Idaho State Police
Forensic Services

Toxicology Discipline Training Plan

Section Five – Technique/Instrument Update
LCMS-QQQ

Section Five – Technique/Instrument Update

LCMS Analysis of Urine and Blood

5.0   TABLE OF CONTENTS

5.0   TRAINING OBJECTIVES

5.0   <u>Introduction</u>

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 LC/MS 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 quadrapule of the instrument, the hexapule, and the final quadrapule?

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 quadrapule 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

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5.3   TRAINING PLAN TOPIC COMPLETION SIGN-OFF

    5.1   PRINCIPLES OF LCMS-QQQ

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Date of Completion

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Trainee

_____
Trainer

    5.2   INSTRUMENTATION LCMS-QQQ

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Date of Completion

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Trainee

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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