

I. Ruiz Salmón, P. Luis; *CO2 capture: an approach based on membrane technology*. Network Young Membrains 2015, Aachen, 4th-5th September 2015, Germany. (oral communication)

Abstract:

The concentration of atmospheric carbon dioxide (CO₂) in the atmosphere has increased significantly from about 280 ppm in 1750 (pre-industrial era) to 367 ppm in 1999 [1] and to 379 ppm in 2005 [2].

Membrane research focused on CO₂ capture started around 1990 and since then, great advances have been obtained: higher mass transfer coefficients, new materials for membrane synthesis, integration of membrane-based technology, etc.[3].

In this project, membrane technology is presented as the cornerstone for CO₂ capture with a double purpose. First, as a novel strategy to minimize energy and material consumption due to the intrinsic advantages of membrane processes and the use of NaCl as the only material source in the process; and secondly, the integration of different membrane systems (i.e., membrane-based absorption, membrane crystallization, membrane distillation, nanofiltration and bipolar electrodialysis) allows the design of an overall process that leads to the recovery and further reuse of the CO₂ captured as a carbonated compound (i.e., Na₂CO₃).

Thus, a revolutionary approach for CO₂ capture from flue gases and sequestration in a potential reusable material is presented. In addition, the obtained Na₂CO₃ can be reused in the industry (e.g., cement and ceramic industry), which will have an impact on the conventional production of Na₂CO₃ via the Solvay process, due to: i) ammonia (NH₃) is not required, which is an essential reagent in the conventional process; ii) conversion of CaCO₃ to produce CO₂ (reagent in the Solvay process) is not needed since CO₂ is obtained from flue gases; iii) HCl can be obtained as sub-product instead of CaCl₂, which is a low value compound produced by the conventional process.