

## **Essentials of Modern HPLC/UHPLC 2: Operation, Troubleshooting, and Method Development**

Dr. Michael W. Dong, MWD Consulting, Norwalk Ct, USA,  
michaelwdong2015@gmail.com

### **Course description**

This intermediate course will introduce you to best practices of high-performance liquid chromatography (HPLC) and ultra-high-pressure liquid chromatography (UHPLC) as well as tricks-of-the-trade and best practice for successful HPLC operation. The attendees will learn step-by-step guide to operating HPLC modules, maintenance procedures, troubleshooting strategies, traditional and accelerated method development processes as well as recent advances of this analytical technique including a section on UHPLC. This is the second part of a two-course series for modern HPLC introduction. "Essentials of Modern HPLC/UHPLC 1" introduces HPLC fundamental concepts, columns, instrumentations and applications, is a prerequisite.

### **Target Audience**

Analysts, scientists, researchers and managers who want to get an intermediate course on modern HPLC practices, instrument operation, maintenance, troubleshooting, method development and UHPLC. A good understanding of general chemistry is recommended. Some prior hands-on HPLC experience will be helpful but not mandatory.

### **Course Outline**

#### **5. HPLC operation, maintenance and troubleshooting**

- Mobile phase preparation
- Best practice in HPLC operation
- Guidelines for increasing HPLC precision and for trace analysis
- Common HPLC maintenance procedures
- Problem diagnosis and troubleshooting guide with case studies
- Diagnosing and solving problems (pressure, baseline, peak, data performance)

#### **6. HPLC method development and validation**

- Tradition strategy for HPLC method development
- 3-pronged template approach for efficient method development
- Method prequalification and validation
- Modern trends – software tools and automated systems
- Case studies on developing ICH impurity testing of pharmaceuticals including some discussions on phase-appropriate method development concepts

#### **7. Ultra-high pressure LC 1 – concepts, perspectives, and benefits**

- History and current status of UHPLC
- Practical concepts and instrumental considerations
- Benefits: very fast separation with good resolution, very high resolution of complex samples, and facilitating rapid method development
- Case studies (NCE, OTC, complex molecules and natural products)

#### **8. Ultra-high pressure LC 2 – practice, potential issues and QC implementation**

- Potential issues and operating nuances (viscous heating, system dispersion, compatibility to existing methods, injection precision and carryover, detector sensitivity and dwell volumes, and method transfer issues)
- Case studies illustrating issues and myths, and how to mitigate potential pitfalls
- How to get started and to transition from HPLC to UHPLC

### **About the instructor**

Dr. Michael W. Dong is a principal in MWD Consulting focusing on training and consulting services in HPLC/UHPLC, pharm analysis and drug quality. He was formerly Senior Scientist at Genentech, Research Director at Synomics Pharma, Research Fellow at Purdue Pharma, and Senior Staff Scientist at Applied Biosystems / Perkin-Elmer. He holds a Ph.D. in Analytical Chemistry from City University of New York, and a certificate in Biotechnology at U. California. Santa Cruz. He has over 100 publications and a best-seller book in HPLC. He is an editorial advisory board member of LCGC magazine and American Pharmaceutical Review.

### **Recommended reference:**

M. W. Dong, Modern HPLC for Practicing Scientists, Wiley-Interscience, New Jersey, 2006. This book is used as a course reference and supplements the course presentation handouts.