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Purification of antileukemic biopharmaceuticals using supported ionic liquid materials based on silica

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Acute lymphoblastic leukemia (ALL) accounts with approximately 5,000 new cases in the United States and 4,000 in Europe each year. The first-line biopharmaceutical being used to treat acute ALL, Oncaspar, is based on L-asparaginase (LA), and accounts with approximately USD $100 million in annual sales, with its purification accounting for up to 80% of its total production cost. Therefore, it is crucial to optimize the purification of LA in order to decrease its current cost and allow their routinely use by a widespread population.

Supported ionic liquid materials based on silica (SILs) are already reported in the literature and have been mainly used in the separation of natural compounds from vegetable biomass. Although SILs represent a class of materials with high potential in the purification of proteins, this particular application has been scarcely considered.

In this work, the search for SILs able to establish (non-covalent) specific interactions with LA, allowing therefore its purification from the fermentation broth in which it is produced was investigated. Commercial LA was used in a first set of studies in order to understand the adsorption behavior of the enzyme into SILs. Experimental conditions, such as pH, contact time and SILs/LA ratio were evaluated and optimized in what concerns the LA purity and yield. With this strategy, process costs, energy consumed, and waste generated, may be significantly decreased, which may lead to this biopharmaceutical price decrease and wider application.

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