

## Chemist

CS-1320-13

### INTRODUCTION

This position is located in the in the Department of Forensic Sciences (DFS), Forensic Science Laboratory Division. The mission of DFS is to provide high-quality, timely, accurate, and reliable forensic science services using best practices and best available technology, focusing on unbiased science and transparency to enhance public safety and health.

The incumbent of this position serves as the senior expert leading the analysis and interpretation of the complex composition of molecules, physical and chemical properties, molecular structure and chemical reactions the prediction of transformation they undergo, and the amount of matter and energy included in these analytical transformations.

### MAJOR DUTIES AND RESPONSIBILITIES

Performs and supervises a full range of chemical tests of known and unknown and samples in a laboratory which includes, but not limited to analyses of controlled substances, toxic material and other substances of importance to the Drug Laboratory Program.

Develops, adapts and implements new testing and analytical methodologies in a laboratory.

Supports quality control and quality assurance for the drug chemistry laboratory, which involves participation in a Proficiency Testing Program.

Develops, improves, and customizes products, equipment, formulas, processes, and analytical methods and compiles and analyzes test information to determine the process or whether the equipment is operating efficiently and to diagnose malfunctions or inconsistencies.

Directs, coordinates, and advises personnel in test procedures for analyzing components and physical properties of materials. Confers with other scientists and chemists to conduct analyses of research projects, interpret test results, or develop nonstandard tests.

Writes technical papers and detailed monthly reports and enters relevant data into scientific computer programs; prepares standards and specifications for procedures, products, and tests and analyzes and interprets the results or computer data.

Makes necessary recommendations to improve techniques in the laboratory and keeps up-to-date with chemical literature and the latest developments, techniques and methods.

Provides technical guidance to other analytical chemists and lower level chemists on a continuing basis to ensure quality control.

May be required to testify in courtrooms exclusively as an expert witness.

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### **FACTOR 1 - KNOWLEDGE REQUIRED BY THE POSITION**

Advanced professional knowledge of chemical principles, theories, practices and established methodology sufficient to assist in the analysis of complex and unprecedented samples or specimens.

Extensive experience in forensic testing and associated legal practices of representing findings in court for testing of chemical substances, including controlled substances.

Professional knowledge of standard computer programs and instrumentation used for calibrating, troubleshooting and instrument operation. This position requires a demonstrated knowledge of functions and use of several types of mass spectrometers and their applications, in at least two of the three following analytical systems: (1) Liquid Chromatography Mass Spectrometry, LC-MS, or LC-MS/MS, (2) Gas Chromatography Mass Spectrometry, GC-MS, (2) Gas Chromatography Flame Ionization Detector, GC-FID, and Fourier Transform Infrared Spectroscopy, FT-IR. In addition, a sound working knowledge of general wet chemical techniques and related safety knowledge is required.

Professional knowledge of gas chromatography (GC), gas chromatography mass spectrometry (GC-MS), gas chromatography flame ionization detection (GC-FID), liquid chromatography mass spectrometry (LCMS) and Fourier Transform Infrared Spectroscopy (FT-IR) to determine chemical and physical properties, composition, structure, relationships, and reactions. These analyses, resolutions or treatment of chemical/scientific problems extends beyond routine application.

Professional knowledge of a wide range of theories, principles and concepts in physical and organic chemistry, biochemistry and mathematics gained through extended professional experience in current methods of chemical research as demonstrated in publications in scientific journals in order to perform the full range of duties involved in researching, developing, adapting and evaluating analytical methodologies used in chemistry.

Mastery knowledge of instrumental analysis, such as gas and thin layer chromatography, spectrophotometry, electrophoresis, etc., in order to effectively evaluate sensitivity of procedures and precision and accuracy of the results obtained and to engage in investigative developmental work toward implementing improved analytical methods.

Ability to communicate facts and ideas to a variety of persons and audiences both within and outside the laboratory, and the ability to write memorandums, prepare reports and/or position papers on significant analytical results and submit papers for publication and circulation among other governmental agencies or other interested scientists in the discipline.

Ability to clearly and concisely answer challenges to findings.

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### FACTOR 2 - SUPERVISORY CONTROL

The incumbent works under the direct supervision of the Director of the Forensic Science Laboratory, who defines overall objectives to be achieved, coordinates resources, and relies on the incumbent's expertise when coordinating, and accomplishing program objectives and in consultation, develop the deadlines, projects, and work to be done.

Work is performed with minimum supervision, within the latitude of established policies. Incumbent resolves most conflicts, occasionally coordinates work with other chemist, scientist, or managers as necessary and interprets agency and activity test and evaluation policy on own initiative in relation to established objectives. Work is accepted as technically authoritative and is reviewed for accomplishing objectives conformance to standards, guidelines, feasibility, and effectiveness in meeting deadlines and expected results.

### FACTOR 3 - GUIDELINES

The guidelines include DFS methods and protocols, chemical references and literature, Instrument handbooks, methodology manuals, and current work in the specialty area in addition to criteria set by a certification organization. The incumbent uses initiative and professional and technical experience in the specialty area to modify and/or extend the methods to satisfy unprecedented analytical requests and requirements; and uses resourcefulness and knowledge of the field to adapt and develop new approaches and methods to identify areas that need method developments to the work and needs of the laboratory.

### FACTOR 4 - COMPLEXITY

The work consists of executing and validating established analytical and testing methods, and solving complex chemical problems. The work requires interpretation of data, some of which are not conclusive. Assignments may involve analysis of highly complex and unprecedented samples not covered by established analytical methods. Approved modifications of established methods and development of new methods and techniques may be necessary. The incumbent is expected to develop new approaches in solving a variety of problems.

### FACTOR 5 - SCOPE AND EFFECT

The work involves serving as a senior expert in forensic chemical analyses of complex or unprecedented samples, typically to determine levels of trace organic chemicals in both simple and complex matrixes. The work involves modifying and validating methods to accommodate unusual or unprecedented analytical requirements. The work effort supports the overall operation of the DFS.

### FACTOR 6 - PERSONAL CONTACT

Personal contacts are with the forensic community, local and federal law enforcement communities, and other District agencies, in addition to other chemists, forensic scientists and technicians within the DFS.

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### FACTOR 7 - PURPOSE OF CONTACT

The purpose of contacts is to advise on work performed in the Forensic Science Lab Division and support technical matters regarding the sample analytical methodology, and then report results of the analyses performed, potentially including technical training of students or staff.

### FACTOR 8 - PHYSICAL DEMANDS

The work requires prolonged standing, walking, lifting and transporting reagents, gas cylinders, *etc.*

### FACTOR 9 - WORK ENVIRONMENT

Work involves regular and recurring exposure in a controlled environment to irritant chemicals and controlled narcotic and pharmaceutical substances. The incumbent is required to adhere to safety precautions including but not limited to, wearing protective clothing (*e.g.*, laboratory coats and gloves) and eye protection (*e.g.*, safety goggles).

### OTHER SIGNIFICANT FACTS

This position's duty station will be housed within the Consolidated Forensic laboratory (CFL) which is a protection-sensitive facility. As such, incumbents of this position shall be subject to criminal background checks, background investigations, and mandatory drug and alcohol testing, as applicable.

The nature of the DFS mission necessarily involves the potential risks associated with biological or chemical hazards, including morgue functions. Although contact with these functions is intended to be minimal, the risks are nevertheless possible; training to recognize, address, and mitigate these risks is required as is dealing with potentially personally difficult topics, such as crime, death, and disease. Although there is not much risk if proper procedures are followed, some chemists could face safety or health dangers.

Experience at technical writing and general laboratory maintenance is desired. Professional knowledge of forensic sample processing, handling and their analysis for chemical constituents is highly desired.

### EDUCATION AND EXPERIENCE

Basic Requirement - Degree: physical sciences, life sciences, or engineering that included 30 semester hours in chemistry, supplemented by course work in mathematics through differential and integral calculus, and at least 6 semester hours of physics. **OR**

Combination of education and experience -- course work equivalent to a major as shown in A above, including at least 30 semester hours in chemistry, supplemented by mathematics through differential and integral calculus, and at least 6 semester hours of physics, plus appropriate experience or additional education.

In addition to the basic requirements above, the individual must also have one (1) year of specialized experience equivalent to the grade 12 level. Specialized experience is experience which is directly related to the position which has equipped the individual with the knowledge, skills and abilities to successfully perform

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the duties of the position to include analyzing and interpreting complex composition of molecules, physical and chemical properties or similar analytical chemistry work.

### LICENSURE/CERTIFICATION

NONE – However, graduation certificate from the American Chemical Society is desirable.