

Using MicromATR Vision™ to Identify Drugs of Abuse : Heroin

The US National Institute on Drug Abuse estimates that in 2011, 4.2 million Americans aged 12 or older (or 1.6 percent) had used heroin at least once in their lives. It is estimated that about 23 percent of individuals who use heroin become addicted.¹ It is estimated that between 28.6 and 38 million people globally have used opioids in the past year, a global average of 0.7%. The previous year usage rate in the United States is higher at 4%,² and growing, partially due to heroin's relatively low cost. The abuse of opioids is significant contributor to crime not directly related to narcotics usage.

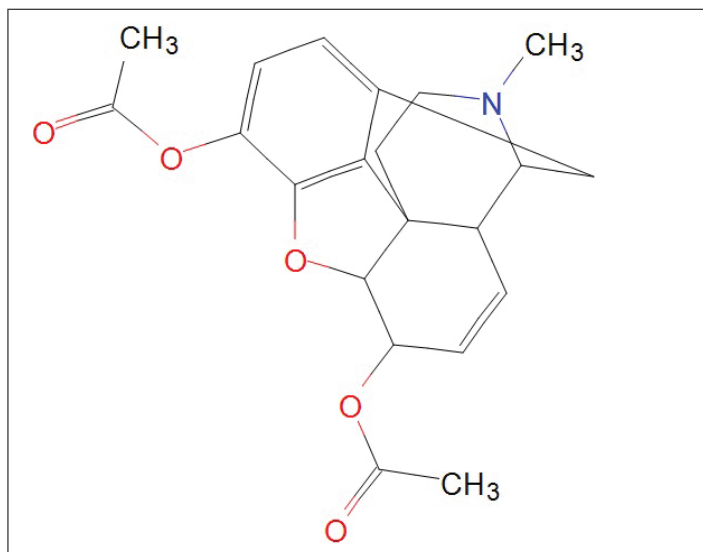


Figure 1: The chemical structure of heroin

Heroin is a diacetyl synthetic derivative of morphine, a naturally occurring alkaloid that is prevalent in the opium poppy, *Papaver Somniferum*. The chemical structure of

heroin is shown in Fig. 1. Street drug heroin most often appears as white or brown powders or a black, tar-like substance. It can be found in several chemical forms, including the free base or hydrochloride, citrate, or tartrate salts. Heroin is most often snorted or injected by the user.

Infrared (IR) spectroscopy is an approved method for the identification of narcotics drugs by forensic scientists.³ The Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) categorizes analytical methods by their discriminating power. IR spectroscopy is a Category A method, in the group of the most discriminating methods. When a Category A method is used, SWGDRUG recommends the use of an additional Category A, B, or C method for confirmation of chemical identity.

An example IR spectroscopy analysis of seized, suspect narcotics is presented in this paper. Numerous small envelopes of white powder were found in the suspect's possession. Fig. 2. Is a photograph of one of the seized envelopes, labelled with the dealer's brand, "O.V.O." A small quantity of the powder was transferred to the



Figure 2: Suspect Drug Package





Figure 3: Video micrograph of suspect powder

diamond internal reflection element (IRE) of the MicromATR Vision attenuated total reflection (ATR) accessory. No other sample preparation was required. The material was observed as a finely divided powder on the MicromATR Vision integrated video microscope, Fig. 3. The contact of the sample with the diamond IRE can be readily observed on eSpot™ video imaging software.

A representative ATR IR spectrum of the suspect heroin is shown in Fig. 4, top. The suspect powder spectrum very closely corresponds to a standard reference spectrum^{4,5} of the hydrochloride salt of heroin, shown in the middle trace of Fig. 4. In the bottom trace, the reference spectrum of heroin free base is shown for comparison.

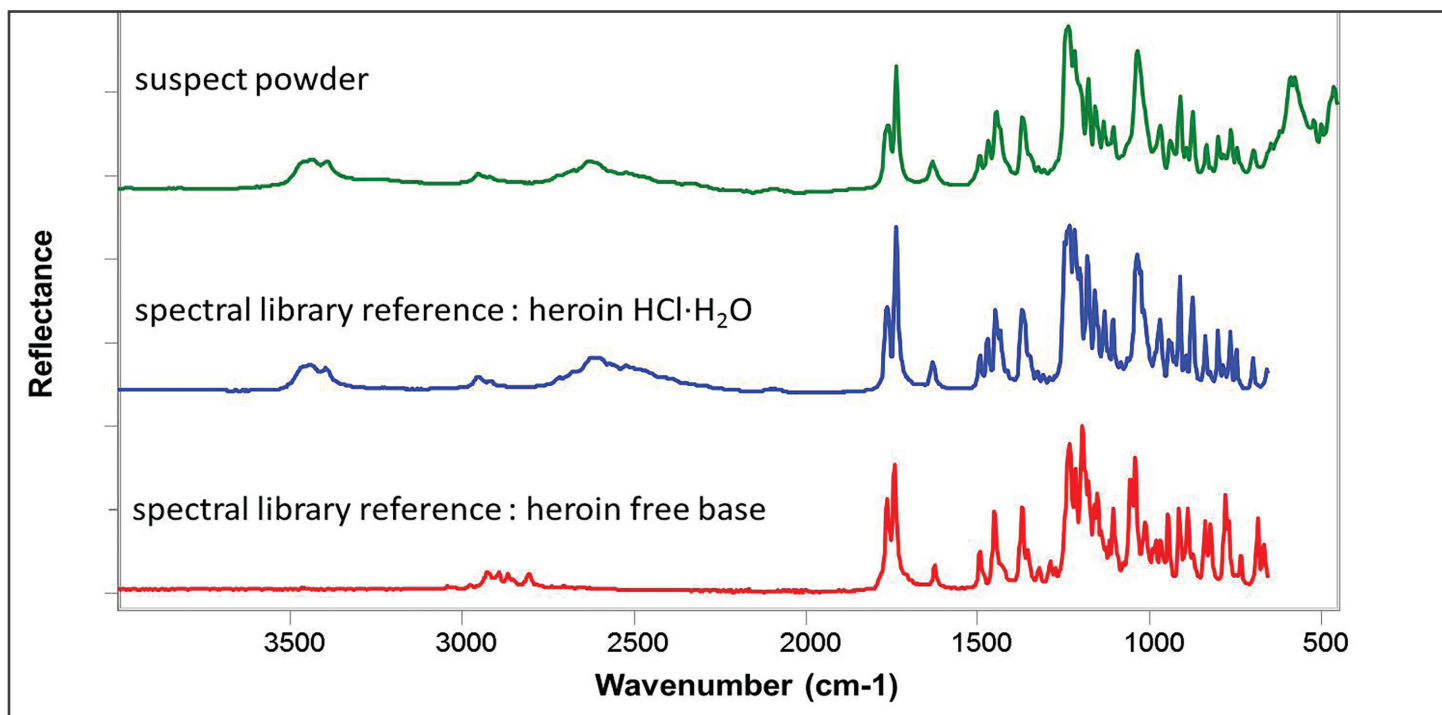


Figure 4: Top : ATR IR spectrum of suspect powder. Middle: ATR IR reference spectrum of heroin HCl salt. Bottom: ATR IR reference spectrum of heroin free base.

Bibliography:

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