POLYBENZIMIDAZOLES AND TR-POLYMERS: SYNTHESIS & GAS TRANSPORT PROPERTIES

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Separation of gases via memrane technology is an energy efficient and eviroment-friendly process, where the characteristics of the membrane play a key role. Thus, demand for new polymer memranes with enhanced gas-transport properties has been growing during the last decade. The intrinsic permeability - selectivity trade off together with the low processability and plasticization resistance are the main obstacles for many high performance polymers to be applied as membranes.

Aromatic polybenzimidazoles (PBIs) are exceptionally robust material remaining stable even in very aggressive environments. Generally, PBIs have good intrinsic selectivity, particularly for CH_4/CO_2 gas pair but low permeability. In contrast to polyimides, which also have high gas selectivity, PBIs don't suffer the plastization and much better maintain their dimensional stability, but it is difficult to modify their structures to improve the permeability due to severe conditions of their synthesis. However, in the last decade important progress has been made in the synthesis and modification of PBIs. Here we would like to report our last data on PBI synthesis. The formation of self-supported carbon molecular sieve membrane based on PBI precursors with excellent separation performance, that largely surpass the Robeson 2008 upper-bound for several gas pairs, will also be reported.
On the other hand, it has been shown that polyimides containing hydroxyl groups in ortho position(o-HPIs), could be thermally rearranged into polybenzoxazoles (TR-PBOs) giving polymers with exeptionally good thermostability and gas transport properties. We would like to report a novel family of o-HPIs with high molecular weights. TR process for these o-HPIs and gas transport properties of thus obtained novel TR-PBOs will be discussed.

Keywords: polybenzimidazole, TR-polymers, polyimide

Acknowledgment:

Financial support from DGAPA (PAPIIT projects IG100420 & AG100323) and CONAHCYT (. The authors are also gratefull to G. Cedillo Valverde, A. Tejeda Cruz and E. R-Morales (IIM-UNAM) for the NMR, XRD and thermo-mechanical analyses. M. Rojas Rodriguez gratefully acknowledges CONACYT for PhD fellowship.

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