

**Idaho State Police
Forensic Services**

Toxicology Discipline Training Plan

Section Five – Technique/Instrument Update

LCMS-QQQ

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Section Five – Technique/Instrument Update

LCMS Analysis of Urine and Blood

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5.0 TRAINING OBJECTIVES5.0 Introduction

This section of the Idaho State Police Forensic Services (ISP-FS) toxicology training plan is designed as a guide to provide a previously trained ISP-FS Analyst with the background necessary to operate and interpret data on the LCMS-QQQ.

5.1 PRINCIPLE: LCMS QQQ

- 5.1.1 The trainee must have a working knowledge of the theory of HPLC and the application of a triple quad mass selective detector.
- 5.1.1 Required Background Reading
 1. Agilent 6400 Series QQQ LC/MS Techniques and Operation, Course Number R1893A Volume 1 Student Manual, Agilent 2010
 2. Agilent 6400 Series QQQ LCMS Techniques and Operation, Course Number R1893A Volume 2 Student Manual, Agilent 2010
- 5.1.3 Explain how the following terms define or affect the performance of the instrument.
 - Resolution
 - Eddy diffusion
 - Capacity
- 5.1.4 Determine what type of column is currently installed on the LCMS QQQ in your laboratory.
 - What is the column packing material?
 - What is the total particle size of the packing material?
 - What is the inner diameter of the column?
 - What is the length of the column?
 - What pH range can this column accommodate?
 - What is the maximum operating pressure for this column?
- 5.1.5 Describe the difference between a gradient and an isocratic elution.
- 5.1.6 Discuss ways to reduce carry over.

- 5.1.7 What does the term data rate mean and how can that affect resolution and capacity?
- 5.1.8 Describe the difference between electrospray ionization and atmospheric pressure chemical ionization. What are the pros and cons of each ionization technique?
- 5.1.9 What is ion suppression? How is it evaluated and what can be done to reduce it?
- 5.1.10 What occurs in the first quadrapole of the instrument, the hexapole, and the final quadrapole?
- 5.1.11 Give a basic explanation of the following acquisition parameters
- ms2scan
 - ms2sim
 - MRM
 - Dynamic MRM
 - Product Ion
 - Neutral Loss
 - Neutral Gain
- 5.1.12 Recommended Background reading
1. Agilent 1260 Infinity Binary LC Optimization Guide

5.2 INSTRUMENTATION: LCMS QQQ

- 5.2.1 The trainee must demonstrate their ability to operate a LC equipped with a triple quadrapole Mass Selective Detector.
- 5.2.2 The Trainee must demonstrate an understanding of the system's software, troubleshooting techniques, and the maintenance that is to be performed on the LCMS/QQQ.
- 5.2.3 The Trainee must demonstrate to the trainer the ability to pull up the instrument manuals on line.
- 5.2.4 References
- <http://www.chem.agilent.com/en-US/Technical-Support/Instruments-Systems/Mass-Spectrometry/6400-Series-Triple-Quadrupole-LC-MS/Pages/default.aspx>
- <http://www.chem.agilent.com/en-US/Technical-Support/Instruments-Systems/Liquid-Chromatography/1260-Infinity-Binary-LC/Pages/default.aspx>

5.3 TRAINING PLAN TOPIC COMPLETION SIGN-OFF

5.1 PRINCIPLES OF LCMS-QQQ

Date of Completion

Trainee

Trainer

5.2 INSTRUMENTATION LCMS-QQQ

Date of Completion

Trainee

Trainer

Revision #	Issue Date	History
0	1/7/2013	Original Issue
1	04/22/2015	Minor formatting changes to reflect those included in Toxicology Training Plan Section One

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