ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889,
2023-5.384 ResearchBib IF: 8.848 / 2024

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-1

FORENSIC CHEMICAL LABORATORY EXAMINATION OF DRUG SUBSTANCES

Navbatova Gulnora Xodjimuratovna

Expert of the forensic chemistry department of the Surkhandarya branch of the Republican Scientific and Practical Center of Forensic Medical Expertise

Abstract: The following methods have been approved by the Scientific Working Group on the Analysis of Seizure Drugs. Scientific working groups are composed of subject matter experts who collaborate to identify best practices and develop consensus standards. Thus, these methods have been proven to be effective in the analysis of unknown (forensic) illegal substances and are therefore the best methods used in the identification of unknown substances. Not all of these methods are readily accessible at the point of care, as some require advanced technical knowledge and/or a laboratory setting. Therefore, any of the following methods may be appropriate in each case. This is because some clinics have easy access to more discriminatory methods through direct funding or industry partnerships, while some clinics have less accurate testing due to lack of funding or support. may rely on methods and equipment.

Key words: Mass spectrometry, drugs, Infrared spectroscopy

Applicability: Mass spectrometry (MS) is the easiest of drug testing methods. Mass spectrometry measures the exact molecular mass of ions, determined by their mass-to-charge ratio (m / z), and is the current gold standard in forensic drug analysis [1]. In general, mass spectrometry requires separation, ionization, and finally detection. The separation can be done by gas chromatography, liquid chromatography or capillary electrophoresis. There are different methods of ionization. Electron ionization, atmospheric pressure chemical ionization, electrospray ionization, matrix-assisted laser desorption ionization, and atmospheric pressure photoionization are the most commonly used in the analysis of illegal substances. Ionization methods can be divided into hard or soft methods.

Fragmentation is useful in analysis because the fragmentation patterns of molecules are known. A spectral database allows a computer to quickly match spectra and identify molecular species. Rigorous techniques are limited to the detection of small molecules. Most illicit drugs are small molecules, with the exception of drugs of a biological nature that are consumed in their crude form. What substances can be detected and how accurately? Almost any substance can be determined using MS in combination with separation (chromatographic) techniques. The sensitivity of current mass spectrometers allows the detection of analytes in concentrations in the attomolar range (10 -18). MS has increased sensitivity compared to other analytical methods because the analyzer, a massive charge filter, reduces background noise (ie, a more accurate readout/analyte fingerprint can be produced). It exhibits excellent specificity due to its characteristic fragmentation patterns, high resolution, and unique filtering capabilities, especially available in tandem or higher order mass spectrometry. MS provides information on molecular mass and isotopic abundance of elements and time-resolved chemical information, allowing for highly accurate identification. The new devices are easier to use and much smaller than the older versions. Communication with computers allows accurate database searches, which facilitates the process of drug identification. The main disadvantage of MS is that the tested sample taken from the delivery is destroyed by the testing process). Only a very small sample size (milligrams) is required. There are also ongoing costs due to the consumables required and some of these consumables are toxic/hazardous. Complex mixtures must be

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889,
2023-5.384 ResearchBib IF: 8.848 / 2024

VOLUME-4, ISSUE-1

separated by chromatographic techniques (gas or liquid chromatography) to accurately identify each component.

Materials and Methods: Infrared (IR) spectroscopy is another highly discriminatory technique based on measuring the amount of IR radiation absorbed or emitted by a sample as a function of wavelength. A spectrum is obtained by passing infrared radiation through a sample and determining the amount of incident radiation (radiation that falls on the molecule rather than passing through it) absorbed at each IR frequency [2]. The interpretation of the spectra allows the identification of molecular functional groups. The IR spectra of a pure molecular compound provide a unique fingerprint that can be easily distinguished from the IR absorption patterns of other compounds, including compounds with the same chemical formula but a different arrangement of atoms in the molecule (known as isomers) [3] .]. The advantage of the IR technique is that almost all compounds have IR active vibrational modes and can therefore be investigated both qualitatively and quantitatively. However, quantitative analysis can present problems with unknown samples and mixtures.

In harm reduction clinics, it may be difficult or impossible to find the spectroscopic expertise needed for forensic analysis and quantification of a substance. Most articles describing relatively simple quantification methods are performed with controlled standards, methodologies, and standards in pharmaceutical research. Although quantification of unknown substances is technically possible, it is truly a case-by-case and painstaking process usually performed by highly skilled technicians and chemists in forensic laboratories. Under these conditions, quantification using this technology is unlikely. Recent advances in IR technology have allowed the development of portable IR devices. What substances can be detected and how accurately? Most compounds can be accurately identified based on their IR spectra when reference spectra are available. Drugs can be identified through a searchable database. Whereas IR cannot distinguish between enantiomers (similar to MS), IR can produce structural information that provides sufficient selectivity to produce the highest discrimination capability. IR can distinguish between diastereomers (eg, pseudoephedrine and ephedrine) and free base/acid and salt forms. The free base/acid and salt forms indicate differences in physical properties that may alter the application of the substance. A free base is usually more volatile and usually has a lower boiling point, allowing the substance to smoke. The salt form is usually more stable, crystalline, and soluble in water, allowing it to be swallowed, inhaled (breathed through the nose), or injected. A common example is crack cocaine (free base) and cocaine (salt); they are actually the same drug (cocaine) and the actual effect on the body is the same, but due to the different absorption and dosage depending on the method of use, a different spectrum of reactions can be observed for each drug. . One of the important advantages of IR spectroscopy is that it does not destroy the provided sample - important when working with drugs and the people who use them. It also requires very small sample sizes in the milligram or less range. In addition, samples can be studied in almost any physical state (primarily solid or liquid). Interference is very common and causes difficulties in identification.

Conclusion: There are many validated techniques for the identification and/or quantification of drugs. Each of these methods has different pros and cons to consider. With this in mind, this review is not meant to be an in-depth scientific analysis of each of these methods, but rather a guide to practical considerations of use and recommendations for harm reduction at the point of care. Manufacturers have found these technologies to be very easy to use and

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889,
2023-5.384 ResearchBib IF: 8.848 / 2024

effective in identifying unknown analytes. The main disadvantages of this technology are that quantification may require advanced expertise and these units are still quite expensive. Quality use of these units usually requires very little technical experience or training.

List of literature

1. Rendle DF. X-ray Diffraction in Forensic Medicine. Rigaku J. 2003; 19 (2): 11–22.

2. Trzybiński D, Niedziałkowski P, Ossowski T, Trynda A, Sikorski A. Single crystal X-ray analysis of designer drugs: metaphedrone and pentedrone hydrochlorides. Forensic Int. 2013; 232 (1):e28–e32. doi: 10.1016/j.forsciint.2013.07.012. [PubMed] [CrossRef] [Google Scholar]

3. Phadnis NV, Cavatur RK, Suryanarayanan R. Determination of drugs in pharmaceutical dosage forms using X-ray powder diffractometry. J Pharm Biomed Anal. 1997; 15(7):929–943. doi: 10.1016/S0731-7085(96)01939-5. [PubMed] [CrossRef] [Google Scholar]

4. Elie MP, Elie LE. Microcrystalline tests in forensic drug analysis. In: Meyers RA, editor. Encyclopedia of Analytical Chemistry. Hoboken: Wiley; 2009. pp. 471–481. [Google Scholar]5. Baymanovich, X. B., Xayrullo O'g'li, A. A., Hamidullo O'g'li, A. J., & Yo'lchiyevich, N. S. (2022). CAUSES AND CAUSES OF METAPLASIA OF THE CYLINDRICAL EPITHELIUM IN SMOKERS. European International Journal of Multidisciplinary Research and Management Studies, 2(04), 300-303.

6. Boymanovich, X. B., Shodiqul o'g'li, X. I., Yo‘lchiyevich, N. S., & Komilovich, M. A. (2022). PARODONTOSIS IN THE ELDERLY PERSONS DUE TO DISORDERS.

7.Boymanovich, X. B., & Yo‘lchiyevich, N. S. (2022). EFFECT AND IMPORTANCE OF MICROELEMENTS AND CARBOHYDRATES IN PERIODONTAL DISEASE.

8.Norqobilov, SYL (2022). BOLALARDA QORINCHALAR ARO TO 'SIQ DEFEKTLARINING D-EXOKG IMKONIYATLARI. XALQARO KONFERENTLARDA (1-jild, 21-son, 364-368-betlar).