

CARBON DIOXIDE SEPARATION FROM ANAESTHETIC GASES WITH MEMBRANE CONTACTORS AND BIOCOMPATIBLE IONIC LIQUIDS

Carla Martins, LAQV, Requimte, Chemistry Department, Faculdade de Ciências e Tecnologia, Universidade NOVA de Lisboa, 2829-516 Caparica, Portugal
cmm17205@campus.fct.unl.pt

Luísa Neves, LAQV, Requimte, Chemistry Department, Faculdade de Ciências e Tecnologia, Universidade NOVA de Lisboa, 2829-516 Caparica, Portugal

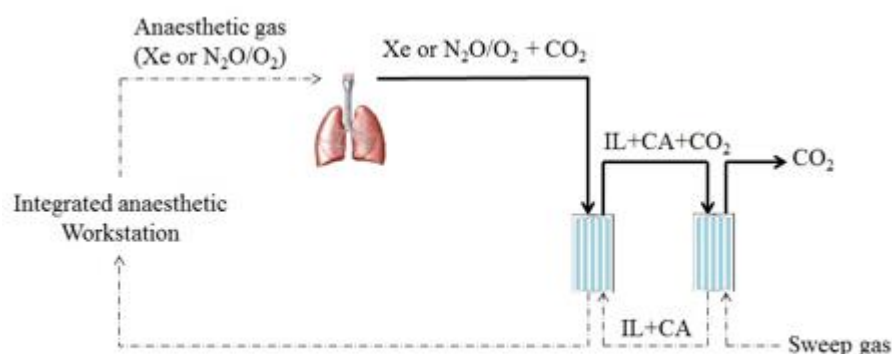
Carlos Afonso, Instituto de Investigação do Medicamento (iMed.U LISBOA), Faculdade de Farmácia, Universidade de Lisboa, Av. Prof. Gama Pinto, 1649-003 Lisboa, Portugal

Isabel Coelho, LAQV, Requimte, Chemistry Department, Faculdade de Ciências e Tecnologia, Universidade NOVA de Lisboa, 2829-516 Caparica, Portugal

João Crespo, LAQV, Requimte, Chemistry Department, Faculdade de Ciências e Tecnologia, Universidade NOVA de Lisboa, 2829-516 Caparica, Portugal

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This work aims the development of a self-renewable technology for CO₂ separation from anaesthetic gas streams using hollow fiber membrane contactors with biocompatible ionic liquids and carbonic anhydrase (CA) enzyme. Aiming this objective, a system with two hollow-fiber membrane modules is considered, one for the removal of CO₂ and the other for the regeneration of the ionic liquid and enzyme. Figure 1 illustrates the proposed concept of this work for an anaesthetic gas closed-circuit.



This approach intends to minimize the cost per surgery and afford the use of expensive anaesthetic gases (e.g. Xenon)¹, by the reuse of the anaesthetic gases that are not absorbed during medical intervention. On the other hand, it is thought-out the use of a biocompatible ionic liquid, as an alternative for the traditional carbon dioxide absorbent, soda lime (calcium hydroxide).

Figure 1 – Anaesthetic closed-circuit with hollow-fiber membrane modules.

Studies of CO₂ sorption in cholinium-based ionic liquids with carboxylate anions and amino-acids were performed. Also, ideal selectivities in supported ionic liquid membranes (SILMs) with different ionic liquids were obtained. The experiments were carried out considering different water activity states of the ionic liquids, similarly to the performed in the previous works^{2,3}. Based on the best results, an ionic liquid was selected for the operation with the hollow fiber membrane modules. On-going work comprises the mimicking of the patients exhaled stream and the capture of carbon dioxide with the hollow fiber membrane contactors and the ionic liquid with CA, integrated with a standard anaesthetic workstation (Cicero EM, Dräger®).

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