Dr. Michael W. Dong, Norwalk CT, USA (1-day), michael@mwd-consulting.com

Course description

This intermediate 1-day workshop will provide the analytical scientist with a clearer understanding and a solid working knowledge of the concepts, instrumentation, and columns of HPLC and UHPLC (ultra-high-pressure liquid chromatography). The focus is on pharmaceutical analysis of small molecule drugs.

Who Should Attend

Analysts, scientists, researchers, and managers in pharmaceutical and other industries who want to get an updated overview of the fundamentals of HPLC and UHPLC in pharmaceutical analysis and other applications. A basic understanding of chemistry and HPLC with some hands-on experience is assumed.

Day 1: HPLC 1: Fundamentals

1. Concepts

A. Introduction: The chromatographic process, advantages and limitations, and chromatographic modes (NPC, RPC, IEC, SEC)

B. Concepts: Retention factor (k), separation factor (α), column efficiency (N), resolution (R_s), tailing factor (T_f), the resolution equation, the linear solvent strength theory, and column void volume (V_M)

C. Mobile phase factors (organic modifiers, pH, buffers), mass spec compatibility, isocratic and gradient separations, operating parameters (Flow, gradient time (t_G), column temperature (T)), peak capacity (P_c)

2. **HPLC Columns, Trends and Selection Guides**

A. Column fundamentals: Glossary, Characteristics, and types, packing characteristics (support type, particle size, pore size), bonded phases, end-fittings, plate height (H), the van Deemter equation

B. Trends: Trends of shorter and smaller columns and the use of high-purity silica, traditional and novel bonding chemistries, the concept of "orthogonality," listing

of common RPC columns, column selection guide

C. Newer column types: Hybrids, charged surface hybrids, HILIC, sub-3 and sub-2 μm, and superficially porous particles (SPP)

3. **HPLC instrumentation and Operating Principles**

A. System, Pump, and Autosampler. Integrated vs. modular system, solvent delivery system, low-pressure vs. high-pressure mixing, dwell volume, pump trends, autosampler types and trends

B. Detectors: Operating principles of UV/Vis detection and characteristics, photodiode array detector (DAD), newer detectors for non-chromophoric analytes (ELSD, CAD, and CLND)

C. MS, CDS, and Instrument Bandwidth. The mass spectrometer (MS), types and ESI interface, Data Chromatography System (CDS), peak integration strategy, instrumental bandwidth

Biography

Dr. Michael W. Dong is a principal consultant in MWD Consulting, focusing on consulting and training services on HPLC, pharmaceutical analysis, and drug quality. He was formerly Senior Scientist in Analytical Chemistry and Quality Control at Genentech, Research Director at Synomics Pharma, Research Fellow at Purdue Pharma, Senior Staff Scientist at Applied Biosystems/Perkin-Elmer, section head at Celanese Research Company, and postdoctoral research fellow at Naylor-Dana Institute for Disease Prevention.

He holds a Ph.D. in Analytical Chemistry from the City University of New York and a certificate in Biotechnology from the University of California Santa Cruz. He has 130+ publications and five books, including a bestselling book on chromatography (HPLC and UHPLC for Practicing Scientists, 2nd Ed., Wiley, 2019). He is an advisory board member of LCGC magazine, American Pharmaceutical Review, Chinese American Chromatography Association, and Connecticut Separation Science Council. He has been a columnist of "Perspectives of Modern HPLC" for LCGC North America since 2013. Michael was born in Shanghai and raised in Hong Kong. He is multilingual, an Eagle Scout, and a long-term Toastmaster.

Recommended textbook:

M. W. Dong, **HPLC and UHPLC for Practicing Scientists**, 2nd Ed., Wiley, Hoboken, New Jersey, *2019. List price is $99.95 though it can be purchased at Amazon.com at a substantial discount for both the paperback and the E-book.*