Designation: ~~E2125 – 11~~ E2125 – 19

Standard ~~Guide~~Practice for Microcrystal Testing in Forensic Analysis ~~of~~for Phencyclidine and Its Analogues[1]

This standard is issued under the fixed designation E2125; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Microcrystal tests are primarily chemical-precipitation tests in which a light microscope is used to observe and distinguish the different types of crystals formed. These tests require skill and expertise on the part of the analyst that can be adequately gained only through appropriate training and experience in their use. These tests should not be attempted by those who are unfamiliar with them for use in the analysis of phencyclidine and its analogues.

1. Scope

1.1 This ~~guide~~practice describes ~~some standard~~ procedures applicable to the analysis of phencyclidine and its analogues using microcrystal tests (**1-8**).[2]

1.2 These procedures are applicable to ~~phencyclidme~~phencyclidine and its analogues which are present in solid ~~dosage~~ form or in a liquid form. They are not typically applicable to the analysis of phencyclidine and its analogues in biological samples.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *These procedures could generate observations indicating a positive test for phencyclidine and its analogues which could be incorporated into the analytical scheme as defined by the laboratory.*

1.5 *This standard cannot replace knowledge, ~~skill~~,skills, or ~~ability~~abilities acquired through appropriate education, training, and experience (see Practice E2326) and ~~should~~ is to be used in conjunction with sound professional ~~judgment.~~judgment by individuals with such discipline-specific knowledge, skills, and abilities.*

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E1459 Guide for Physical Evidence Labeling and Related Documentation
E1492 Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory
E1732 Terminology Relating to Forensic Science
E2326 Practice for Education and Training of Seized-Drug Analysts
E2329 Practice for Identification of Seized Drugs
E2548 Guide for Sampling Seized Drugs for Qualitative and Quantitative Analysis
E2764 Practice for Uncertainty Assessment in the Context of Seized-Drug Analysis

[1] This ~~guide~~practice is under the jurisdiction of ASTM Committee E30 on Forensic Sciences and is the direct responsibility of Subcommittee E30.01 on Criminalistics.
Current edition approved ~~March 1, 2011~~Nov. 1, 2019. Published ~~April 2011~~December 2019. Originally approved in 2001. Last previous edition approved in ~~2007~~2011 as ~~E2125 – 07.~~E2125 – 11. DOI: ~~10.1520/E2125-11.~~10.1520/E2125-19.

[2] The boldface numbers in parentheses refer to a list of references at the end of this standard.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the ~~standard's~~standard's Document Summary page on the ASTM website.

3. Terminology

3.1 ~~For definitions of terms used in this standard, refer to Terminology E1732.~~*Definitions:*

3.1.1 For definitions of terms used in this standard, refer to Terminology E1732.

3.2 ~~*Definitions:*~~*Definitions of Terms Specific to This Standard:*

3.2.1 ~~*aggregation—*~~*aggregation, n—*the collecting of units or parts into a mass or whole.

3.2.2 ~~*birefringence—*~~*birefringence, n—*property of some ~~crystals~~ crystals, those having more than one refractive index; this will result in interference colors which are viewed through a polarized light microscope.

3.2.2.1 *birefringent, adj—*material exhibiting birefringence.

3.2.3 ~~*grains—*~~*grains, n—*thick tablets having nearly equal width, breadth, and thickness.

3.2.4 ~~*habit—*~~*habit, n—*the external morphology of the crystal.

3.2.5 ~~*microdrop—*~~*microdrop, n—*a small drop of liquid that would fit on the end of a standard size, flattened toothpick; the approximate volume of this drop would be 10 to 25 µL.

3.2.6 ~~*nails—*~~*nails, n—*a skeleton of some kinds of triangles, elongated, usually pointed with a short head usually thicker or broader.

3.2.7 *needles ~~(acicular)—~~(acicular), n—*long, thin crystals with pointed ends.

3.2.8 ~~*nuggets—*~~*nuggets, n—*irregularly formed grains without sharp faces or edges.

3.2.9 ~~*pliers—*~~*pliers, n—*crystals resembling pliers, generally X-shaped.

3.2.10 *razor ~~blades—~~blades, n—*thin oblong crystals with length about twice the width, resembling a safety razor blade.

3.2.11 ~~*sheaves—*~~*sheaves, n—*elongated crystals form two opposite fans from the same joining point.

3.2.12 *skeletal ~~crystal—~~crystal, n—*a crystal in which all of the spaces in the crystal lattice are not occupied.

3.2.13 ~~*spindles—*~~*spindles, n—*shorter than course needles, but more substantial cross-section.

4. Summary of the Technique

4.1 A small ~~sample~~amount of ~~the~~test material containing the suspected phencyclidine or its analogues is dissolved in a dilute acid and the appropriate precipitating reagent is added. The crystals that are formed are observed and distinguished utilizing a light microscope.

5. Significance and Use

5.1 ~~The~~This technique ~~produces~~involves a chemical-precipitation reaction between the phencyclidine or its analogues and the precipitating reagent. The habit and the aggregation of the crystals formed ~~may~~could be used to distinguish phencyclidine or its analogues from other drugs.

5.2 ~~The~~This technique can be utilized on phencyclidine or its analogues present in either the salt or free base form.

5.3 ~~The~~This technique does not distinguish between salt and free base forms.

6. Interferences

6.1 Diluents/adulterants present in combination with phencyclidine or its analogues in the sample to be tested ~~may result in~~ could inhibit crystal formation or could generate crystals that are distorted or otherwise rendered unidentifiable. Diluting the sample could reduce the interference. The higher the concentration of the adulterant, the more difficult it will be to observe characteristic crystals. In these instances, it will be necessary to separate the phencyclidine or its analogues from the diluents/adulterants or to use other testing methods to analyze for phencyclidine or its analogues.

7. Apparatus

7.1 *Standard Light Microscope,* ~~Standard light microscope~~ capable of varying magnifications including 100× is needed for viewing the crystals. ~~Polarized~~ This is the minimum equipment required. A polarized light attachment is not essential, but is desirable because crystals resulting from the precipitation reaction are birefringent.

7.1.1 *Polarized Light Microscope (PLM),* capable of varying magnifications from 40× to 400×. The following are typical accessories on a PLM and could be useful, but are not required, to conduct microcrystalline testing: specialized rotating stage (360°) and compensator (retardation plate). Cross-polarizers are verified by observing a black background when the polarizer and analyzer are in the optical path at 90 degrees to one another (for example, polarizer is in the east-west direction and the analyzer is in the north-south direction).

7.1.2 The best practice for documenting the crystal formation results is to take a digital photograph. It is advised that the minimum equipment required also has the capability of digital photography.