

分离用金属膜制备工艺与技术进展

Key technologies for preparation of porous metallic membrane

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中文摘要:

膜分离技术大规模成功地应用于海水、苦咸水的淡化、超纯水制备及食品工业、生物工程、电子工业、石油、化学工业、环保工程等领域, 是一种高新分离技术。然而膜分离技术尚存在许多理论和技術上的问题需要研究、开发、完善和提高, 其中以膜材料显得尤为突出。目前膜分离设备中使用的有机膜受材料性能的影响, 在通量、选择性和化学稳定性、热稳定性方面存在很大缺陷; 而陶瓷膜受制备工艺的影响, 孔径不易控制在比较狭窄的范围, 造成膜的分离精度不高, 截留分子量过于分散, 致命的是陶瓷膜支撑体强度不够, 使用过程中会发生突然的脆断或破裂。金属膜是2

英文摘要:

Membrane filtration is a high-tech separation technique which was triumphantly and cosmically applied to food engineering, biotechnological engineering, electronics engineering, petroleum engineering, chemical engineering and environmental protection engineering; however, some theoretical and technical issues still need to be investigated, especially the materials for membrane. The materials that were utilized at present mainly include organic and ceramic membranes. Owing to natural property of material, organic membranes have low flux, selectivity, chemical and thermal stabilities. The limitation of preparation technique for ceramic membranes leads to a wide pore size distribution which results in a low separation precision and a wide molecular weight cut off. Furthermore, ceramic substrates are too frangible; this makes ceramic membranes tend to be broken abruptly during working. Metallic membrane is a new kind of material, which was first developed in USA in 1990s. It was composited with porous 316L stainless steel substrate and TiO₂ ceramic top layer. The 316L substrates endow the membrane high fatigue, tenacity, intensity and high adaptability for liquid fluid. The excellent material properties make it the most powerful material following organic and ceramic membranes. There are two critical procedures when fabricating it—preparing the porous substrate and top layer. The preparation of substrate depends on powder metallurgy and the top layer is based on the sol-gel technique.

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