



## B50 Presumptive and Confirmatory Identification of 1,2-Triazolo-Benzodiazepines

Thomas A. Brettell, PhD, and Erika L. Asselin, BS\*, Cedar Crest College, Department of Chemical and Physical Sciences, 100 College Drive, Allentown, PA 18104

After attending this presentation, attendees will understand the methods used for presumptive and confirmatory identification of the subclass of benzodiazepines called the 1,2-triazolo-benzodiazepines. Experimental data as well as literature data from commonly used sources will be presented.

This study will impact the forensic community by allowing for a summary of many common analytical techniques and their results to identify these drugs by a number of methods.

Forensic science drug laboratories are reporting a significant increase in the prevalence of benzodiazepines in submissions from drug- facilitated sexual assaults. The pharmacological properties of these drugs, and their availability by prescription, make their potential for abuse high. Their physiological effects on the central nervous system such as drowsiness, confusion, impaired coordination, and amnesia are ideal effects for use in the commission of these crimes. Most of the time, benzodiazepines are presented as bulk evidence in the tablet form or as a powder from a crushed tablet. When tablets are crushed into powder, isolation and conformation of the active ingredient becomes much more difficult since there is no logo to compare as in whole tablets. A series of presumptive and confirmatory tests are then needed for identification.

Benzodiazepines are generally divided into four sub-classes based on their structure. The basis of all the structures is a seven-member diazepine ring with most of the benzodiazepines having a phenyl substituent at the -5 position. The four basic structural groups are: (I) 5- aryl-1,4-benzodiazepines, (II) 4,5- oxazolo-benzodiaepines, (III) 1,2- triazolo- or 1,2-imidazo-benzodiazepines, and (IV) 1,4-thienodizepines. There are a number of other benzodiazepines that do fall into any of the four basic groups and are usually grouped as "odd" benzodiazepines. This study focused on the sub-group of the benzodiazepine class of drugs, 1,2-triazolo-benzodiazepines, which are being often detected in samples from the drug-facilitated sexual assault cases and other crimes.

This study is a comprehensive analysis of this class of drugs using data collected from the literature as well as new data generated in our laboratory. Prior analytical studies of 1,2-triazolo-benzodiazepines deal mainly with their metabolites and toxicology testing. This study will compile the physical properties, chemical properties, and analytical methods for analyzing and identifying these drugs. The drugs of interest were adinazolam, alprazolam, estazolam, midazolam, and triazolam. Adinazolam is used to treat anxiety disorders and is not available in the Unitied States. Alprazolam, commonly known as Xanax®, and estazolam, commonly known as Prosam®, are used to treat anxiety and panic disorders. Midazolam, commonly known as Versed®, is used as a sedative or hypnotic prior to surgical anesthesic. Triazolam, commonly known as Halcion®, is used as a hypnotic to treat insomnia. All of the 1,2-triazolo-benzodiazepines are Schedule IV controlled substances in the United States. Previously unreported data from color reagents commonly used in forensic science drug laboratories will be presented as well as new information from analysis by gas chromatography (GC) and thin-layer chromatography (TLC). Data included in this study has also been collected using ultraviolet (UV) spectrophotometry, high- pressure liquid chromatography (HPLC), infrared spectroscopy, Raman spectroscopy, mass spectrometry (MS), and proton nuclear magnetic resonance spectroscopy (H<sup>1</sup>-NMR).

Benzodiazepine, 1,2-Triazolo-Benzodiazepines, Drug Chemistry