14.1 Objectives

14.1.1 To familiarize the trainee with the history, theory and practical aspects of marijuana.

14.1.2 To make the trainee proficient in the analysis and identification of marijuana and marijuana products.

14.2 Modes of Instruction

14.2.1 Self-directed study through reading assignments

14.2.2 Presentations and demonstrations

14.2.3 Practical exercises

14.3 References


14.3.2 *Basic Training Program for Forensic Chemists*. U.S. Department of Justice, Drug Enforcement Administration, Office of Science and Technology; pp 3-59 – 3-75.


14.3.4 Chemistry Unit Methods Manual, Cannabis Methodology


14.3.8 Hanson, G. R.; Venturelli, P. J.; Fleckenstein, A. E. *Drugs and Society*, 7th ed; Jones and Bartlett Publishers: Sandbury, MA, 2002; pp 362-390.


14.3.10 Lowry, W.T. On the Legality of Cannabis: The Responsibility of the Expert
14.3.11 Marijuana Chemistry


### 14.4 Assignments

14.4.1 Completion of required reading assignments (14.3.6, 14.3.2, 14.3.5, 14.3.8, 14.3.7, 14.3.3, 14.3.12, 14.3.13, 14.3.9, 14.3.1, 14.3.10, 14.3.4)

14.4.2 Study questions

14.4.3 Practical exercises

### 14.5 Study Questions

14.5.1 Describe the appearance of a mature marijuana plant.

14.5.2 What is the derivation of the word “marijuana”?

14.5.3 What are Ganja and Bhang?

14.5.4 What is sinsemilla and how is it grown?

14.5.5 What is hemp?

14.5.6 What is the taxonomic name for marijuana including family, genus and species?

14.5.7 What parts of the plant contain Tetrahydrocannabinol (THC)?

14.5.8 Define “agronomic variety” and differentiate between Cannabis sativa, Cannabis ruderalis, Cannabis indica and Cannibis americana.

14.5.9 Define “dioecious” and relate it to Cannabis.

14.5.10 What is the function of the resin found on the plant?

14.5.11 Describe the differences between hashish and hash oil including preparation, schedule, and analysis.

14.5.12 How is hash analyzed?
14.5.13 What is the average percentage of THC found in marijuana?

14.5.14 What is the pharmacological action of marijuana when smoked?

14.5.15 What is Dronabinol?

14.5.16 What factors influence the relative amounts of cannabinoids present in marijuana?

14.5.17 Are the cannabinoids acidic or basic? Polar or non-polar?

14.5.18 Chemically, can any of the other cannabinoids break down or be converted to THC? Does THC break down?

14.5.19 What information is gained from the macroscopic examination?

14.5.20 What information can be obtained from the microscopic examination?

14.5.21 What power of magnification is needed to view cystolithic hairs and glandular hairs?

14.5.22 Describe cystolithic, glandular, and elongated hairs including characteristics and locations found on marijuana.

14.5.23 Discuss any other plants which have cystoliths including how to differentiate them from those found on marijuana such as:

- *Humulus japonica*
- *Humulus lupulus*
- *Lantana camara*

14.5.24 What substances give false positive results with the Rapid Modified Duquenois-Levine (D-L) test?

14.5.25 What is the D-L reagent made up of?

14.5.26 What causes the purple color obtained with the Duqueois reagent and marijuana? What determines whether this product is soluble in the chloroform? Describe/draw a probable reaction mechanism.

- Describe the following tests including their uses and positive results:

  - meta-Duquenois test
  - Beam test
  - Ghamravy reaction
  - Duquenois test
  - Duquenois-Negm test
CH Cannabis

- Modified Duquenois test
- D-L test
- Rapid Modified Duquenois-Levine test

14.5.27 How would the analysis of a young, old or moldy marijuana plant differ from that of a more mature plant?

14.5.28 How specific is the Rapid Modified Duquenois-Levine test for marijuana?

14.5.29 What is the detection limit of the Rapid Modified Duquenois-Levine test?

14.5.30 Describe the specificity of the combination of the three tests normally incorporated into the analytical scheme for marijuana analysis (i.e. Macroscopic ID, microscopic ID, and D-L).

14.5.31 What other tests are available for the analysis of marijuana?

14.5.32 Describe the quality assurance procedures for the D-L reagents and the microscopes.

14.5.33 Define “residue” as it relates to marijuana analysis. Describe an appropriate procedure for analyzing a smoking device containing suspected marijuana residue.

14.5.34 Describe the use of field test kits for marijuana.

14.5.35 Explain as to a jury how the analysis of marijuana is performed.

14.5.36 What is the definition of Cannabis in the Florida Statutes? How is it scheduled?

14.5.37 What are the marijuana trafficking limits in Florida? Are the trafficking weights based on a wet or dry sample?

14.6 Practical Exercises

14.7 Examine each of the following under the microscope and describe in detail:
- Dry marijuana
- Hashish
- Marijuana seeds, if available
- Marijuana stems, if available
- Oregano
- Parsley
- Sage
- Salvia divinorum
- Sinsemilla, if available
- Tobacco
14.7.1 Perform Duquenois-Levine tests on the following and describe results:

- Cannabinoid standard Coffee
- Hashish
- Hops, if available
- Marijuana
- Oregano
- Parsley
- Patchouli oil, if available
- *Salvia divinorum*
- Tobacco

14.7.2 Obtain actual marijuana cases from the TC. Analyze these following the guidelines set forth in the Cannabis Methodology SOP.

14.7.3 Obtain a young marijuana sample from the TC. Perform the Duquenois test using a petroleum ether extraction. Note any difficulties or differences between the analysis of young plants and more mature plants.

14.7.4 Analyze a sample of hash using the lab analytical scheme. When performing GC/MS note the retention times and major mass spectral differences between:

- Cannabidiol
- Cannabinol
- THC

### 14.8 Modes of Evaluation

14.8.1 Written and/or oral examination