

On-line process control in pharmaceutical industry

by

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SYNOPSIS

For pharmaceutical compounds that have a chiral center it is necessary to control the enantiopurity because the enantiomers have got different pharmacokinetics and pharmacodynamics. A big interest was recorded in the last few years for the on-line process control of enantiopurity in the pharmaceutical industry. The most used methods are the chromatographic ones. These methods are not very accurate, they are time consuming and also very expensive. A good alternative to the chromatographic methods is the utilization of

sequential injection analysis/sensors systems for on-line simultaneous analysis of enantiomers. The first step in on-line process control in the pharmaceutical industry with sequential injection analysis/sensors systems is sensor development. The most sensitive sensors are the amperometric ones. If amperometric detection is coupled with a biochemical reaction (e.g., enzymatic reaction or immunoreaction), the selectivity or enantioselectivity of these sensors will increase. The matrix of the sensors is also influencing the sensitivity and selectivity of them. By using a diamond paste matrix these parameters increased for the analysis of enantiomers, creatine, creatinine and azidothymidine.

By coupling the reliability of the proposed sensors with the accuracy and precision of an optimized sequential injection analysis system, the results obtained are not only competing with those obtained by using chromatographic techniques, but they are far more reliable, and the method is faster (75 samples/h for an assay of one component and 34 samples/h for simultaneous assay of two components). The system is fully computerized, inexpensive and suitable for on-line monitoring of the components in pharmaceutical industry. The proposed system has got features also for clinical analysis.

Aan-lyn proseskontrole in farmaseutiese industrie

deur

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SAMEVATTING

Vir farmaseutiese verbindings met 'n chirale senter is dit nodig om die enantiosuiwerheid te kontroleer omdat enantiomere verskillende farmakokinetika en farmakodinamika het. 'n Groot belangstelling het die afgelope paar jaar ontstaan vir aan-lyn proseskontrole van die enantiosuiwerheid in die farmaseutiese industrie. Die metodes wat oor die algemeen aangewend word, is chromatografie. Hierdie metodes is nie baie akkuraat nie, is tydrowend en ook baie duur.

Sekwensiële inspuitanalitiese sensorsisteme vir aan-lyn gelyktydige bepaling van enantiomere is 'n goeie plaasvervanger vir chromatografie.

Die eerste stap in aan-lyn proseskontrole in die farmaseutiese industrie met sekwensiële inspuitanalitiese sensorsisteme is sensorontwikkeling. Die mees sensitiewe sensors is die gebaseer op amperometrie. Indien amperometriese deteksie gekoppel word met 'n biochemiese reaksie (byvoorbeeld 'n ensiematiese reaksie of 'n immunoreaksie), sal die selektiwiteit of die enantioselektiwiteit van hierdie sensors toeneem. Die matrys van die sensors word ook deur hulle sensitiwiteit en selektiwiteit beïnvloed. Hierdie parameters neem verder toe met die gebruik van 'n diamantpasta matrys vir die analise van enantiomere, kreatien, kreatinien en asidotimidien.

Deur die betroubaarheid van die voorgestelde sensors met die akkuraatheid en presisie van 'n geoptimiseerde sekwensiële inspuitanalise sisteem te koppel, is die resultate wat verkry word nie alleenlik kompetend met chromatografiese tegnieke nie, maar is hulle ook by verre meer betroubaar en vinniger (75 monsters per uur vir een komponent en 34 monsters per uur vir die gelyktydige bepaling van twee komponente). Die sisteem is ten volle gerekenariseerd, goedkoop en geskik vir die aan-lyn monitering van komponente in die farmaseutiese industrie. Die voorgestelde sisteem is ook geskik vir kliniese analise.

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