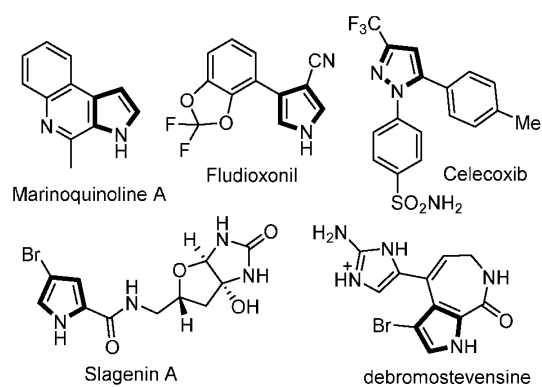
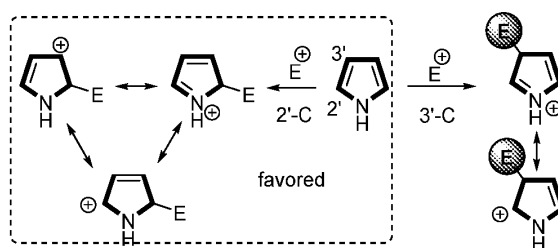
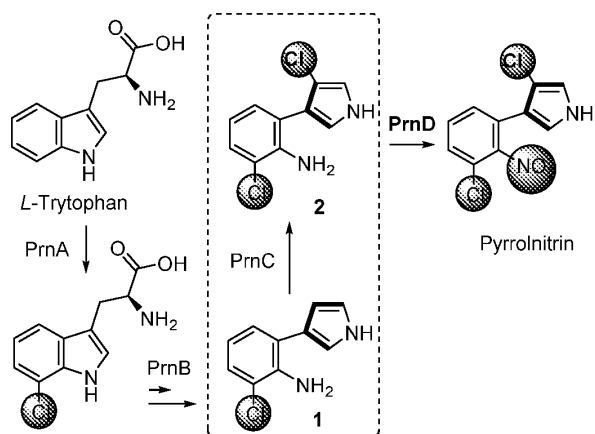


**Figure 1****A. Preferred 2'-Carbon Site of Halogenation for Pyrroles****B. Site Specific 3'-Carbon halogenation via the PrnC Enzyme within the Pyrrolnitrin Biosynthesis****Figure 2A and 2B**

C. Representative Synthetic Protocol vs This work for Site-selective Halogenation of Pyrroles

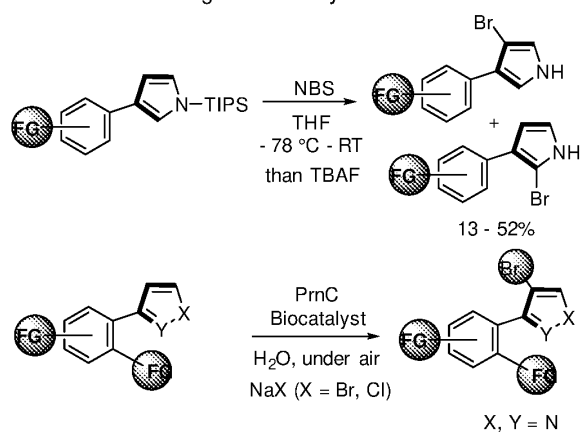


Figure 2C

PrnC Preliminary optimization

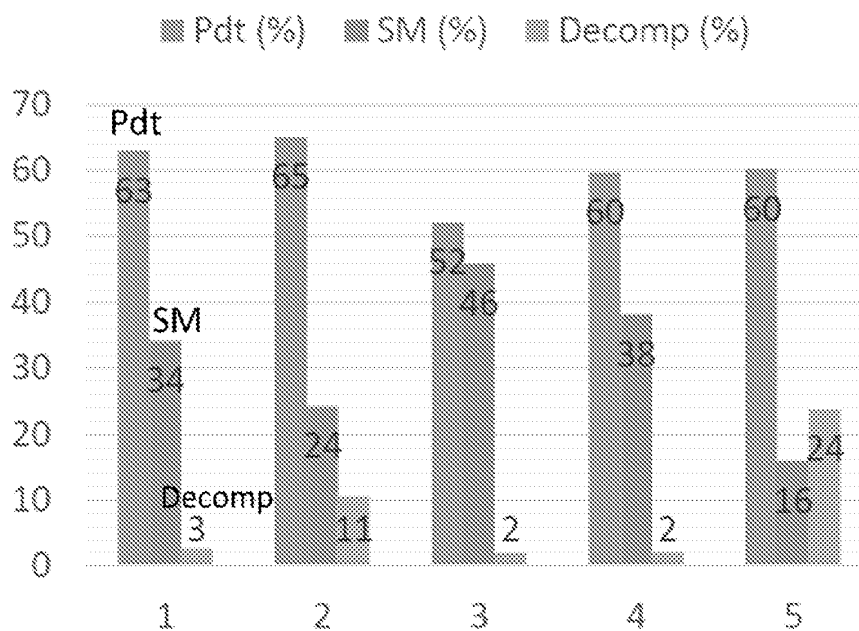


Figure 3A

Preliminary Optimization Table 2

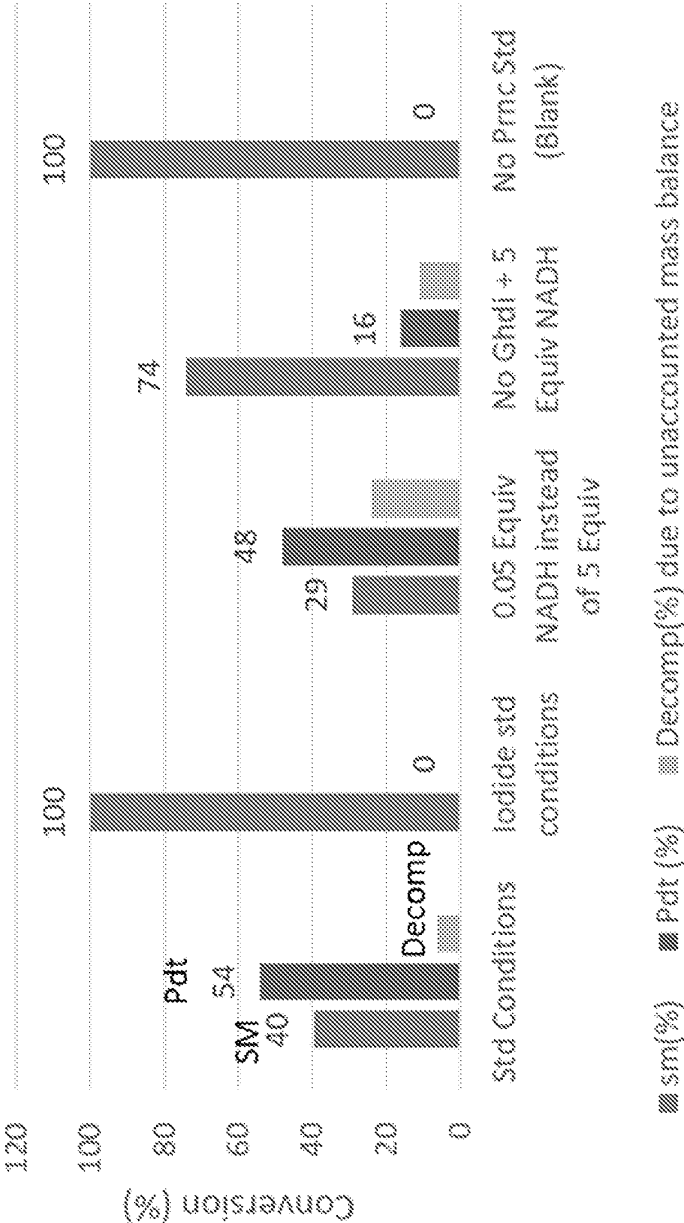
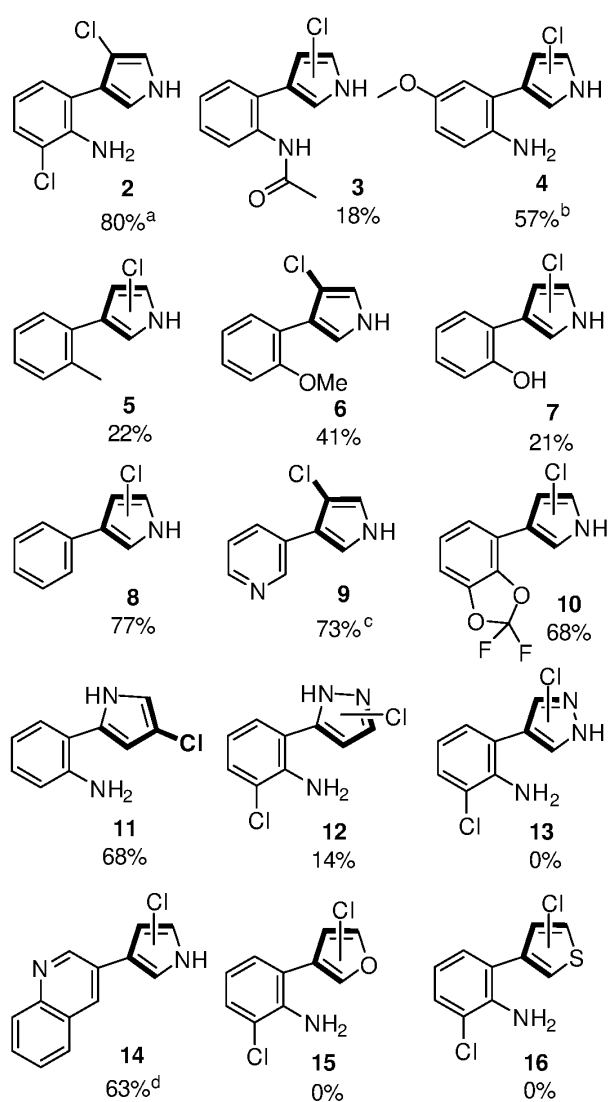


Figure 3B



Conversion yields determined by integration of the HPLC peaks at 254 nm from LC-MS analyses of the crude reaction mixtures relative to control standard at 4 mol% loading of NT-11 PrnC. Duplicated data. ^a2 mol% loading. ^bMono-Chlorinated: Di-Chlorinated mixture (7:1). ^cMono-Cl: Di-Cl mixture (16:1). ^dMono-Cl regioisomers (2:1)

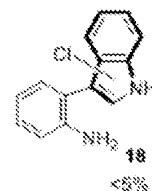


Figure 4

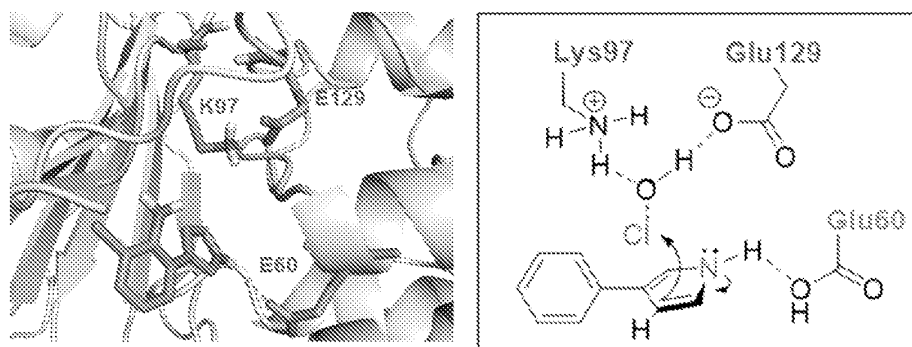


Figure 5

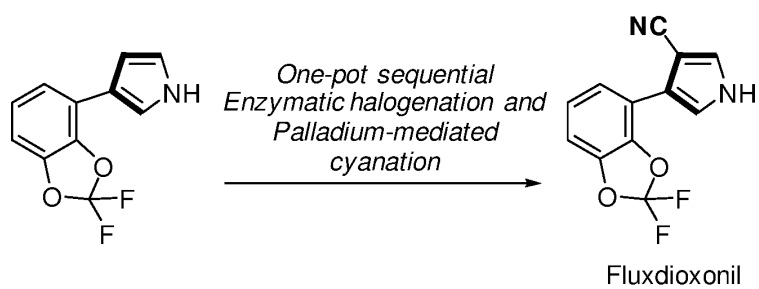


Figure 6

Telescoping enzymatic reaction with a subsequent Palladium catalyzed Cyanation

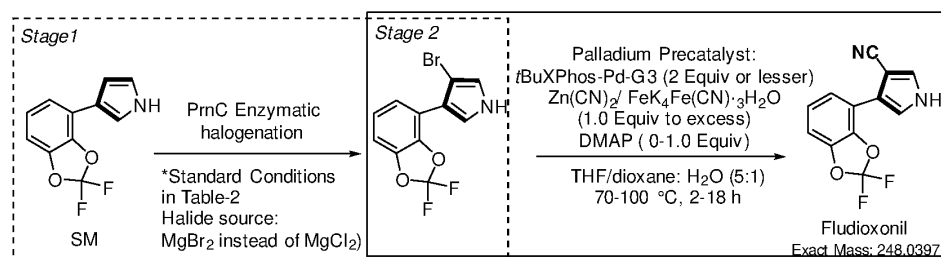
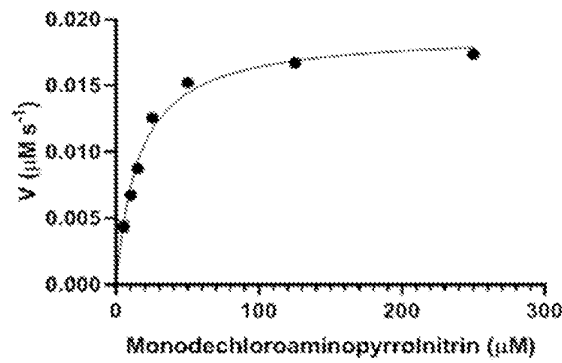
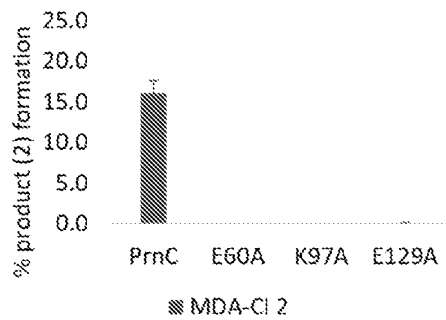


Figure 7



Kinetic parameters	Value
k_{cat} (s ⁻¹)	$7.60 \pm 0.08 \times 10^{-3}$
K_m (M)	$1.58 \pm 0.07 \times 10^{-5}$
k_{cat}/K_m (s ⁻¹ M ⁻¹)	$4.83 \pm 0.24 \times 10^2$

Figure 8



PrnC mutants	% MDA-Cl (2)
Wild-type	16.01
E60A	N.D.
K97A	N.D.
E129A	0.07

Figure 9

PrnC	13	NHFDVILGSGMSGTQMGAIALKQQFRVLIIEESSHPRFTIGESSIPETSLMNRRIADRY	72
6BZA	22	NQYDVIIIGSGIAGALTGAVLAKSGLNVLILDSAQHPRFSVGEEATPESGFLRLLSKRF	81
PrnC	73	GIPELDHITSFYSTQRYVASST-GIKRNFQFVFHKPGQEHDPKEFTQCVIPELPWGPESH	131
6BZA	82	DIPEIAYLSHPDKIIQHVGSSACGIKLGFSFAWH---QENAPSSPDHLVAPPLKV-PEAH	137
PrnC	132	YYRQVDVAYLLQAAIKYGCKVHQKTTVTVEYHADKDGVAVTTAQGERFTGRYMIDCGGPRA	191
6BZA	138	LFRQIDYFALMIALKHGAESRQNIKIESISLNDGGEVALSNAAPVKAAFIIDAAAQGS	197
PrnC	192	PLATKFKLREPCRFKTHSRSLYTHMLGVKPFDDIFKVKGQR---WRWHEGTLHHMFEGG	248
6BZA	198	PLSRQLGLRTTEG-LATDTCSEFFTHMLNVKSYEDALAPLSRTRSPIELFKSTLHHIFEEG	256
PrnC	249	WLWVIPFNNHPRSTNNLVSVGLQLDPRVYPKTDISAQQEFDEFARFPSIGAQRDAVPV	308
6BZA	257	WLWVIPFNNHPQGTNQLCSIGFQFNNAKYRPT-APEIEFRKLLKKYPAIGEHEFKDAVNA	315
PrnC	309	RDWVKTDRLQFSSNACVGDYCLMLHANGFIDPLFSRGLENTAVTIHALAARLIKALRDD	368
6BZA	316	REWIYAPRINYRSVQNVGDRFCLLPQATGFIDPLFSRGLITTFESILRLAPKVLDAARSN	375
PrnC	369	DFSPERFEYIERLQQKLLDHNDQFVSCCYTAFSDFRLWDAFHRLWAVGTILGQFRLVQAH	428
6BZA	376	RWQREQFIEVERHCLNAVATNDQLVSCSYEAFSDFHLWNVWHRVWLSGSNLGSAFLQKLL	435
PrnC	429	ARFRASRNEGDLHDNDPPVYLGYLCADEEYVQLFNDAKAEVEAVSAGRKPADAAAARI	488
6BZA	436	HDLEHSGDARQFDAALEAVRFPGLSLDSPAYESLFRQSCQVMQQAREQARPVAETANAL	495
PrnC	489	HALIDERD	496
6BZA	496	HELIKEHE	503

Figure 10

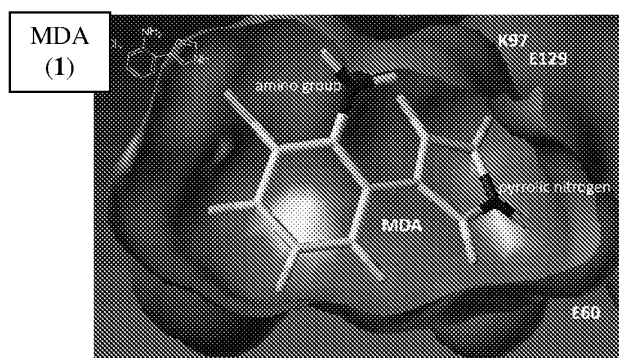


Figure 11

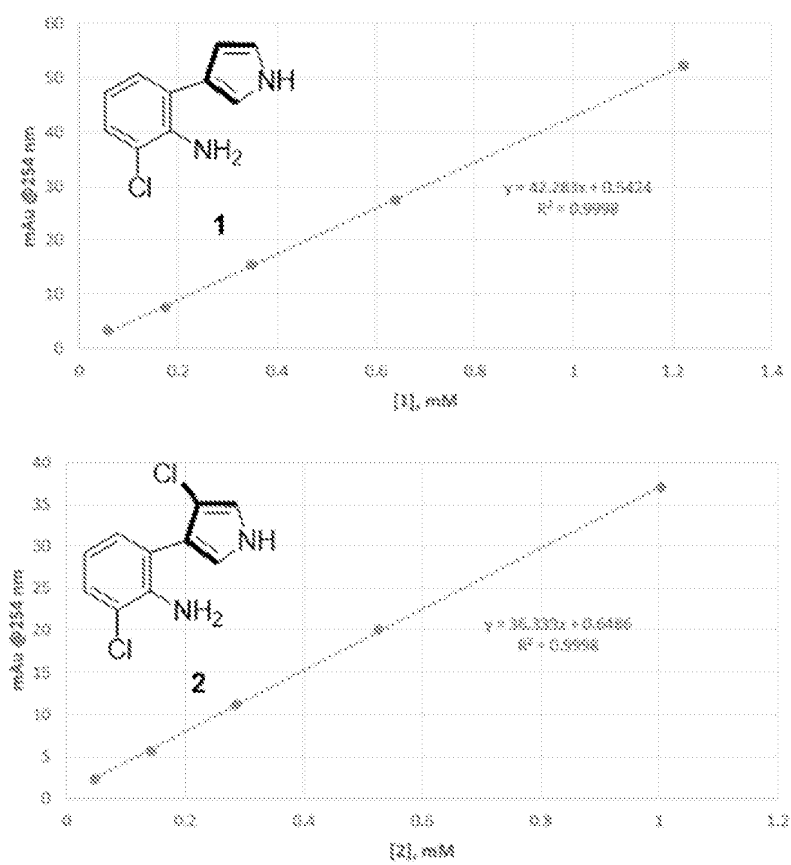
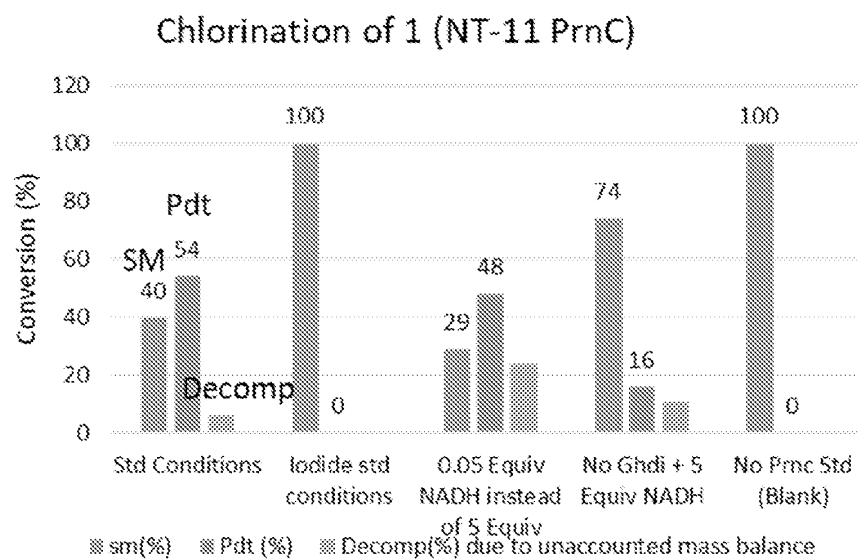


Figure 12

**Figure 13**

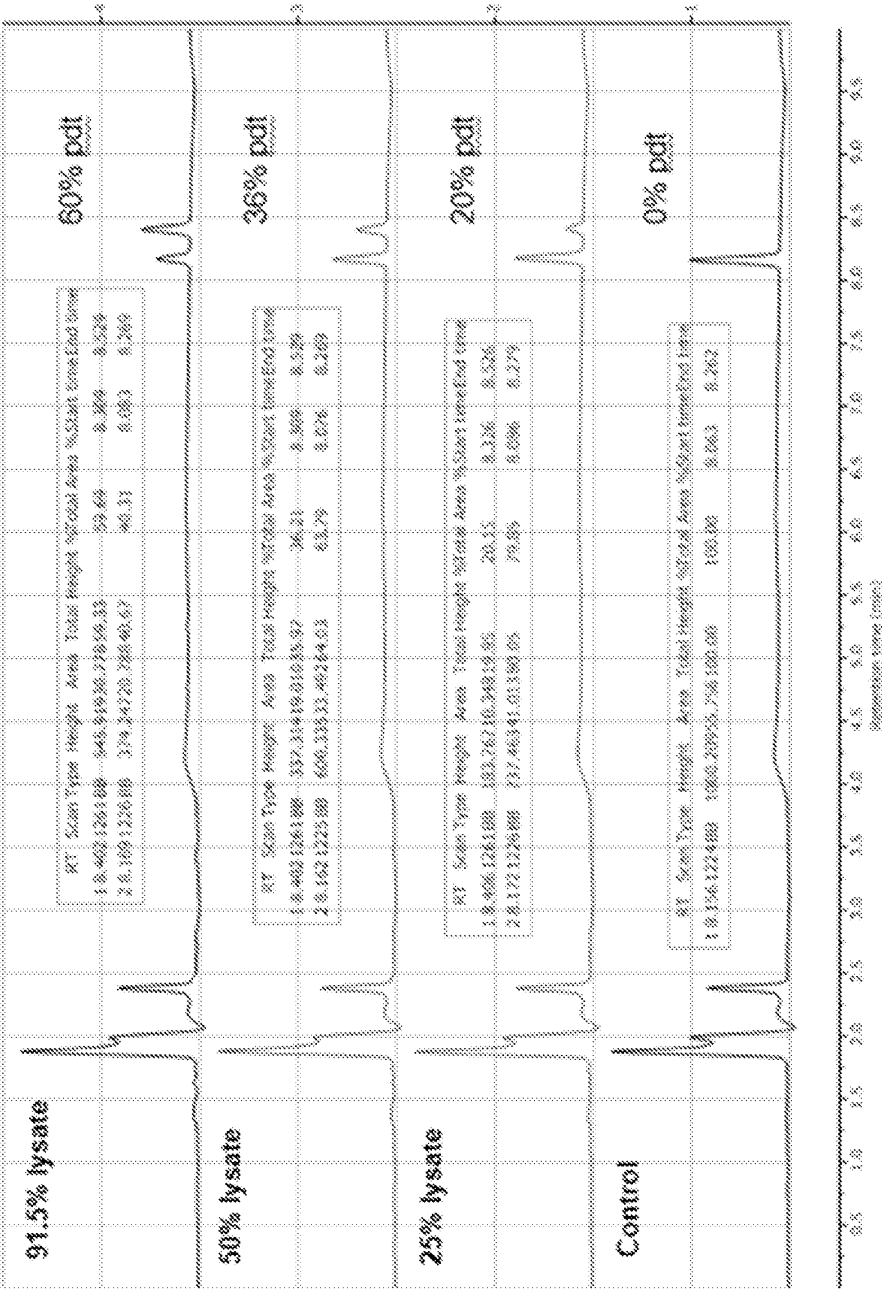


Figure 14