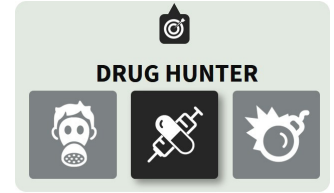


MX908 DRUG HUNTER OVERVIEW

The MX908's Mission Modes are specialized hardware and software configurations for **enhanced operational performance** under specified mission objectives.



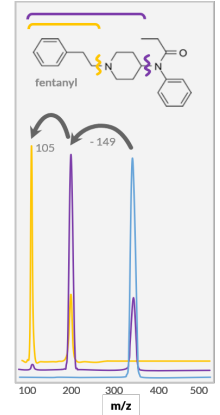
Drug Hunter mode focuses on optimal detection of a subset of the MX908's Target List including:

- broad range of fentanyls
- other opioids including heroin, morphine, cocaine
- hydrocodone and oxycodone
- amphetamines

Hardware & Software Optimization:

Drug Hunter generates a series of mass spectral scans with progressive fragmentation voltages (collisionally induced dissociation) to selectively create & confirm the expected mass fragments of the drug targets of interest.

This process is automatic and occurs within milliseconds during operation in the DrugHunter Mission.



Mass Spec avoids several limitations of optical techniques for fentanyl and related compounds:

Raman/FTIR sensitive to salt/base forms – fentanyl citrate doesn't look anything like fentanyl HCl

Raman sensitive to polymorphs / crystal structure and can miss ID if the library polymorph isn't the same as a unknown.

Raman/FTIR have a hard time finding a needle in a haystack with mixtures < 10-20%.

Raman/FTIR - Bulk quantities required for handling - hundreds of micrograms – increases First Responder exposure risk.



- ▶ all salts convert to base form in TD
- ▶ polymorphism not observable with MS
- ▶ LOD's at 0.1% or lower feasible with CID
- ▶ trace detection to ~100 ng levels



Current Drug Hunter Targets: ORANGE

Long Name	Alarm Name	MW	CAS	Vapor	Trace	DH Vapor	DH Trace	Target List
DRUGS								
benzylfentanyl (surrogate – not DEA scheduled)	benzylfentanyl	322.45	1474-02-8					fentanils, drugs
3-methylfentanyl	3-MF	350.00	42045-86-3					fentanils, drugs
acetylfentanyl	acetylfentanyl	322.44	3258-84-2					fentanils, drugs
alfentanyl	alfentanyl	416.52	71195-58-9					fentanils, drugs
butyryl fentanyl	butyryl fentanyl	350.50	1169-70-6					fentanils, drugs
carfentanyl	carfentanyl	394.00	59708-52-0					fentanils, drugs
fentanyl	fentanyl	336.47	437-38-7					fentanils, drugs
furanylfentanyl	furanylfentanyl	374.48	101345-66-8					fentanils, drugs
remifentanyl	remifentanyl	376.00	13275-6-7					fentanils, drugs
sufentanyl	sufentanyl	386.55	56030-54-7					fentanils, drugs
amphetamine	amphetamine	135.20	300-62-9					drugs
cathinone	cathinone	149.19	71031-15-7					drugs
captagon	captagon	341.41	3736-08-1					drugs
cocaine	cocaine	303.35	50-36-2					drugs
ephedrine	ephedrine	165.23	299-42-3					train, drugs
heroin	heroin	369.41	561-27-3					drugs
hydrocodone	hydrocodone	299.37	125-29-1					drugs
MDMA	MDMA	193.24	42524-10-9					drugs
methadone	methadone	309.44	76-99-3					drugs
methamphetamine	methamphetamine	149.23	537-46-2					drugs
morphine	morphine	285.30	57-27-2					drugs
oxycodone	oxycodone	315.36	76-42-6					drugs

Target list will continue to expand.

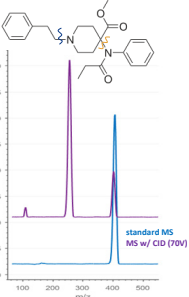
MX808 DRUG HUNTER OVERVIEW

Drug Hunter Examples

CID Fragmentation

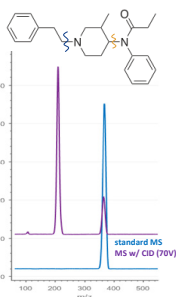
Carfentanyl Expected Masses

- M+H = 395.23 m/z
- Frag1 = 246.15 m/z
- Frag2 = 105.07 m/z



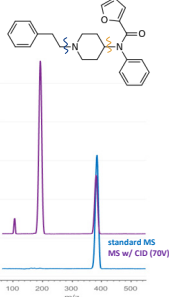
3-methylfentanyl Expected Masses

- M+H = 351.24 m/z
- Frag1 = 202.16 m/z
- Frag2 = 105.07 m/z

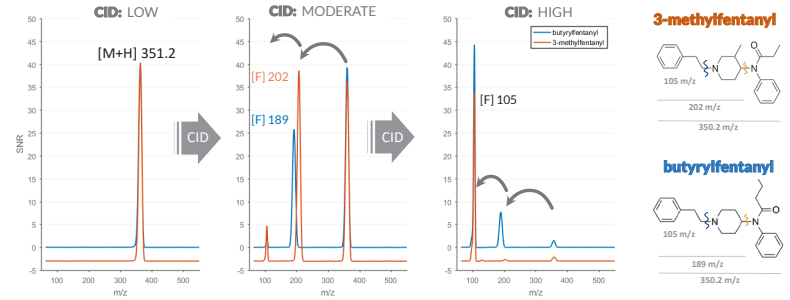


Furanylfentanyl Expected Masses

- M+H = 375.21 m/z
- Frag1 = 188.14 m/z
- Frag2 = 105.07 m/z

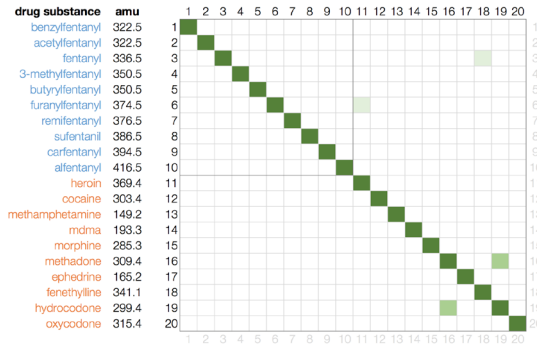


Isobar Identification



Chained probability: Joint probability of M+H, M+H yielding daughter ion 1, daughter 2, ... daughter ion N

Isobar Identification



Drug Hunter is able to resolve fentanyls with the same molecular weight.

Detection With Diluent @ 100:1

diluent	replicate		
	1	2	3
none	fen	fen	fen
acetaminophen	fen	fen	fen
boric acid	fen	fen	fen
caffeine	fen	fen	fen
dextrose	fen	fen	fen
heroin	*	*	*
lactose	fen	fen	fen
lidocaine	NTD	fen	NTD
mannitol	fen	fen	fen
phenacetin	NTD	NTD	NTD
sodium bicarb	fen	fen	fen

Fentanyl + Diluent
100 ng + **10,000 ng**

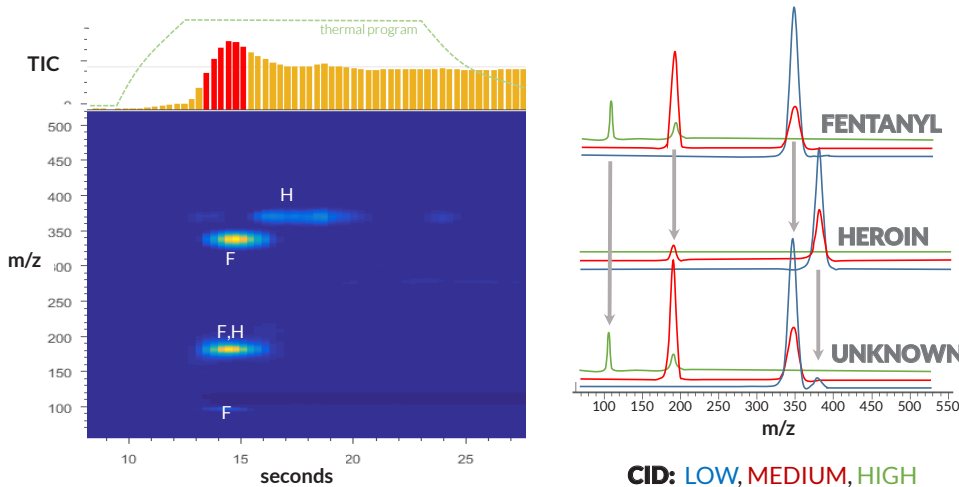
Dosed to swab

3 reps

DrugHUNTER Mode

* Multiple Possible Alarms:
fentanyl, heroin, turanylfentanyl

Simultaneous Detection of Multiple Targets



CID: LOW, MEDIUM, HIGH

multiple possible alarms

ALARM FENTANYL
CAS 437-38-7

ALARM HEROIN

DETAILS **RETURN**