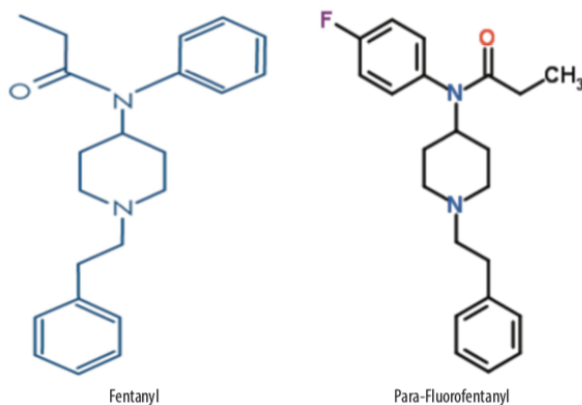


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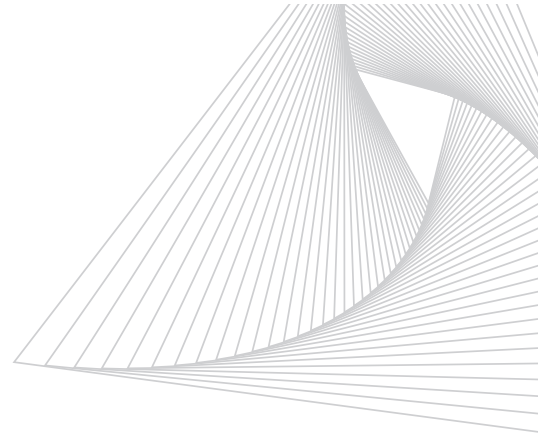
Analysis of Fluorofentanyl Isomer Compounds by Gas-Chromatography Coupled with Solid Phase Infrared Detector

A developing problem within the illicit drug market is the increasing use of opioids and their analogues. Among these opiates is the potent synthetic analgesic, fentanyl. Fentanyl is 50 – 100 times stronger than morphine. It is a very powerful opiate agonist of μ -opioid receptors in the brain.

Fentanyl drugs can be classified into registered therapeutic fentanyl and illicitly produced fentanyl and its analogues. One of the illicitly produced analogues that has recently been encountered within forensic laboratories is fluorofentanyl. Para-fluorofentanyl activates the human μ -opioid receptor with greater potency than fentanyl.



Para-Fluorofentanyl is the only isomer that is federally controlled by the DEA. Para-Fluorofentanyl is federally a Schedule I controlled substance. The ortho and meta isomers are currently not federally scheduled. Differentiation of these isomers can be achieved via infrared spectroscopy. DiscovIR[®] coupled with a Dani-GC offers forensic chemists conclusive infrared spectra for each compound in a mixture. This application will show the analysis and differentiation of the fluorofentanyl isomers.

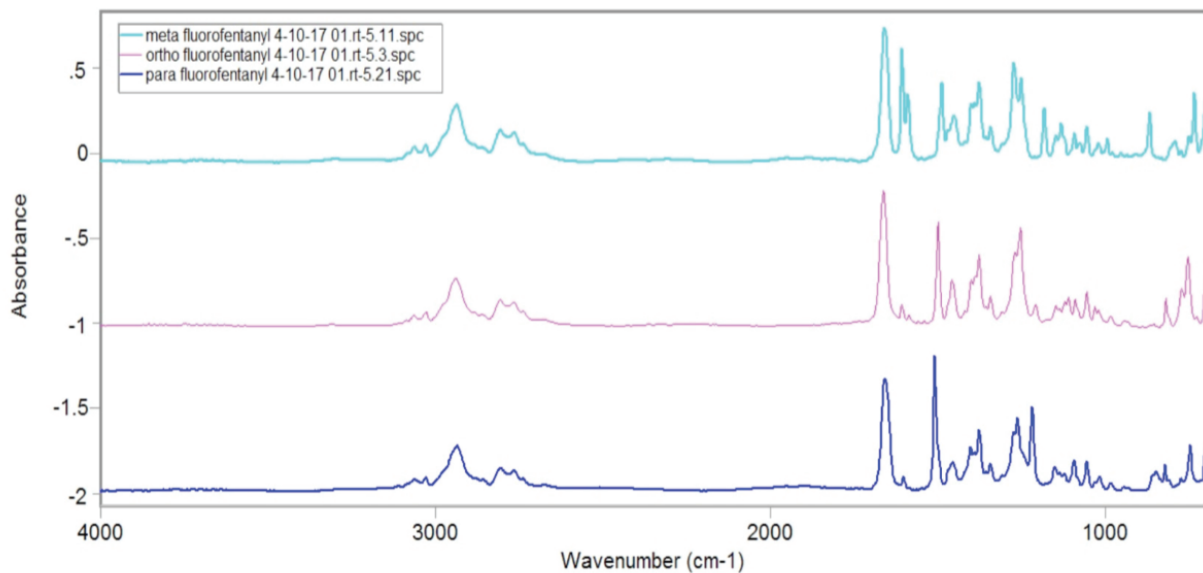


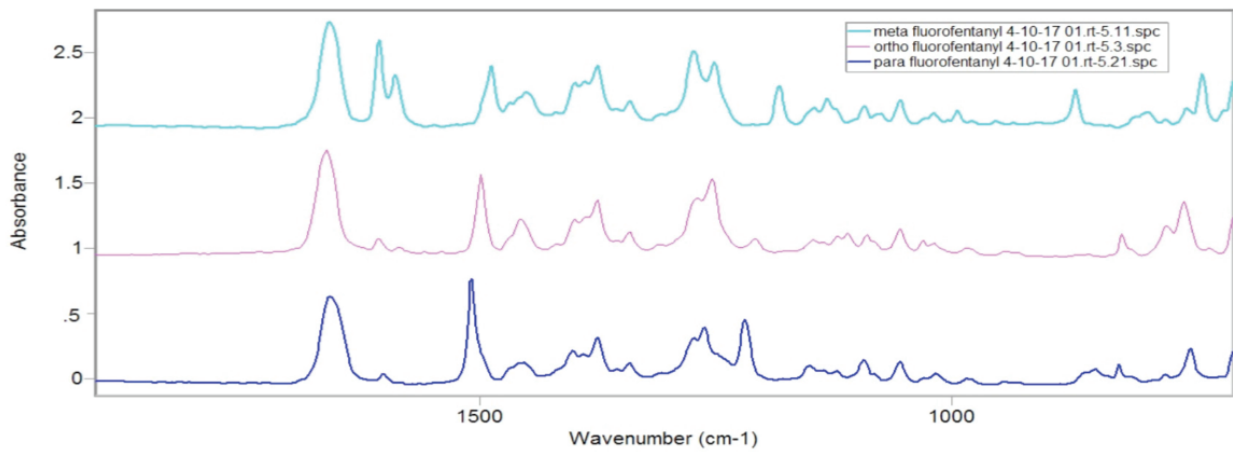
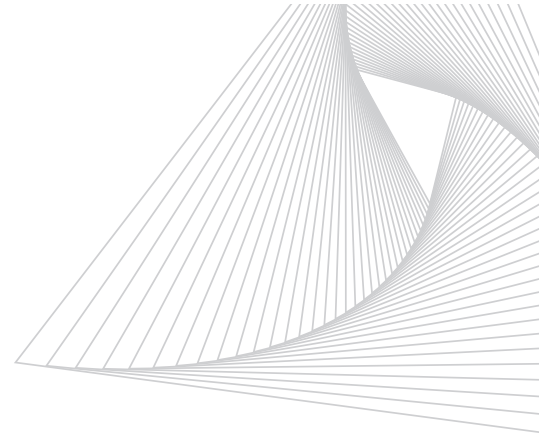
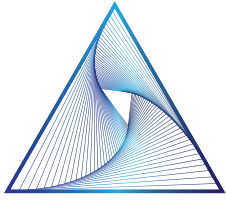
DiscovIR-GC® Fluorofentanyl Isomers

The fluorofentanyl isomers were purchased from Cayman Chemical. A 1mg/mL concentration of each compound was made in MeOH. Each compound was basified with 0.5M NaOH and extracted with CHCl₃.

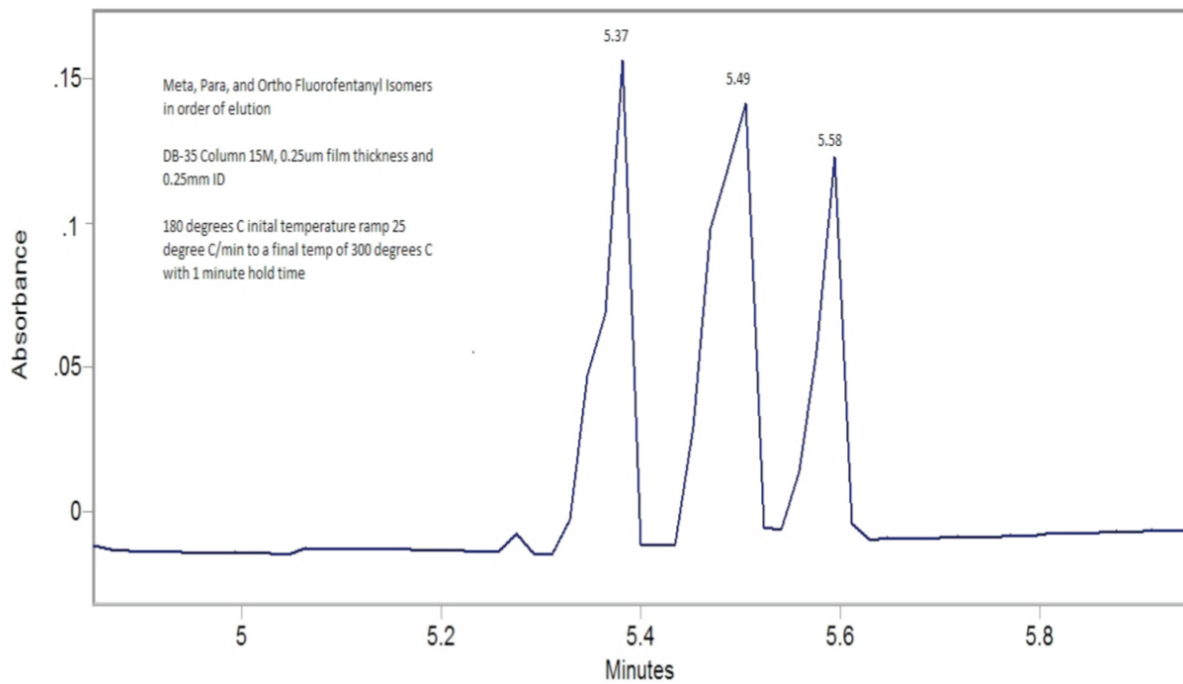
The resulting extract was placed into a normal GC vial with screw cap fitted with a low volume insert. Each isomer was analyzed via a Dani-GC coupled with a DiscovIR® infrared detector. Collection occurs onto a ZnSe disc super-cooled with LN₂. Thus, separation of any mixture is achieved with the GC, with the resulting IR collected in a solid phase. Solid phase collection results in improved resolution when compared to gas phase or light pipe technology.

The compounds were analyzed singularly as well as made into a mixture. Mixture concentration of 0.33mg/ml and split ratio of 5:1 places 67ng of each isomer onto the column. A 15-meter column with 0.25mm ID and 0.25µm film thickness of DB35 was used for analysis of each compound as well as to provide adequate separation of the mixture of the compounds. The infrared spectrum of each compound is depicted below.

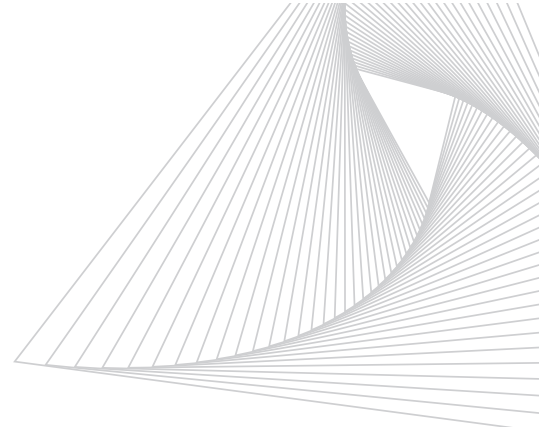




Expanded Fingerprint Region of Fluorofentanyl Isomers



Gas Chromatogram of a Mixture of Fluorofentanyl Isomers by FTIR



DiscovIR-GC® Fluorofentanyl Isomers

Top four reasons to purchase a DiscovIR-GC system:

1. Spectral Resolution
2. Sensitivity – ng level of nonadecane, <100ng level of most controlled substances
3. Compatible with most existing solid phase (ATR) IR libraries
4. Compatible with existing GC-MS columns and methods, no need for customer to change to unknown columns or methods

DiscovIR-GC® Specifications	
Infrared Spectrum Range	4000-700 cm ⁻¹
Resolution	4 cm ⁻¹
Spectrum Type	Transmittance
Re-Usable ZnSe Sample Disc Capacity	40 hours

