

SEPARATION OF PRAZQUANTEL ENANTIOMERS IN AN OPTIMIZED WAY USING A CHROMATOGRAPHIC UNIT IN A PILOT SCALE CALLED SIMULATED MOVING BED (SMB)

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The main goal of this work is to separate praziquantel (PZQ) enantiomeric mixtures in an optimized way using a well-known chromatographic process named Simulated Moving Bed (SMB). This work includes the following steps: (1) project, (2) construction, (3) operation and (4) control of the constructed chromatographic unit. The first to third steps were already accomplished and the fourth step is the current step of this work.

The current results are made of well-succeeded separations of a racemic mixture of PZQ in a diluted region of the praziquantel isotherm. By well-succeeded separations it means pure (R)-PZQ and (S)-PZQ obtained in the extract and raffinate streams, respectively. Besides the complete and continuous separation of these enantiomers using the constructed SMB unit, these separations are still far from being the best separations. That means, there are big opportunities to increase productivity and decrease solvent consumption, for instance. And it is exactly what the fourth step of this work is going to solve, after the end of this step, the unit is going to be able to separate the enantiomers in a more efficient way. In other words, the great challenge is not the separation itself, but the separation keeping the maximum of yielding, production and desired purity of the outlet streams and at the same time minimizing the solvent consumption.

The case study adopted was the PZQ substance. This one is largely used in medicines that fight against parasitic diseases, like schistosomiasis. Bearing in mind that parasitic diseases compose the well-known group of diseases called Neglected Tropical Diseases (NTDs), it helps to understand the importance of this separation and, ultimately, of this work. This separation is the first step to formulate pediatric medicines for children under six years old, as they are not able to swallow the regular medicines, which are available just in tablet forms and contains both enantiomers. It is important to highlight that the (R)-PZQ is the active principle responsible to kill the parasites, while the (S)-PZQ is responsible to add a very strong bitter taste that makes any pediatric treatment disruptive in liquid formulations. Besides the social appeal added to this work thanks to PZQ use, this process can separate in an efficient way any enantiomeric substances. It is a very interesting situation, because nowadays government legislation has becoming more and more restrictive to the used of racemic mixtures in the formulation of the medicines.

key-words: (1) Simulated Moving Bed, (2) separation of enantiomeric mixtures, (3) process control, (4) neglected tropical diseases and (5) praziquantel.