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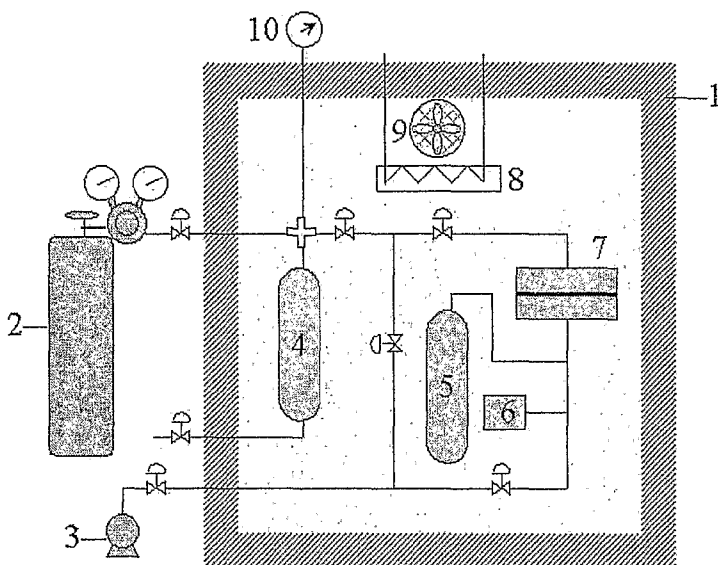
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(54) Title: MIXED MATRIX MEMBRANE WITH MESOPOROUS PARTICLES AND METHODS FOR MAKING THE SAME



(57) Abstract: A mixed matrix membrane for separating gas components from a mixture of gas components is disclosed. The membrane comprises a continuous phase polymer with inorganic porous particles, preferably molecular sieves, interspersed in the polymer. The polymer has a CO₂/CH₄ selectivity of at least (20) and the porous particles have a mesoporosity of at least 0.1 cc STP/g. The mixed matrix membrane exhibits an increase in permeability of at least 30% with any decrease in selectivity being no more than 10% relative to a membrane 10 made of the neat polymer. The porous particles may include, but are not limited to, molecular sieves such as CVX-7 and SSZ-13, and/or other molecular sieves having the required mesoporosity. A method for making the mixed matrix membrane is also described. Further, a method is disclosed for separating gas components from a mixture of gas components using the mixed matrix membrane with mesoporous particles.

Schematic of gas permeation apparatus for flat membrane films

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INTERNATIONAL SEARCH REPORT

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PCT/US05/41918

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC: B01D 53/22(2006.01)</p> <p>USPC: 95/45,51,90,902;96/4,8,10,135;264/176.1,177.14 According to International Patent Classification (IPC) or to both national classification and IPC</p>																
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<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X — Y</td> <td>US 2003/0131731 A1 (KOROS et al) 17 July 2003 (17.07.2003), paragraphs [0034] to [0116].</td> <td>1-7,9-15 and 17-23 ----- 23</td> </tr> <tr> <td>X — Y</td> <td>US 6,626,980 B2 (HASSE et al) 30 September 2003 (30.09.2003), column 5, line 56 to column 12, line 60.</td> <td>1-22 ----- 23</td> </tr> <tr> <td>A</td> <td>US 6,117,328 A (SIKDAR et al) 12 September 2000 (12.09.2000), the entire document.</td> <td>1-23</td> </tr> <tr> <td>A</td> <td>US 5,127,925 A (KULPRATHIPANJA et al) 07 July 1992 (07.07.1992), the entire document.</td> <td>1-23</td> </tr> </tbody> </table>		Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X — Y	US 2003/0131731 A1 (KOROS et al) 17 July 2003 (17.07.2003), paragraphs [0034] to [0116].	1-7,9-15 and 17-23 ----- 23	X — Y	US 6,626,980 B2 (HASSE et al) 30 September 2003 (30.09.2003), column 5, line 56 to column 12, line 60.	1-22 ----- 23	A	US 6,117,328 A (SIKDAR et al) 12 September 2000 (12.09.2000), the entire document.	1-23	A	US 5,127,925 A (KULPRATHIPANJA et al) 07 July 1992 (07.07.1992), the entire document.	1-23
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<p>Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201</p>	<p>Authorized officer Jason M. Greene Jacqueline A. Whitfield Telephone No. (571) 272-1700 Special Project Asst.</p>															