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Introduction

The Toxicology Section performs analyses on biological samples (e.g., blood, urine, liver) to determine the absence/presence/concentration(s) of drugs, including alcohol and poisons.

This document is intended as a convenient investigative reference but should not be relied upon as definitive or exhaustive. Please contact the Centre of Forensic Sciences (CFS) Toxicology Section for assistance with questions of an analytical or toxicological nature by e-mail or telephone 647-329-1400 or 647-329-1430. When calling please ask for the appropriate coordinator:

Coroner’s Coordinator:
CFSToxicologyCoronerCoordinator@ontario.ca

Criminal Coordinator:
toxcrime@ontario.ca

Examination Strategy and Capability

The screening methods employed in the Toxicology Section are:

1. Gas Chromatography (GC) and Gas Chromatography/Mass Spectrometry (GC/MS)
2. Immunoassay (IA)
3. Head-Space GC analysis for volatiles
4. Quadrupole Time-of-Flight MS (QTOF)

The targeted/quantitation methods employed in the Toxicology Section are:

1. GC, GC/MS
2. Liquid Chromatography (LC), LC-MS/MS
3. Head-Space GC analysis for volatiles

Capabilities of screening methods are presented in Appendix 1. While these screening methods have wide-ranging capabilities not all drugs may be reliably detected. Appendix 2 contains a list of compounds that may not be identified by the screening methods but may be detected/quantitated by targeted methods. Many of the compounds contained in this list will not be tested for unless specifically requested. If use of a specific drug is known or suspected and is relevant it should be noted in the case synopsis.

The examination strategy, i.e., determining which tests will be performed in a case, is informed by a variety of sources including case type, case history, nature of submitted samples, analytical protocols and capabilities, and discussions with clients. The initial toxicological analyses conducted for a variety of case types are presented in Appendix 3.

Urgent Cases

Requests for expedited analyses must meet specific criteria before being accepted as an urgent case. This process requires authorization by Toxicology Section management.

Examination

All items are visually examined on receipt to check the seal numbers (if present), the contents, and the integrity of the packaging.
Instrumentation

**Chromatography: Gas Chromatography (GC); Liquid Chromatography (LC)**
Chromatography is an analytical technique used to separate compounds based on their chemical and structural properties. GC uses a pressurized gas, while LC uses a pressurized liquid, in the separation of compounds.

**Immunoassay (IA)**
IA detects compounds in biological fluids using a reaction of an antibody or antibodies to its antigen (i.e., the drug). This technique is primarily a screening technique; however, some IA methods are semi-quantitative, e.g., acetaminophen.

**Mass Spectrometry (MS)**
MS detects, identifies, and quantitates compounds. An MS can be coupled with a GC or an LC.

**Quadrupole Time-of-Flight-MS (QTOF)**
QTOF detects and identifies compounds. A QTOF is coupled with an LC.

**Tandem MS (MS/MS)**
MS/MS detects, identifies, and quantitates compounds and is commonly coupled to a GC or LC.

**Ultraviolet and Visible (UV/VIS) Spectrophotometry**
UV/VIS spectrophotometry identifies and/or quantitates a drug based on its UV and/or visible light-absorbing properties.

**Carbon Monoxide**
Carbon monoxide is analyzed by visible spectrophotometry. Results are expressed as % carboxyhemoglobin saturation.

**Interpretation**
Quantitative results may be expressed as 1) a concentration or 2) as < or > a concentration, e.g., when sufficient for interpretation. Blood ethanol interpretations provided in reports are generally limited to cases in which the detected concentration may be associated with fatalities, may be influenced by post-mortem artefacts, may have toxic interactions with other drugs, or in the case of motor vehicle collision, associated with impairment.

**Measurement Uncertainty**
Measurements made with all scientific instruments are associated with variability. No measurement is exact but is an estimate of the true value. Calculation of measurement uncertainty (MU) employs statistical methods to determine the range of values within which the quantitative result is likely to reside. The MU provides a reasonable estimate of the variability associated with the analytical method and is based on the analysis of matrix-matched quality control samples. A minimum of 10 such analyses are used. The MU is calculated with a confidence of 95.45 per cent using a k-factor based on the degrees of freedom as determined by the Student’s t-test and the standard deviation of the associated quality control data. The MU is expressed in the same units in which the quantitative result is reported, e.g., ng/mL, mg/L and is reported as: quantitative result ± MU.

**Limitations**
The focus of this laboratory is drug toxicity. Clinical blood/urine chemistry analysis, e.g., electrolytes, cell counts, gas saturation, creatinine, is not performed. Analysis for antiepileptic drugs is limited to determining drug
toxicity, when warranted, based on case history. This laboratory does not have validated methods to analyze some sample types, e.g., oral fluid, hair, bile, muscle, brain tissue. There are a variety of analytical issues that may prevent the detection of some of the drugs that this laboratory is commonly capable of detecting, which include:

- matrix effects
- degree of putrefaction
- type of sample (e.g., splenic blood)
- post-mortem interval
- storage conditions

- volume of sample submitted
- low concentration of the drug/sensitivity of the method

Conversely, some novel, or rarely encountered, drugs not listed in Appendix 1 may be identified by the GC and GC/MS or QTOF screens. In this case, analytical reference material would be acquired (if available) then analysed to confirm identity. There are drugs/compounds for which the CFS Toxicology Section does not have a method, examples of which are provided in Appendix 4.

Glossary

Abbreviations
Analytical results are reported in terms of mg/100 mL, mg/L, or ng/mL, as shown below:

- g gram
- mg milligram
- ng nanogram
- L litre
- mL millilitre

Breakdown Product
A compound produced either inside or outside the body that may or may not be pharmacologically active.

Carboxyhemoglobin saturation
The percentage of hemoglobin bound by carbon monoxide.

Central Nervous System Depression (CNS depression)
A lowering of the functional activity of the brain and/or spinal cord. Depression of the respiratory and the cardio-regulatory centres are most relevant toxicologically.

Confirmation
The process of verifying the presence of a drug by replicate analysis using the same or different analytical technique(s). Confirmation of an immunoassay result is achieved using a more specific analytical technique.

Coroner's Case Analytical Summary
Contains analytical results with the fatal reference and limitations. The Coroner’s Case Analytical Summary is accompanied by an Interpretive Guide with information specific to this report type.

Detected
The drug has been identified in the sample. Identification is based on criteria specific to the analytical technique.
Fatal Reference
A minimum drug concentration at which death has been reliably reported in the forensic literature.

Inconclusive
The presence or absence of a drug could not be determined.

Metabolite
The product of enzymatic conversion of a drug within the body to a different compound that may or may not be pharmacologically active.

No [other] significant findings by a [method name(s)]
This comment is inserted to provide a reference to the methods that were used. Appendices 1 and 5 can be used to identify compounds not listed and that were either not detected or the results were deemed to not be toxicologically significant, e.g., caffeine or nicotine. This may also apply to endogenous compounds, e.g., acetone < 2 mg/100 mL.

Not Detected
The drug is either not present or is present but at an amount that cannot be discerned from other constituents in the sample.

Post-mortem redistribution
A phenomenon that refers to a change (either an increase or a decrease) in blood drug concentration after death; post-mortem redistribution may occur regardless of sampling site but is commonly observed as increased drug concentrations in heart blood as compared to femoral blood.

Putrefaction
The decomposition of organic material that involves micro-organisms.

Report
Contains a comprehensive summary of analytical results accompanied by interpretative conclusions.

Tentative
A drug has been identified by a non-specific screening method (e.g., immunoassay) but has not been confirmed. Further analysis would be required to positively identify the compound.

Therapeutic
The detected drug concentration is generally considered to not be toxicologically significant. The use of this term does not imply clinical efficacy.

Traces
The drug was detected at a concentration below that which can be reliably quantitated. The use of this term does not imply clinical efficacy.

Unconfirmed
A drug has been identified by a screening method but has not been confirmed by a second analysis. Unconfirmed findings may or may not be toxicologically significant.
Appendix 1 – Screening Methods

Drugs that can be reliably detected by screening methods

GC and GC/MS Screen

A
alpha-pyrrolidinovalerophenone (α-PVP)
acetyl fentanyl
amantadine
amitriptyline
amlodipine
amoxapine
amphetamine
amphetamine (4-fluoro)
anabasine
atomoxetine
atropine/hyoscynamine

B
benzocaine
benzofuran (6-(2-aminopropyl, 6-APB)
bentropine
benzylpiperazine (BZP)
bromocryptine
bupivacaine
bupropion
butylone/ethylone
butyryl fentanyl

caffeine
 carbamazepine
 cain (cath)
n-ethyl-cath
4-fluorocath-cath
3-methoxycath-cath
4-methylcath-cath
meth-cath
chlorcyclazine
chlor Diazepoxide
chloroquine
chlorpheniramine
chlorpromazine
cisapride

citalopram
clomipramine
clonidine
clozatine
cocaethylene
cocaine
codeine
cotinine
cyclobenzaprine
cyoheptadine

desipramine
dextromethorphan
dextrorphan*
diazepam
diazepam (nor)
dibucaine

dihydrocodeine
diltiazem

diltiazem (desacetyl)
dimethyltryptamine
diphenhydramine
doxepin
doxylamine

ephedrine
estazolam
etizolam
ethylone/butylone

F
x-flouroamphetamine
fluoxetine
fluoxetine (nor)
flurazepam
flurazepam (n-desalkyl)
fluvoxamine
H
haloperidol¹
hydrocodone²
hydroxychloroquine
hydroxyzine¹
I
ibogaine
imipramine²
K
ketamine²
L
lamotrigine²
laudanosine
levamisole
lidocaine
loratadine
loxapine²
M
maprotiline¹
meclizine¹
mefloquine¹
meperidine²
meperidine (nor)²
mephedrone²
mepivacaine¹
methadone²
methamphetamine²
methamphetamine (4-fluoro)
methedrone
methotrimempazine²
methylendioxyamphetamine (MDA)²
methylendioxyethylamphetamine (MDEA)²
methylendioxyethylamphetamine (MDMA)²
3,4-methylendioxyxylopyrovalerone (MDPV)²
methylon²
methylphenidate²
metclopramide¹
metoprolol²
midazolam²
mirtazapine²
moclobemide¹
N
nicotine¹
nortriptyline²
O
olanzapine²
orphenadrine²
oxybutynin¹
oxycodone²
P
paroxetine²
pentadrope
pentazocine²
pentoxophylline²
pentanyl
phencyclidine (PCP)²
phenethalamines (2C-B, 2C-B-Fly, 2C-T-7, PEA)
pheniramine²
phenmetrazine
phentermine¹
piperazine, 1-3 chlorophenyl (mCPP)
piperazine, trifluoromethylphenyl (TFMPP)
p-fluorofentanyl
p-methoxymphetamine (PMA)²
p-methoxymeth-amphetamine (PMMA)
procaine³
prochlorperazine²
procyclidine¹
propoxyphene²
propranolol²
pseudoephedrine*²
Q
quetiapine²
quinidine¹
R
ropivicaine
S
scopolamine (hyoscine)¹
sertraline²
strychnine¹
**QTOF Screen**

The QTOF screen is a powerful and sensitive method that can reliably detect the drugs included in the following methods (details are listed in Appendices 5 and 6):

- LC-MS/MS Mix 2
- LC-MS/MS Mix 3 (except carfentanil)
- LC-MS/MS Mix 4
- LC-MS/MS Mix 5 (except: diflunisal, furosemide, ibuprofen, salicylate, vigabatrin)

In addition, the QTOF screen can identify psilocin. The list of drugs potentially identifiable by QTOF is too extensive to list within this document. For questions about a specific drug not listed, please contact the appropriate case coordinator.

*The GC and GC/MS screen and QTOF screen are not capable of distinguishing racemates, therefore compounds such as dextrophan/levorphanol, citalopram/escitalopram and ephedrine/pseudoephedrine cannot be separated. Similarly, the GC and GC/MS screen cannot distinguish between 2-fluoroamphetamine, 3-fluoroamphetamine, and 4-fluoroamphetamine.

**Immunoassay Tests (known cross-reactivity)**

**Barbiturates:**

- amobarbital
- butalbital
- pentobarbital
- phenobarbital
- secobarbital

**Head-space GC-FID analysis for volatiles (screen and quantitation)**

- acetone
- ethanol
- isopropanol
- methanol
- n-propanol (qualitative)
### Volatile screen (qualitative only)

<table>
<thead>
<tr>
<th>Difluoroethane</th>
<th>Propane</th>
<th>Acetone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichloromethane</td>
<td>Butane</td>
<td>Methyl ethyl ketone</td>
</tr>
<tr>
<td>1,1,1,2-tetrafluoroethane</td>
<td>Isobutane</td>
<td>Isopropyl alcohol</td>
</tr>
<tr>
<td>Ethyl acetate</td>
<td>Toluene</td>
<td>Acetaldehyde</td>
</tr>
<tr>
<td>Diethyl ether</td>
<td>Methanol</td>
<td>Chloroform</td>
</tr>
<tr>
<td>Dimethyl ether</td>
<td>Ethanol</td>
<td>Gasoline</td>
</tr>
</tbody>
</table>
Appendix 2 – Drugs Requiring Targeted Analysis

Compounds that may not be identified by screening methods but might be detected and/or quantitated by targeted methods.

A
acepromazine³
amiloride³
antipyrine (phenazone)¹
atracurium³
azacyclonol³

B
bromocriptine³

C
carbaryl¹
carbon monoxide⁵
clorzoxazone³
cyanide²

D
dantrolene³
diflunisal²
dipyriramole³

E
ethopropazine³
ethylene glycol⁶

F
fenfluramine¹
fenodipine³
fenoprofen³
formic acid⁴
furosemide²

I
ibuprofen²
indomethacin³

K
ketoconazole³

M
mefenamic acid³
methaqualone¹
metronidazole³
mexiletine¹

N
nabumetone³

O
oxprenolol³

P
pericyzine³
phenylbutazone³
phenyltoloxamine¹
physostigmine¹

Methods used for the quantitation of compounds identified in the preceding appendices are denoted as follows:

¹ GC-NPD
² LC-MS/MS
³ LC-DAD
⁴ GC-FID
⁵ Visible spectrophotometry
⁶ Qualitative

pimozide³
pindolol³
pipotiazine³
piroxicam³
prazosin³
sotalol³
sufentanil¹

S
terazosin³
terfenadine³
tiaprofenate³
timolol³
tolbutamide³
toluene⁴
triamterene³

T
valproic acid⁴
vigabatrin²

Y
yohimbine³
Appendix 3 – Initial Analyses by Case Type

**Alcohol-impaired driving:** Ethanol  
**Attempted murder:** dependent upon case history  
**Confirmation of ketoacidosis:** Ethanol (includes acetone), BHB  
**Death of child < 5 years of age:** Ethanol, QTOF Screen, LC-MS/MS Mix 3, IA cannabinoids, IA acetaminophen  
**Drug-impaired driving:** QTOF Screen, IA cannabinoids, UDM, GHB  
**Fatal motor vehicle collision (driver) and aviation death:** Ethanol, QTOF Screen, LC-MS/MS Mix 3, IA cannabinoids, CO\(^b\)  
**Fire-related death\(^c\):** CO (whole blood required)  
**Homicide:** Ethanol, QTOF Screen, LC-MS/MS Mix 3, IA cannabinoids  
**Mandatory inquest:** Ethanol, QTOF Screen, LC-MS/MS Mix 3, IA cannabinoids  
**Possible drug-related death:** Ethanol, QTOF Screen, LC-MS/MS Mix 3  
**Rule Out/exclusionary Toxicology:** Ethanol, LC-MS/MS Mix 3  
**Sexual assault\(^a\):** dependent upon case history  
**SIU death investigation:** Ethanol, QTOF Screen, LC-MS/MS Mix 3, IA cannabinoids

\(^a\) dependent upon sample volume  
\(^b\) if fire is involved  
\(^c\) other analyses may be performed dependent upon evidence/suspicion of intoxication
## Appendix 4 – No Method Available

Examples of drugs/compounds for which this laboratory does not have a method

<table>
<thead>
<tr>
<th>Animal toxins</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>α-bungarotoxin</td>
<td>insulin</td>
</tr>
<tr>
<td>conotoxin</td>
<td>lead, mercury</td>
</tr>
<tr>
<td>maurotoxin</td>
<td>lithium</td>
</tr>
<tr>
<td>tetrodotoxin</td>
<td>polychlorinated biphenyls (PCB)</td>
</tr>
<tr>
<td></td>
<td>succinylcholine</td>
</tr>
<tr>
<td></td>
<td>thallium</td>
</tr>
<tr>
<td>Anesthetic gases</td>
<td></td>
</tr>
<tr>
<td>halothane</td>
<td></td>
</tr>
<tr>
<td>isoflurane</td>
<td></td>
</tr>
<tr>
<td>nitrous oxide</td>
<td></td>
</tr>
<tr>
<td>Curare-related toxins</td>
<td></td>
</tr>
<tr>
<td>alloferine</td>
<td></td>
</tr>
<tr>
<td>toxiferine</td>
<td></td>
</tr>
<tr>
<td>tubocurarine</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 5 – Capability of Quantitative Methods

Barbiturate method (LC-MS/MS)
- amobarbital (qualitative)
- butalbital
- pentobarbital
- phenobarbital
- phenytoin
- primidone
- secobarbital

GHB/BHB method (LC-MS/MS)
- γ-hydroxybutyrate (GHB)
- β-hydroxybutyrate (BHB)

Cannabinoid method (LC-MS/MS)
- tetrahydrocannabinol (THC)
- THC (11-nor-carboxy; THC-COOH)
- THC (11-hydroxy; THC-OH, qualitative)
- cannabidiol
- cannabinol

Digoxin method (LC-MS/MS)
- digoxin
- digitoxin (qualitative)

LC-MS/MS Mix 2
- benztropine
- benzylpiperazine
- brompheniramine
- caffeine (semi-quantitative)
- clonidine
- ephedrine
- flubromazolam
- flualprazolam
- haloperidol
- ketorolac
- loperamide (qualitative)
- lidocaine (semi-quantitative)
- mitragynine (qualitative)
- nicotine (semi-quantitative)
- phenylephrine (qualitative)
- pseudoephedrine
- trimeprazine (qualitative)
- warfarin

LC-MS/MS Mix 3
- 6-monoacetylmorphine (6-MAM; qualitative)
- alprazolam
- amitriptyline
- amphetamine
- benzoylecgonine
- bupropion
- carfentanil
- chlorpheniramine
- citalopram/escitalopram
- clonazepam
- clonazepam (7-amino; qualitative)
- cocaine
- codeine
- cyclobenzaprine
- dextromethorphan
- diazepam
- diazepam (nor)
- diphenhydramine
- fentanyl
- flunitrazepam (7-amino)
- fluoxetine
- fluoxetine (nor)
- flurazepam (n-desalkyl)
- hydrocodone
- hydromorphone
- ketamine
- ketamine (nor)
- lorazepam
- meperidine
- meperidine (nor)
- mephedrone
- methadone
- methamphetamine
- methylenedioxymethamphetamine
- methylenedioxyethylamphetamine
- methylenedioxymethylamphetamine
- midazolam
- mirtazapine
- morphine
- nortriptyline
- olanzapine
- oxazepam
- oxycodone
- oxymorphone
- paroxetine
- pseudoephedrine
- quetiapine
- risperidone
- sertraline
- temazepam
- tramadol (cis)
- trazodone
- venlafaxine
- zopiclone
### LC-MS/MS Mix 4

<table>
<thead>
<tr>
<th>Substance</th>
<th>Substance</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>acetyl fentanyl</td>
<td>doxylamine</td>
<td>naltrexone</td>
</tr>
<tr>
<td>alprazolam (hydroxyl)</td>
<td>duloxetine</td>
<td>nitrazepam</td>
</tr>
<tr>
<td>amoxapine</td>
<td>etizolam</td>
<td>nitrazepam (7-amino)</td>
</tr>
<tr>
<td>bromazepam</td>
<td>flunitrazepam</td>
<td>orphenadrine</td>
</tr>
<tr>
<td>buprenorphine</td>
<td>flunitrazepam (N-desmethyl)</td>
<td>PCP</td>
</tr>
<tr>
<td>butyryl fentanyl</td>
<td>flurazepam</td>
<td>pentazocine</td>
</tr>
<tr>
<td>chlor diazoxide</td>
<td>fluvoxamine</td>
<td>pheniramine</td>
</tr>
<tr>
<td>chlorpromazine</td>
<td>furanyl fentanyl</td>
<td>promethazine</td>
</tr>
<tr>
<td>clobazam</td>
<td>imipramine</td>
<td>propoxyphene</td>
</tr>
<tr>
<td>clomipramine</td>
<td>levorphanol/dextrophan</td>
<td>triazolam</td>
</tr>
<tr>
<td>clozapine</td>
<td>(qualitative)</td>
<td>triazolam (hydroxy)</td>
</tr>
<tr>
<td>demoxepam</td>
<td>loxapine</td>
<td>trimipramine</td>
</tr>
<tr>
<td>desipramine</td>
<td>MDPV</td>
<td>U-47700</td>
</tr>
<tr>
<td>desomorphine</td>
<td>methotrimeprazine</td>
<td>venlafaxine (O-desmethyl)</td>
</tr>
<tr>
<td>diltiazem</td>
<td>methylone</td>
<td>ziprasidone</td>
</tr>
<tr>
<td>diltiazem (desacetyl)</td>
<td>methylphenidate</td>
<td>zolpidem</td>
</tr>
<tr>
<td>doxepin</td>
<td>naltrexone</td>
<td></td>
</tr>
</tbody>
</table>

### LC-MS/MS Mix 5

<table>
<thead>
<tr>
<th>Substance</th>
<th>Substance</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>acebutolol</td>
<td>gabapentin</td>
<td>prochlorperazine</td>
</tr>
<tr>
<td>acetaminophen</td>
<td>guaifenesin</td>
<td>propafenone</td>
</tr>
<tr>
<td>amiodarone</td>
<td>ibuprofen</td>
<td>propranolol</td>
</tr>
<tr>
<td>amlodipine</td>
<td>labetalol</td>
<td>pseudoephedrine</td>
</tr>
<tr>
<td>atenolol</td>
<td>lamotrigine</td>
<td>salicylate</td>
</tr>
<tr>
<td>baclofen</td>
<td>methocarbamol</td>
<td>topiramate</td>
</tr>
<tr>
<td>carbamazepine (qualitative)</td>
<td>metoprolol</td>
<td>verapamil</td>
</tr>
<tr>
<td>diflunisal</td>
<td>naproxen</td>
<td>vigabatrin</td>
</tr>
<tr>
<td>furosemide</td>
<td>pregabalin</td>
<td></td>
</tr>
</tbody>
</table>

---
Appendix 6 – Capability of Targeted Qualitative Methods

Urine Drug Mix (UDM; LC-MS/MS)

6-monoacetylmorphine (6-MAM)  ephedrine
acetylfentanyl  etizolam
acetylnorfentanyl  fentanyl
alprazolam  fentanyl (nor)
amitriptyline  flualprazolam
amloidipine  flurbiprofen
amoxapine  flunitrazepam
amphetamine  flunitrazepam (7-amino)
baclofen  flunitrazepam (N-desethyl)
benzoylcegonine  fluoxetine
bromazepam  fluoxetine (nor)
brompheniramine  flurazepam
buprenorphine  flurazepam (n-desalkyl)
buprenorphine glucuronide  fluvoxamine
bupropion  furanyl fentanyl
butyrylfentanyl  gabapentin
carfentanil  heroin
clordiazepoxide  hydrocodone
chlorpheniramine  hydromorphone
citalopram/escitalopram  hydromorphone-3-glucuronide
clobazam  hydroxyalprazolam
clomipramine  hydroxytriazolam
clonazepam  imipramine
clonazepam (7-amino)  ketamine
clozapine  ketamine (nor)
cocaethylene  lamotrigine
cocaine  levorphanol/dextrophan
codeine  lidocaine
codeine-6-glucuronide  lorazepam

cyclobenzaprine  lorazepam glucuronide
demoxepam  loxapine
desipramine  meperidine
desomorphine  meperidine (nor)
dextromethorphan  mepedrine

diazepam  methadone
diazepam (nor)  methamphetamine
diltiazem  methylenedioxymethamphetamine
diltiazem (desacetyl)  methylenedioxyethylamphetaminerone
diphenhydramine  methylenedioxymethamphetamine
doxepin  methylone
doxylamine  methylphenidate
duloxetine  methane
<table>
<thead>
<tr>
<th>Substance</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>metoprolol</td>
<td>propoxyphene</td>
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<tr>
<td>midazolam</td>
<td>propranolol</td>
</tr>
<tr>
<td>mirtazapine</td>
<td>pseudoephedrine</td>
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<tr>
<td>morphine</td>
<td>quetiapine</td>
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<tr>
<td>morphine-3-glucuronide</td>
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<td>temazepam</td>
</tr>
<tr>
<td>nitrazepam</td>
<td>temazepam glucuronide</td>
</tr>
<tr>
<td>nitrazepam (7-amino)</td>
<td>THC-COOH glucuronide</td>
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<td>nortriptyline</td>
<td>THC-COOH</td>
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<tr>
<td>olanzapine</td>
<td>topiramate</td>
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<tr>
<td>orphenadrine</td>
<td>tramadol (cis)</td>
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<tr>
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<td>trazodone</td>
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<td>triazolam</td>
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<tr>
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<td>venlafaxine (O-desmethyl)</td>
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<td>zaleplon</td>
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<tr>
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<td>ziprasidone</td>
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<tr>
<td>pregabalin</td>
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