  - chromium



Request SVT from testing laboratory or use dip-stick SVT products for on-site testing





# Controlling Specimen Tampering

- develop challenging collection strategy - ie. make the testing unannounced and RANDOM!
- directly observed collections is the most effective approach to preventing adulteration and substitution
- inspect sample - train collection staff
- keep abreast of tampering techniques
- take temperature measurements (90° - 100° F)
- use laboratory employs specimen validity tests & use with on-site devices

# Myth or Fact

- I tested positive because of a poppy seed bagel.



# Myth or Fact

- Vigorous working out will clear drugs from my system.

# Myth or Fact

- THC can stay in your system for a month.



# Myth or Fact

- I haven't had any pot. It was secondhand smoke.

# Frequency Guidelines

- Twice per week until all other requirements have been reduced.
- When testing is reduced, near the end, the participants should still have enough time in the program to assess the impact of the reduction.



# Question Time

