

论文

含有聚醚链段的可溶性聚酰亚胺气体分离膜材料及其性能

邱晓智^{1,2}, 曹义鸣¹, 王丽娜¹, 周美青¹, 袁权¹

1. 中国科学院大连化学物理研究所, 大连 116023;
2. 中国科学院研究生院, 北京 100049

摘要:

将4,4'-六氟亚异丙基-邻苯二甲酸酐(6FDA)和1,3-苯二胺(mPDA)与二端氨基聚醚缩聚, 得到含有聚醚柔性链段的聚酰亚胺气体分离膜材料. 所合成的共聚聚酰亚胺在*N*-甲基吡咯烷酮(NMP)和四氢呋喃(THF)等有机溶剂中具有良好的溶解性能. 研究了O₂, N₂, H₂, CH₄和CO₂在聚酰亚胺均质膜中的渗透性能, 考察了二端氨基聚醚的含量、链长和化学结构对气体渗透性能的影响. 结果表明, 聚醚链段的引入增大了气体的扩散系数, 气体的渗透系数显著增大; 聚醚链段与CO₂相对较强的相互作用, 增大了对CO₂/N₂的溶解选择性, CO₂/N₂的分离性能优于CO₂/CH₄, 同时CO₂比H₂优先透过膜.

关键词: 气体分离膜 聚酰亚胺 聚醚 渗透系数

Preparation and Properties of Soluble Polyimide Membranes Containing Polyether Segment for Gas Separation

QIU Xiao-Zhi^{1,2}, CAO Yi-Ming^{1*}, WANG Li-Na¹, ZHOU Mei-Qing¹, YUAN Quan¹

1. Dalian Institute of Chemical Physics, Chinese Academy of Science, Dalian 116023, China;
2. China Graduate University of Chinese Academy of Science, Beijing 100049, China

Abstract:

Polyimide copolymers as materials for gas separation containing polyether soft segment were synthesized from 2,2-bis(3,4-dicarboxyphenyl) hexafluoropropane dianhydride(6FDA) with *m*-phenylenediamine(mPDA) and polyether diamine by two steps of condensation polymerization. Permeation properties of O₂, N₂, H₂, CH₄ and CO₂ were investigated. The co-polyimides were soluble in common solvents such as NMP and THF. The effects of content and structure of the polyether on permeation properties were studied. It was found that introducing soft polyether segment into polyimide main chain increased the diffusion coefficients due to increasing of chain flexibility, and also increased CO₂ solubility selectivity due to the strong affinity of ether oxide groups with CO₂. The results show that the permeability coefficients of CO₂ for co-polyimides are higher than that for 6FDA-mPDA polyimide; the CO₂/N₂ selectivity is better than CO₂/CH₄; meanwhile, CO₂ permeability coefficients for co-polyimides is higher than H₂.

Keywords: Gas separation membrane Polyimide Polyether Permeability

收稿日期 2008-05-30 修回日期 1900-01-01 网络版发布日期

DOI:

基金项目:

扩展功能

本文信息

Supporting info

PDF(456KB)

[HTML全文](OKB)

参考文献[PDF]

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

本文关键词相关文章

▶ 气体分离膜

▶ 聚酰亚胺

▶ 聚醚

▶ 渗透系数

本文作者相关文章

▶ 邱晓智

▶ 曹义鸣

▶ 王丽娜

▶ 周美青

▶ 袁权

▶ 邱晓智

▶ 曹义鸣

▶ 王丽娜

▶ 周美青

▶ 袁权

PubMed

Article by

Article by

Article by

Article by

Article by

Article by

Article by

Article by

Article by

Article by

参考文献:

1. Zhao H., Cao Y., Ding X., *et al.* J. Membr. Sci.[J], 2008, 310: 365-373
2. ZHANG Jun-Yan(张俊彦), LIU Wei-Min(刘维民), XUE Qun-Ji(薛群基). Acta Polymerica Sinica(高分子学报)[J], 1999, (2): 227-231
3. LI Yue-Sheng(李悦生), DING Meng-Xian(丁孟贤), XU Ji-Ping(徐纪平). Acta Polymerica Sinica(高分子学报)[J], 1994, (3): 335-341
4. Wang L., Cao Y., Zhou M., *et al.* J. Membr. Sci.[J], 2007, 305: 338-346
5. Lin H., Freeman B. D.. J. Membr. Sci.[J], 2004, 239: 105-117
6. Lin H., Kai T., Freeman B. D., *et al.* Macromolecules[J], 2005, 38: 8381-8391
7. Lin H., Freeman B. D.. Macromolecules[J], 2006, 39: 3568-3580
8. Lin H., Wagner E. V., Freeman B. D., *et al.* Science[J], 2006, 311: 639-642
9. Charmette C., Sanchez J., Gramain P.. J. Membr. Sci.[J], 2004, 230: 161-169
10. Bondar V. I., Freeman B. D., Pinnau I.. J. Polym. Sci., Part B: Polym. Phys.[J], 2000, 38: 2051-2062
11. Liu L., Chakma A., Feng X.. Ind. Eng. Chem. Res.[J], 2005, 44: 6874-6882
12. Okamoto K., Fujii M., Okamoto S., *et al.* Macromolecules[J], 1995, 28: 6950-6956
13. Yoshino M., Ito K., Kita H., *et al.* J. Polym. Sci., Part B: Polym. Phys.[J], 2000, 38: 1707-1715
14. Yang S., Jang W., Lee C., *et al.* J. Polym. Sci., Part B: Polym. Phys.[J], 2005, 43: 1455-1464

本刊中的类似文章

文章评论

序号	时间	反馈人	邮箱	标题	内容
					ugg online ugg boots online buy ugg boots ugg boots sale ugg boots us cardy ugg boots Ugg cardy tall ugg ugg tall boots ugg knightsbridge