

# **OSAC 2021-N-0026**

# **Standard for Education and Training of Forensic Toxicology Personnel**

*Forensic Toxicology Subcommittee  
Seized Drugs and Toxicology SAC  
Organization of Scientific Area Committees (OSAC) for Forensic Science*



## **Draft OSAC Proposed Standard**

# **OSAC 2021-N-0026 Standard for Education and Training of Forensic Toxicology Personnel**

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Version: 1.0  
July 2021

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### **Disclaimer:**

This OSAC Proposed Standard was written by the [insert subcommittee or other unit name] of the Organization of Scientific Area Committees (OSAC) for Forensic Science following a process that includes an [open comment period](#). This Proposed Standard will be submitted to a standards developing organization and is subject to change.

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# 1 Foreword

2 This document was developed to provide the minimum requirements for educational  
3 qualifications, training, competency, experience, continuing education, and certification of  
4 laboratory personnel performing or overseeing forensic toxicology analysis and breath alcohol  
5 instrument calibration. This standard was developed by the Forensic Toxicology Subcommittee  
6 of the Organizational Scientific Area Committees.

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15 **1 Scope**

16 This document provides minimum requirements for educational qualifications, training,  
17 competency, experience, continuing education, and certification of laboratory personnel  
18 performing or overseeing forensic toxicology analysis and breath alcohol instrument  
19 calibration. This applies to the following sub-disciplines: postmortem toxicology, human  
20 performance toxicology (e.g., drug-facilitated crimes and driving-under-the-influence of  
21 alcohol or drugs) and other forensic testing (e.g., court-ordered toxicology, general  
22 forensic toxicology). Laboratory personnel that exclusively perform administrative or non-  
23 technical duties are outside the scope of this document. This document does not  
24 address proficiency testing or requirements of specific professional certification and  
25 licensing bodies.

26 **2 Normative References**

27 N/A

28 **3 Terms and Definitions**

29 For purposes of this document, the following definitions and acronyms apply.

30 Analyst - An individual (however named) who conducts, directs or reviews the analysis of  
31 forensic toxicology samples, evaluates data<sup>1</sup> and reaches conclusions;<sup>2</sup> may sign a report for  
32 court or investigative purposes as a consequence of such examinations. This person does not  
33 provide interpretive opinions related to the results of toxicological tests

34 1 "Evaluates data" refers to the evaluation of scientific data to meet reporting criteria.

35 2 "Reach conclusions" refers to the decision to report the substance as detected and  
36 quantify, if applicable, or not detected and submit those findings for review.

37 Breath Alcohol Program – An organizational structure including policies, procedures,  
38 responsibilities and resources necessary for implementing core breath alcohol activities. The  
39 program includes, but may not be limited to, requirements or specifications for reference  
40 materials, training of operators, maintenance and calibration of instrumentation, the evidential  
41 breath alcohol test sequence, and record retention.

42 Certification – The recognition by an independent certifying body that an individual has acquired  
43 and demonstrated specialized knowledge, skills, and abilities.

44 Competency – The demonstration of technical skills and knowledge necessary to perform  
45 forensic analysis successfully.

46 Continuing Education - Ongoing training whereby personnel remain current, or advance to a  
47 higher level of expertise, specialization, or responsibility.

- 48 Course – An officially recognized program of instruction that is taught through an accredited  
49 college or university program in which the student’s successful completion is documented by an  
50 official record of the institution.
- 51 Credential – A formal recognition of a professional’s knowledge, skills, and abilities (e.g.,  
52 diploma, license).
- 53 Education – Formal coursework at an accredited college or university.
- 54 Experience – Direct observation of and participation in the practice of a discipline.
- 55 Laboratory Personnel – Individuals who perform analytical or laboratory-based functions of a  
56 technical nature. This excludes administrative or non-technical support staff.
- 57 Methodology – The analytical processes and procedures used to support forensic toxicology  
58 (e.g., chromatography, spectroscopy or immunoassay).
- 59 Professional Development – The education and training that contributes to career advancement  
60 and succession planning (e.g., administration, leadership, management and fiscal  
61 responsibility).
- 62 Qualifications – The combined education, training, and experience of an individual.
- 63 Reference Material – A material or substance, sufficiently homogenous, stable, and of known  
64 concentration with respect to one or more specified properties, which has established to be fit  
65 for its intended use in a measurement process.
- 66 Technician – An individual (however named) who performs basic analytical functions but does  
67 not evaluate data, reach conclusions or sign a report for court or investigative purposes.
- 68 Toxicologist – An individual (however named) who provides factual information and/or  
69 interpretive opinions related to the results of toxicological tests for court or investigative  
70 purposes. May be further defined by role [e.g., Toxicologist (General), Toxicologist (Alcohol),  
71 Toxicologist (Breath Alcohol)] .
- 72 Toxicology Supervisor – An individual (however named) who is responsible for the technical and  
73 administrative oversight of the toxicology laboratory.
- 74 Training – The formal, structured process of teaching and assessment, through which personnel  
75 reach a level of scientific knowledge and expertise required to perform specific tasks.

#### 76 **4. Minimum requirements for Personnel**

##### 77 4.1 Educational Qualifications

78 One indication of professional standing is educational qualifications. Diplomas and formal  
79 academic transcripts are required as proof of academic credentials.

80 Minimum standards for education are summarized in Annex A for each category of employment.  
81 Core scientific topics are listed in Annex B.

82 4.1.1 Technician: Associates degree in Natural Science, Applied Science, or Technology from  
83 an accredited institution.

84 4.1.2 Analyst: Bachelor's degree in Natural Science (Preference in Chemistry, Toxicology,  
85 Biochemistry, Pharmacology, or Biology) or Applied Science (Forensic Science, Medical  
86 Sciences) from an accredited institution; completion of general and organic chemistry with  
87 associated laboratory classes.

88 4.1.3 Toxicologist: Bachelor's degree in Natural Science (Preference in Chemistry, Toxicology,  
89 Biochemistry, Pharmacology, or Biology) or Applied Science (Forensic Science, Medical  
90 Sciences) from an accredited institution; completion of general and organic chemistry with  
91 associated laboratory classes; at least one (1) college-level course from Column A and one (1)  
92 from Column B located in Appendix B. Supplemental trainings (40-hour course or time  
93 equivalent to 3 credit courses) can be substituted for interpretive coursework.

94 4.1.4 Toxicology Supervisor: Bachelor's degree in Natural Science (Preference in Chemistry,  
95 Toxicology, Biochemistry, Pharmacology, or Biology) or Applied Science (Forensic Science,  
96 Medical Sciences) from an accredited institution; completion of general and organic chemistry  
97 with associated laboratory classes; at least one (1) college-level course from Column A and one  
98 (1) from Column B located in Annex B. Supplemental trainings (40-hour course or time  
99 equivalent to 3 credit courses) can be substituted for interpretive coursework.

## 100 4.2 Training, Experience, & Competency

101 Personnel require training to build competency. The length of the initial training provided to the  
102 individual depends upon the scope of work to be performed, as well as the qualifications of the  
103 individual. The depth of training is appropriate to the job function(s). Regardless of  
104 qualifications, all technical personnel are provided training to ensure competency in all assigned  
105 areas detailed in the training elements section. Prior to assuming independent responsibility,  
106 personnel must successfully demonstrate competency in their job function(s).

107 Minimum standards for training and experience are summarized in Annex A for each category of  
108 employment.

### 109 4.2.1 Training and Experience

110 The source of training can be internal and/or external to the forensic laboratory. Training  
111 partnerships are valuable because they provide broad perspectives and facilitate consistency of  
112 professional practice. Sources include government agencies, academic institutions, training  
113 academies or institutions, private sector organizations, manufacturers, professional societies,  
114 and mentors.

115 4.2.1.1 Training Program: The laboratory shall have a documented training program which must  
 116 address both theoretical and practical knowledge, skills and abilities necessary to perform job  
 117 functions. Documentation of completion of the elements of the training program are retained.  
 118 The relevance and content of the training program shall be evaluated by the organization  
 119 annually.

120 4.2.1.1.1 Training Elements: Specific training elements shall include the following areas where  
 121 applicable for the specific job duties as summarized below:

122

<b>Element</b>	<b>Suggested Training Content</b>
Administrative and Laboratory Policies	Accreditation; Document and record control; Method validation; Quality management; Safety and security (Biological, chemical, and physical hazards; Security); Standard operating procedures
Alcohol toxicology	Interpretation (Mathematical calculations); Pharmacodynamics; Pharmacokinetics; Physiology (Blood to breath ratio)
Analytical Methodology	Aliquoting; Isolation techniques; Qualitative analysis; Quantitative analysis; Theory
Calibrating device	Dry gas cylinder (Barometric pressure; Theory; Uses/limitations; Wet/dry offset); Wet bath simulator (Partition ratio; Temperature; Theory; Uses/limitations)
Communication	Report writing; Verbal and nonverbal skills (Non-technical; Technical)
Evidence	Chain of custody; Collection; Concepts; Preservation; Retention
Human Factors	Factors such as bias that may affect analytical results and interpretations
Instructional development	Adult learning principles; Knowledge and/or development of curriculum; Use of assigned multi-media equipment
Instrumentation	History; Limitations; Maintenance and troubleshooting; Operation; Technical functions (adjustment/calibration); Testing functions; Theory
Legal aspects	Applicable federal, state, or local laws and rules (regulations); Case law; Terminology; Testimony (Courtroom procedure; Deposition and courtroom)
Quality control	Reference Material (Uses/Limitations; Preparation; Traceability); Theory
Standards of conduct	Ethics; Professionalism
Statistical analysis	Calculations; Control charts and/or trending; Measurement assurance; Measurement uncertainty;



	Terminology
Toxicology	Interpretation; Pharmacodynamics; Pharmacokinetics; Physiology

123 4.2.1.2 Experience

124 Experience is a component of building competency prior to performing the job function.

125 Experience includes both practical and theoretical aspects of the discipline.

126 Minimum standards for training and experience are summarized in Annex A for each category of  
127 employment.

128 4.2.2 Competency

129 4.2.2.1 Initial Competency: Regardless of academic qualifications or past work  
130 experience, all individuals shall satisfactorily complete a competency assessment prior  
131 to assuming independent responsibilities. The format for initial competency  
132 assessment(s) are specified in the training program (see Section 4.2.1). The program  
133 may use different formats such as oral, written, and video as a means of ensuring and  
134 documenting competency. Verification document(s) demonstrating that personnel  
135 achieved the required competence must be maintained by the laboratory.

136 4.2.2.2 Ongoing Competency: The laboratory shall monitor competency of personnel on  
137 a continuous basis, documented annually. Competency shall be assessed at the  
138 appropriate level commensurate with job duties. The laboratory shall establish a  
139 predetermined, acceptable level of performance. The laboratory shall establish  
140 remediation and corrective action plans when expected outcome(s) are not achieved.

141 4.3 Certification

142 Certification provides the public and the judicial system a means of identifying those  
143 practitioners who successfully demonstrate competency. It provides an additional means of  
144 verifying ethical standards and is an external review of ongoing competency.

145 Standards for Certification Bodies include: A formal application process, verification of minimum  
146 educational qualifications, review of official transcript(s) from an accredited college or university  
147 sent directly to the certification body, review professional references from practitioners with  
148 knowledge of the applicant's experience in forensic toxicology submitted directly to the  
149 certification body, verification of required training and experience, statement of adherence to a  
150 professional code of conduct, and perform a proctored written examination appropriate to the  
151 level of certification. Certification bodies shall predefine criteria for successful completion, have  
152 a periodic requalification process and a process to reapply for certification in the event an  
153 individual does not qualify.

154 Minimum standards for training and experience are summarized in Annex A for each category of  
155 employment.

#### 156 4.4 Continuing Education

157 All laboratory personnel have an ongoing obligation to remain current within the discipline  
158 through continuing education and professional development activities appropriate for the scope  
159 of job functions. While casework is the primary focus, individuals should also strive to advance  
160 the profession. This may be accomplished through professional involvement such as research,  
161 mentoring, teaching, participating in professional organizations, scientific publications and other  
162 professional activities. Recognition of any continuing education or professional development  
163 requires proper documentation. The laboratory is responsible for maintaining permanent, official  
164 training records. Assignment of CE credit for various activities is the purview of the respective  
165 Certification Bodies.

166 The laboratory and/or personnel shall maintain documentation of attendance through a  
167 mechanism such as certificates of completion, duration of training, program agenda/syllabi,  
168 travel documentation (if applicable). The activities must be independently verifiable and may  
169 include attending seminars, conferences, coursework, professional meetings or documented  
170 training sessions/classes in relevant subject areas. Continuing education activities also include  
171 an individual's contribution to the field of forensic toxicology. Examples include presentations,  
172 publications in peer-reviewed literature, or authorship of books or chapters. Continuing  
173 education and professional development is a combination of internal and external activities. The  
174 sources of external continuing education and professional development are diverse (e.g.,  
175 government agencies, academic institutions, training academies or institutions, private sector  
176 organizations, professional societies, vendors). Continuing education and professional  
177 development can be delivered in-person or online. Continuing education and professional  
178 development from organizations that provide recognized continuing education credits are  
179 preferred.

180 It is the responsibility of the laboratory to ensure that the following resources shall be available  
181 and accessible to laboratory personnel: Reference texts in key subject areas (e.g., analytical  
182 chemistry, toxicology, pharmacology), reference literature containing physical, chemical,  
183 pharmaceutical and/or analytical data, and relevant periodicals and peer-reviewed journals.  
184 Laboratory management has an ongoing responsibility to provide support and opportunities for  
185 continuing education and professional development.

186 Minimum standards for training and experience are summarized in Annex A for each category of  
187 employment.

# ANNEX A

	<b>Technician*</b> <b>(Breath Alcohol, Blood Alcohol, and Drug Toxicology)</b>	<b>Analyst*</b> <b>(Breath Alcohol, Blood Alcohol, and Drug Toxicology)</b>	<b>Toxicologist*</b> <b>(Breath Alcohol, Blood Alcohol, and Drug Toxicology)</b>	<b>Toxicology Supervisor*</b>
<b>Scope*</b>	Performs basic analytical functions but does not evaluate data, reach conclusions or sign a report for court or investigative purposes. May also perform functions related to instrumentation including maintenance, verification, adjustment, calibration, and other activities.	Conducts, directs or reviews the analysis of forensic toxicology samples, evaluates data and reaches conclusions; may sign a report for court/investigative purposes based on examinations. The analyst may testify but does not provide interpretive opinions. Duties and responsibilities may also include those of a Technician.	Provides interpretive opinions related to the results of toxicological tests for court or investigative purposes. Duties and responsibilities may also include those of an Analyst.	Responsible for the technical and administrative oversight of the toxicology or breath laboratory. Duties and responsibilities may also include those of a Toxicologist.
<b>Education</b>	Associates degree in Natural Science, Applied Science, or Technology	Bachelor's degree in Natural Science (Preference in Chemistry, Toxicology, Biochemistry, Pharmacology or Biology) or Applied Science (Forensic Science, Medical Sciences)	Bachelor's degree in Natural Science (Preference in Chemistry, Toxicology, Biochemistry, Pharmacology or Biology) or Applied Science (Forensic Science, Medical Sciences)	Bachelor's degree in Natural Science (Preference in Chemistry, Toxicology, Biochemistry, Pharmacology or Biology) or Applied Science (Forensic Science, Medical Sciences)
<b>Required Courses</b>	Chemistry (6 semester h)	General & organic chemistry (16 semester h).	General & organic chemistry (16 semester h), 1 analytical and 1 interpretive course.	General & organic chemistry (16 semester h), 1 analytical and 1 interpretive course.
<b>Supplemental trainings</b>	N/A	N/A	Supplemental training (40-hour course) can be substituted for interpretive coursework.	Supplemental training (40-hour course) can be substituted for interpretive coursework.
<b>Training and Experience</b>	Completion of formal, structured training program appropriate to job function	Completion of formal, structured training program appropriate to job function	Completion of formal, structured training program appropriate to job function	Completion of formal, structured training program and 5 years experience
<b>Certification</b>	Not required	Preferred	Preferred	Required

<b>Continuing Education</b>	4 hours relevant to job function with 1 hour from external sources.	Sufficient to maintain certification or 8 hours relevant to forensic toxicology with 2 hour from external sources.	Sufficient to maintain certification or 16 hours relevant to forensic toxicology with 4 hour from external sources.	Sufficient to maintain certification
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190 \*An individual (however named) who fulfills scope.

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## ANNEX B

Column A – Analytical science courses	Column B – Interpretive science courses
Analytical chemistry	Biochemistry
Chemical informatics	Drug metabolism
Instrumental analysis	Forensic toxicology
Mass spectrometry	Medicinal chemistry
Quantitative analysis	Pharmacology
Separation science	Physiology
Spectroscopic analysis	Toxicology
	Supplemental training (40-hour course)

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### Bibliography

194 1. Scientific Working Group for Forensic Toxicology (SWGTOX) Standard for  
195 Laboratory Personnel

196 2. Scientific Working Group for Forensic Toxicology (SWGTOX) Standard for  
197 Breath Alcohol Personnel