

REQUIMTE/CQFB – Chemistry Department

## Polymeric catalytic membranes

Chemical Reaction Engineering and Catalysis



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(PostDoc)

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- 2008: PhD in Chemistry Universidade Lisboa / ITN
- 1997: Degree in Technological Chemistry Universidade Lisboa



## Objectives

➔ Development of **Polymeric Catalytic Membranes (PCM)** to be used in **heterogeneous catalysis** and **polymeric catalytic membrane reactors (PCMR)** under a green and environmental-friendly approach for:

Synthesis of valuable compounds as **aromas** and **precursors** for pharmaceutical industry

**Biodiesel production**

Collaborations: ⇒ Development of **Hybrid** and **Polymeric materials** by  $\gamma$ -irradiation for **bioapplications**

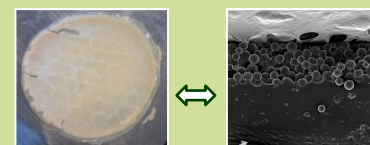
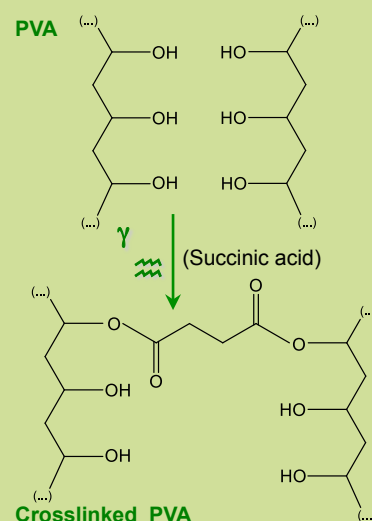
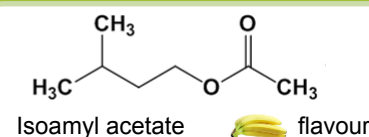
## Methodology

- ① **Preparation/Modification** of PCM and composite polymeric membranes by: **Traditional chemical synthesis** and/or **Gamma-irradiation techniques** (Graft copolymerization; crosslinking reactions; adhesion to a support using hydrophilic polymers as chitosan, PVA, and hydrophobic ones like PDMS)
- ② **Characterization**  
Contact angle, FTIR, DSC, TGA, SEM, AFM, etc.
- ③ **Catalytic tests**  
**Batch reactor** and **Pervaporation membrane reactor**

## Expected Results

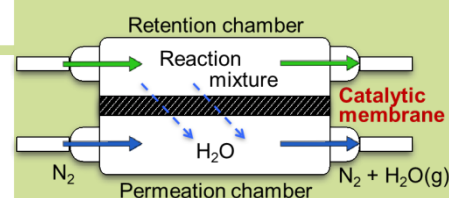
Use of environmental-friendly techniques (less solvents, separation and purification steps, and catalyst re-use) to obtain **effective catalysts** and **sustainable chemical processes**:

- ➔ **Polymer functionalization** to obtain **PCM tailored to present catalytic activity**
- ➔ **PCM as support for active catalyst**
- ➔ **Enhanced catalytic activities** due to a **selective sorption** of reactants and product as result of an **appropriate polymeric environment**
- ➔ **PCMR as a potential competitive process** by combining reaction and separation in a single operation (a **sweep gas pervaporation** is expected to **increase catalytic activity** and **equilibrium conversion**)



PVA supported catalytic membranes

PCMR



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