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The influence of the side groups of the BTP and BTBP type ligands on liquid-liquid extraction of actinides and lanthanides

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Fossil fuels are no longer a choice for energy production, both because of their diminishing availability and the bi-products of their combustion processes. A possibility to replace the fossil fuels would be utilization of nuclear power. No green-house gases are produced, but as any industry, it generates wastes.
A proper plan for reusing valuable nuclides, both by preparing another kind of fuel or by transmutation, which, besides transforming the long-lived nuclides into short-lived ones, generates energy, seem to be P&T (partitioning and transmutation).
The partitioning is the process of separation nuclides from the rest of the waste and involves a separation process which utilize an organic solvent containing one or several molecules and a diluent for extraction purposes.
Among the last extractant families developed in Europe, the 2,6-di(5,6-diethyl-1,2,4 triazin-3 yl)pyridine (BTP) and 6,6'-bis(5,5,8,8-tetramethyl-5,6,7,8-tetrahydro-benzo[1,2,4]triazin-3-yl)-[2,2']bipyridine (BTBP) were/are the most promising molecules for an eventual industrial application.
The present work focuses on several aspects insufficiently studied before and concerning the influence of the side groups attached to the "core" of the moelcule, for both BTPs and BTBPs.
The importance of the diluents regarding both the extraction capabilities of the formed system and the role of the diluents in protecting the molecule against radiolysis without adding a scavenging molecule will be very briefly discussed. However this part will not be further developed here.
The importance of the side groups added to the molecule first to facilitate dissolution, easing the phase transfer and thus enhancing the extraction capabilities and the role the side groups, in protecting the molecule against the radiolysis will be discussed.

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