

Comparison of Gas Chromatography Columns (Rtx[®]-5, Rxi[®]-1ms, and Rxi[®]-1HT) for the Qualitative Analysis of Synthetic Cannabinoids Laurel Hardy, BS; Carrie Kirkpatrick, BS; Pamela Staton, PhD; Lauren Waugh, PhD Marshall University & West Virginia State Police Forensic Laboratory Drug Identification Section

Abstract

As popularity of synthetic cannabinoids and the prevalence of their grow, so does the need to control such substances. For high through West Virginia State Police (WVSP) Drug Identification Laboratory, the hi and low volatility of synthetic cannabinoids poses a problem for analysi cannabinoids elute within the parameters of their standard GC-MS compares the Restek Rxi[®]-1ms and Rxi[®]-1HT GC columns to the Reste (standard method in the WVSP Drug Laboratory) to determine if improve the efficiency of synthetic cannabinoid detection and analysis GC-MS method. The reduced retention times and reproducibility observed indicate the Restek Rxi[®]-1HT and Rxi[®]-1ms columns of possibilities for the qualitative analysis of synthetic cannabinoids laboratories.

Introduction

- Synthetic cannabinoids were first reported in the United States as rec December 2008¹ and are quickly gaining popularity^{1,2} due to "the des and the ability to avoid detection on standard drugs-of-abuse testing THC"³.
- Synthetic cannabinoids present a danger to public health
 - Annual calls to poison control centers is currently increasing wit reported between Jan 1 and Aug 30, 2015
 - Emergency department visits involving synthetic cannabinoids: 28,531 (2011)⁴
 - Synthetic cannabinoids were the second most used illegal drug graders in 2012¹ and the third most used illegal drug among eigh
- Individuals easily overdose on synthetic cannabinoids for several reas
 - lack of information on the real composition"⁶ or the concentration are buying^{6,7,8}
 - higher potency of synthetic cannabinoids due to their higher aff CB2 receptors^{6,7,8,9} than THC
 - lack of correlation between brand name and the type of synthet present on plant material^{6,7,10}
 - inaccuracy of plant materials listed as ingredients on the packag
 - plants used to produce smoking mixtures could themselves be source of adverse reactions.
- Legislation affecting synthetic cannabinoids
 - 2011 emergency scheduling of five compounds due to threat
 - 2012 Synthetic Drug abuse prevention act of 2012 as part of t Innovation act of 2012
 - Additional scheduling of individual compounds in 2013, 2014, ar
- Factors complicating the enforcement of synthetic cannabinoids
 - Lack of presumptive tests
 - Packages contain disclaimer "not for human consumption"
 - emergence of new synthetic cannabinoid compounds to bypass specific compounds
 - delay in scheduling new compounds and development of certification material
- Analytical difficulties
 - Large molecules with low volatility
 - Long throughput times
- The goal of this study is to determine if a different column could be us synthetic cannabinoid GC retention times and improve the efficiency cannabinoid analysis in the laboratory.

Materials & Methods

Rate	Temp	Hold	•	Retention time sh	ift study
(°C/min)	(°C)	(minutes)	•	Retention time rei	oroducibility study
	115	0	•	Agilent Technolog	ies 7890A GC
20	200		_	instrument	
20	290	4		Agilant Tachnalag	iae 50750 inart MCD
Total r	un time	12.75		Agrient recimolog	
Totarr		minutes		with triple-axis de	tector
			CD 47		
Tabla 1	25B-NBOIVIE		CP 47,	,497 C8 HOIMOLOG	JWH-203
	25C-NBOIMe		CP 55,	,940	JWH-203-3 chlorophenyl
	25H-NBOMe		FLIB-P	PB-72	IW/H-210
narameters	5-fluoro-AB-PI	NACA	HU-21	LO	JWH-250
used for	5-fluoro PB-22		HU-21	1	JWH-302
samnle	AB-CHMINACA	4	JMH-0	018	JWH-398
analysis	AB-FUBINACA		JMH-0	018	MAM-2201
anarysis.	AB-PINACA		ADAN	IANTYLCARBOXAMIDE	PB-22
Table 2	AKB-48		JMH-0)19	RCS-4
(Right)	AKB-48 N-(5-fl	uoropentyl)	JWH-0)22	RCS-4-C4 homolog
List of the	AM-1220		JWH-0)73	RCS-8
synthetic	AM-2201		JWH-0	073 6-methoxyindole	STS-135
cannahinoid	AM-2233		JWH-C)81	THJ-2201
standards	AM-694		JWH-1	$\frac{122}{122}$	UR-144
analyzed	CB-25			22 N(4-pentenyi)	10R-144-N-(5chioropentyi)
anaryzeu.	CP 47 497		IW/H-7	200 201	XIR-11
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		• • • •			
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	Synthetic Ca	nnabinoid	Rete	ntion Times	
13 12	Synthetic Ca	nnabinoid	Rete	ntion Times	Figure 1. Box and
13 12 U ¹¹	Synthetic Ca	innabinoid	Rete	ntion Times	Figure 1. Box and whisker plot depicting
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(Minutes) (Minutes) (Minutes) (A in 10 2 2 4	Synthetic Ca		Rete	ention Times	Figure 1. Box and whisker plot depicting the synthetic cannabinoid retention times obtained on the Restek Rtx [®] -5, Rxi [®] - 1ms, and Rxi [®] -1HT GC
13 12 11 10 9 8 7 4 3 2	Synthetic Ca		Rete	Intion Times	Figure 1. Box and whisker plot depicting the synthetic cannabinoid retention times obtained on the Restek Rtx®-5, Rxi®- 1ms, and Rxi®-1HT GC columns.
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13 12 11 10 9 8 7 6 5 4 3 2 1 0	Synthetic Ca		Rete		Figure 1. Box and whisker plot depicting the synthetic cannabinoid retention times obtained on the Restek Rtx®-5, Rxi®- 1ms, and Rxi®-1HT GC columns.
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Synthesis of the second	Synthetic Can Rtx-5	nnabinoid	Rete 	ention Times	Figure 1. Box and whisker plot depicting the synthetic cannabinoid retention times obtained on the Restek Rtx®-5, Rxi®- 1ms, and Rxi®-1HT GC columns.
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Smallest St. Deviation 7.953-Rxi-1m: D 7.830 Rxi-1HT -

Conclusion/Discussion

- Restek Rxi[®]-1ms GC column for analysis.
- (t = 7.378 and 19.688 respectively).
- Identification Laboratory
- throughput laboratories

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Results



Figure 3. Target plots depicting the distribution of retention times for the synthetic cannabinoid compounds that displayed the smallest and largest standard deviations when run in duplicate on the Rxi-1ms GC column and Rxi-1HT GC column. The smallest and largest standard deviations observed using the Rxi-1ms column were (A) CP-47,497 C8 homolog (0.030) and (B) JWH-018 (0.085) and on the Rxi-1HT were (C) JWH-073 (0.030) and (D) JWH-022 (0.062).

Results indicated a dramatic decrease in retention time (average of 2.106 minutes) when using the Restek Rxi[®]-1HT GC column for analysis and a slight decrease in retention time (average of 0.488 minutes) when using the

Data from both the Restek Rxi[®]-1ms and Rxi[®]-1HT columns were

determined to be significantly different from data obtained using the Restek Rtx[®]-5 column based on paired t tests with 95% confidence intervals

Both columns demonstrated adequate reproducibility of retention time for qualitative analysis required at the West Virginia State Police Drug

The Restek Rxi[®]-1HT and Rxi[®]-1ms columns have proved to be a promising possibility for the qualitative analysis of synthetic cannabinoids in high

Acknowledgements

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