TECHNOLOGY OF NEW HPLC PACKINGS FOR HIGHER EFFICIENCY AND SHORTER ANALYSIS TIMES

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In recent years HPLC has been challenged with more complex and faster separation demands. The aim was, and is, to achieve a greater number of separations in a shorter time to increase sample throughput. To compensate for the loss in efficiency due to speeding up of the methods, the trend was towards smaller sub-2µm particles that provided greater efficiency although at the price of high backpressures that often exceed the limits of common HPLC systems. To work with these particles, dedicated ultra high pressure (UHPLC) systems are required.

The Technology of Fused Core™ Particles is a way to get around this dilemma. Due to their design, they provide the efficiency of a sub-2µm particle but at much lower backpressures. They comprise a 2,7µm diameter particle with a 1,7µm solid (fused) core. Improved diffusion properties in these particles lead to the same efficiency as a sub-2µm particle, but at a backpressure only slightly higher than common 3µm particles. As a consequence, UHPLC performance can be achieved on any standard HPLC system: moreover, the columns can also be used with UHPLC systems to extend their capabilities. The gain in efficiency from Fused Core particles can be turned into better separations, solvent savings or shorter analysis times.

In addition due to the more narrow particle size distribution of the Fused Core particles compared to completely porous particles, these column can be sealed with wider (2µm) frits than, for example, sub-2µm columns (0,2µm frits) making them less susceptible to clogging. By this, the same robustness as a 5µm particle column is achieved but with an efficiency of a typical sub-2µm UHPLC column.

In this presentation, the background and applicability of this new particle technology will be discussed, as well as comparisons to existing concepts.

EFFICIENT AND ECONOMICAL HPLC PERFORMANCE QUALIFICATION

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Analytical Instrument Qualification (AIQ) is a prerequisite for any analytical method validation and thus must be considered a vital basis of analytical data integrity and quality in pharmaceutical analysis. As a part of AIQ the performance qualification (PQ) is supposed to ensure continued satisfactory performance of an instrument under actual running conditions over the anticipated working range during daily use. However, PQ is not a one time exercise, but it is currently repeated independently from routine use of the analytical system using standard reference test conditions. This proceeding is inconvenient since it is time consuming, expensive and only provides a snapshot of system performance. As HPLC methods generally require a System Suitability Test (SST) prior and/or after the test, it might be far more reasonable and robust to use these SST data for a continuous PQ. For these reasons, the work presented here demonstrates that, under certain circumstances, satisfactory instrument performance assessment can be derived from system suitability tests and performance data from daily use as well. This approach will not only help to reduce time and effort in the daily laboratory routine without losing data quality, but it will also avoid the critical re-evaluation of numerous analytical tests once a routine PQ fails.

NEW TRENDS IN BIOANALYTICAL MASS SPECTROMETRY AND THEIR APPLICATION TO PHARMACEUTICAL ANALYSIS

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Mass spectrometry applied to the biological sciences in the pharmaceutical industry covers a broad range of application topics, such as structural identification of impurities in drug preparations, quantitative analysis of drugs and metabolites thereof in physiological fluids, qualitative analysis of noncovalent complexes, structural analysis to determine chirality and protein sequence analysis. Regardless of the application, electrospray ionization (ESI), atmospheric pressure chemical ionization (APCI) and matrix assisted laser desorption ionization (MALDI) are the most common ionization techniques for transfer of nonvolatile biologics like proteins and peptides into the gas phase for analysis. ESI is most often used as an interface between high-performance liquid chromatography (HPLC) separation methods and MS. Due to an improved understanding of ionization mechanisms, new ambient desorption ionization methods are developed in the last few years:

1) Techniques where ESI mechanisms are mainly responsible for ionization, such as “desorption electrospray ionization“(DESI), “electrospray-assisted laser desorption ionization” (ELDI), “neutral desorption-extractive electrospray ionization” (ND-EESI) or “laser ablation electrospray ionization” (LAESI) and

2) Methods where chemical ionization is responsible for ionization, such as “direct analysis in real time” (DART), “desorption atmospheric pressure chemical ionization” (DAPCI) or “desorption atmospheric pressure photoionization” (DAPPI).

Many of these techniques have been studied extensively and exploited for analytical applications in the pharmaceutical sector.

CITIUS, ALTIUS, FORTIUS – WIE SCHNELL MUSS MAN IN DER HPLC WERDEN? ERFAHRUNGEN EINES PHARMAZEUTISCHEN DIENSTLEISTERS

CITIUS, ALTIUS, FORTIUS – HOW FAST NEEDS FAST HPLC TO BE? EXPERIENCES BY A SERVICE PROVIDER IN PHARMACEUTICAL INDUSTRY

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In recent years Fast HPLC has become very popular due to its potential of extremely short analysis times and high-throughput applications. Based on the fact that changes in pharmaceutical analysis are limited by a highly regulated environment (changes in analytical methods always involve changes in the documentation for regulatory affairs) such a revolutionary technique has difficulties to enter this area. However, different approaches of Fast HPLC are already established in our laboratory, but due to the causes mentioned above only a limited number of applications employ this new technique.

This presentation is focussing on the two main areas where Fast HPLC is applied in the laboratories of HWI: method development and routine analysis of herbal medicinal products. In these two areas Fast HPLC has proven to be advantageous in terms of time saving compared to classical HPLC. The method development approach in our lab will be shown and how the application of Fast HPLC saves time and improves resolution. Furthermore the use of Fast HPLC on the separation of herbal medicinal products will be discussed.

Counterfeit Drugs and their Identification via X-Ray Diffraction

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Compared to other forms of counterfeiting, the production of fake medicines almost certainly has the greatest potential for harming human health. The scale of the problem is immense with, for example, an estimated 2 - 300,000 people die in China each year as the result of counterfeit medicines. However, the phenomenon is not limited by national boundaries; counterfeit drugs have been detected on numerous occasions in the highly regulated pharmaceutical supply chains of the world's most developed countries. The talk focuses on the XRPD analytical method for tackling the problem of fake, counterfeit and illicit drugs. X-ray analysis is a new and easy to handle technological solution. In addition to tagging and tracing technologies, the use of analytical methods to differentiate between counterfeit and genuine drugs where new standards are urgently required. XRPD is already well established as a key analytical technique in the pharmaceutical industry, used for the discovery, development, patent protection, and manufacture of drugs. New and ultra-fast X-ray detectors allow the XRPD technique to become a useful tool for the effective screening of pharmaceutical tablets. The use of XRPD for the analysis of illicit fake or counterfeit drugs, offers the unique opportunity of a non-destructive technique. X-rays penetrate easily through the commercial blister packaging of drugs, enabling quantitative analysis of crystalline components, without the need to remove tablets from their packaging – even fully opaque blisters. This allows the resale of genuine tablets after testing, avoiding wastage of vital and expensive drugs. Within the talk a unique testing method is described for the rapid, reliable and inexpensive screening of counterfeit drugs. The technique involves the use of XRPD to analyze blisterpacked tablets.

ANALYTICAL ULTRACENTRIFUGATION IN BIOPHARMACEUTICAL DEVELOPMENT – ALREADY AN ESTABLISHED TECHNIQUE?

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In order to gain comprehensive insights into the solution behavior of biopharmaceuticals, a combination of several techniques is needed. One of these techniques, the Analytical Ultracentrifuge (AUC), has received increased interest in recent years for studying the solution behavior of biopharmaceuticals and colloidal formulations like liposomes. In this contribution, we wish to introduce the underlying theory of AUC, present the most commonly used experiments for characterising biopharmaceuticals, discuss strengths and limitations of the technique and how data can be interfaced with other techniques, such as SEC, SEC-MALLS, FFF and DLS. Finally, an outlook will be presented about the potential future role of AUC in biopharmaceutical development.