

Review Article

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Micellar Liquid Chromatography from Green Analysis Perspective

Abstract: Micellar liquid chromatography (MLC) is a simple well-established branch of high-performance liquid chromatography. The applications of MLC for the determination of numerous compounds in pharmaceutical formulations, biological samples, food, and environmental samples have been growing very rapidly. MLC technique has several advantages over other techniques, such as simultaneous separation of charged and uncharged solutes, rapid gradient capability, direct on-column injection of physiological fluids, unique separation selectivity, high reproducibility, robustness, enhanced luminescence detection, low cost, and safety. This review is devoted to the evaluation of the agreement of MLC with the principles of green chemistry which recently represents a universal trend. Also, it provides an overview on the basics of MLC, in addition to a survey of MLC methods published in the past five years for the assay of various compounds in different matrices.

Keywords: micellar liquid chromatography, green analytical chemistry, pharmaceutical analysis, biological analysis

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1 Introduction

Micellar liquid chromatography (MLC) is one of the modes of reversed-phase liquid chromatography (RPLC) in which the mobile phases are aqueous solutions of a surfactant at a concentration above the critical micelle concentration (CMC). Over the past fifteen years, the popularity of MLC has grown rapidly. Micelles have also been used in many other separation techniques; such as electrokinetic

chromatography [1,2], ultrafiltration, and cloud point extraction [3].

Although some publications have reported on the basics and applications of MLC for the analysis of drugs in pharmaceutical preparations and biological samples [4–11], the focus of this review is to highlight the importance of MLC for green analytical chemistry. Green chemistry has evolved from the pollution prevention approach developed within the USA's Environmental Protection Agency as a conceptual framework that minimizes the undesirable effects of chemistry. Many efforts have been made in the field of analytical chemistry to avoid the hazards of the analytical methodologies and to reduce the costs of analysis [12]. In this review article, we present a brief overview of the basics of MLC as well as a comprehensive discussion about its importance from green analytical chemistry perspective. In addition, details about the analytical applications of MLC in the past five years will be presented. It is our hope that this review will provide many fertile ideas to the readers.

2 Basics of micellar liquid chromatography

2.1 Critical micelle concentration and Krafft point

Surfactants are amphiphilic molecules that consist of a hydrophobic moiety and a polar head group. Above their CMC, surfactants form aggregates that are known as micelles. Micelles have a dynamic structure that is the result of the rapid exchange of surfactants in the aggregated and monomeric forms. The number of monomer surfactants in the aggregate form (called aggregation number) and the size of micelles vary greatly between surfactants. The CMC and aggregation number are the result of many factors, such as ionic strength, presence of a co-solvent and temperature. A suitable surfactant for MLC should have a low CMC. A high CMC would result in working at a high surfactant concentration, which would

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Micellar Liquid Chromatography

Jack Cazes



Micellar Liquid Chromatography:

Micellar Liquid Chromatography Alain Berthod, Celia Garcia-Alvarez-Coque, 2000-03-30 Micellar Liquid Chromatography reviews the use of surfactant solutions at or above the critical micelle concentration as mobile phases in liquid chromatography It employs a computer assisted optimization methodology and integrates micellar liquid chromatography MLC with other chromatographic and electrophoretic techniques using surfactants It a **Micellar Liquid Chromatography** Alain Berthod, Celia Garcia-Alvarez-Coque, 2000-03-30 Micellar Liquid Chromatography reviews the use of surfactant solutions at or above the critical micelle concentration as mobile phases in liquid chromatography It employs a computer assisted optimization methodology and integrates micellar liquid chromatography MLC with other chromatographic and electrophoretic techniques using surfactants It also includes the MICHROM software package on CD ROM to facilitate the application of equations and optimize efficiency of MLC systems Efficiency Enhancements in Micellar Liquid Chromatography Through Selection of Stationary Phase and Mobile Phase Organic Modifier David Paul Thomas, 2009 **Micellar Liquid Chromatography of Nucleosides and Bases** Yong-Nam Kim, 1987 **Solvent Strength and Selectivity in Micellar Liquid Chromatography** Alireza Sadegh Khani Kord, 1991 **Micellar Liquid Chromatography** Sigita Aloona Zibas, 1997 Characterization of Chemical Interactions in Micellar Liquid Chromatography (MLC) and Micellar Electrokinetic Capillary Chromatography (MEKC) Shenyuan Yang, 1995 **Gradient Elution in Micellar Liquid Chromatography** Ma. Lillian S. Madamba, 1991 **Chromatographic Determination of Molecular Interactions Applications in Biochemistry, Chemistry, and Biophysics** Tibor Cserhati, Klara Valko, 1993-10-13 Chromatographic Determination of Molecular Interactions describes the theory and practice of the measurement of molecular interactions by thin layer high performance liquid and gas chromatography Methods and various procedures used for the calculation of complex stability constants are compiled and the stability constants of a wide variety of interactions determined by the various chromatographic techniques are included New results of molecular interactions are covered including those for protein peptide and amino acid nucleic acid bases The book will appeal to biochemists analytical chemists molecular biologists biotechnologists biophysicists and medicinal chemists **Encyclopedia of Chromatography** Jack Cazes, 2009-10-12 Thoroughly revised and expanded this third edition offers illustrative tables and figures to clarify technical points in the articles and provides a valuable reader friendly reference for all those who employ chromatographic methods for analysis of complex mixtures of substances An authoritative source of information this introductory guide to specific chromatographic techniques and theory discusses the relevant science and technology offering key references for analyzing specific chemicals and applications in industry and focusing on emerging technologies and uses

Unveiling the Magic of Words: A Review of "**Micellar Liquid Chromatography**"

In a world defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their power to kindle emotions, provoke contemplation, and ignite transformative change is actually awe-inspiring. Enter the realm of "**Micellar Liquid Chromatography**," a mesmerizing literary masterpiece penned by way of a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve to the book is central themes, examine its distinctive writing style, and assess its profound impact on the souls of its readers.

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Micellar Liquid Chromatography Introduction

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