

# **Solid-phase reactors in sequential injection systems**

by

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## **SYNOPSIS**

The increasing number of journals and reviews published on the development of process analysers signals the importance thereof in the various fields that require analytical measurement to be performed. Analysis need to be done faster, more precise, accurate and economical. Hence the introduction of solid-phase reactors in flow systems.

The use of a solid-phase reactor incorporated into the sequential injection analysis (SIA) manifold is an improvement on the homogeneous methods applied. This represents an achievement for on-line determination of different substances in clinical, pharmaceutical,

industrial or agricultural fields. Solid-phase reactors has an advantage over homogeneous methods, particularly if the reagent is expensive, only slightly soluble or only available in the solid form. Reagent consumption is greatly decreased and the system is simplified with fewer junctions for mixing of reagent, sample and carrier stream.

The aim of this research was to investigate the application of the SIA technique as a process analyser, by incorporating super serpentine and solid -phase reactors in its manifold.

Super serpentine reactors were investigated for their sensitivity and precision. The solid-phase reactors were used for the determination of manganese, iron, nitrate and nitrite as well as chromium in industrial effluents, natural waters and pharmaceutical products.

For all these determinations, SIA manifold with a single detector was used. The usefulness, cost-effectiveness and advantages of the solid-phase reactor incorporated into the SIA-manifold over the homogeneous system and the flow injection analysis (FIA) system is highlighted during the course of this study.

# **Vastetoestandreaktore in sekwensiële-inspuitsisteme**

**deur**

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## **SAMEVATTING**

Die toenemende aantal joernaal- en oorsigartikelpublikasies rakende die ontwikkeling van prosesanaliseerders toon die belangrikheid daarvan in die verskeie velde wat vereis dat analitiese meetings uitgevoer moet word. Analises moet vinniger, meer presies, akkuraat en ekonomies uitgevoer word. Dit lei tot inskakeling van vastetoestandreaktore in vloeisisteme.

Die gebruik van 'n vastetoestandreaktor, in 'n sekwensiële-inspuitanalise (SIA) reaksiespoel, is 'n verbetering op die homogene metodes. Dit verteenwoordig 'n doelwit

vir aanlyn bepalings van verskillende stowwe in die kliniese, farmaseutiese, industriële en landbou rigtings. Vastetoestandreaktore het 'n voordeel bo homogene metodes, veral indien die reagentuur duur is, slegs gedeeltelik oplosbaar is of indien dit alleenlik in die vaste toestand beskikbaar is. Reagentuur verbruik is grootliks verminder en die sisteem is, deur van minder koppelings vir die vermenging van die reagentuur-, monster- en draerstroombestruking gebruik te maak.

Die doel van hierdie navorsing was om die toepassing van die SIA- tegniek, as 'n prosesanaliseerder, te ondersoek deur superkronkel- en vastetoestandreaktore in die reaksiespoel te inkorporeer.

Superkronkelreaktore is vir sensitiwiteit en presisie ondersoek. Die vastetoestandreaktore is vir die bepaling van mangaan, yster, nitraat, nitriet en chroom in industriële uitvloeiings, natuurlike water en farmaseutiese produkte aangewend.

'n SIA- reaksiespoel, met 'n enkele detektor, was vir al hierdie bepalings gebruik. Die bruikbaarheid, koste-effektiwiteit en voordele van die vastetoestandreaktor in die SIA- reaksiespoel geïnkorporeer, bo die homogene- en vloeï-inspuitanalise (VIA) sisteme, word deur die loop van hierdie studie uitgelig.

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