최신 미국특허 등록 목록

■ Hybrid RO/PRO system

• Patent number : WO 2007/134226

• Inventors : R.L. Stover and G.G. Pique

• Applicant : Energy Recovery Incorporated, USA

• Abstract : The subject of this patent is a system which includes a separation element (11) that employs a semi-permeable membrane material (17). The system is designed so that it can operate either in an reverse osmosis (RO) mode, to produce high-quality water, or in a pressure-retarded osmosis (PRO) mode, to generate power from two aqueous solutions of different salt concentrations. In a preferred embodiment, a rotary, pressure-transfer device (29) is included to transfer pressure from an outlet stream, exiting the separation element, to an inlet stream that is being supplied to the separation element.

■ High selectivity membranes for CO2/CH4 separation

• Patent number : WO 2007/134094

• Inventors : S. Li, J.L. Falconer, and R.D. Noble

• Applicant : The Regents of the University of Colorado, USA

• Abstract : This patent provides details of SAPO-34 zeolite membranes and methods that are used to prepare them. The SAPO-34 membranes are prepared by contacting at least one surface of a porous membrane support with a synthesis gel. The Si/Al ratio of the synthesis gel can be from 0.3 to 0.15. SAPO-34 crystals are optionally applied to the surface of the support prior to synthesis. A layer of SAPO-34 crystals is formed on at least one surface of the support. SAPO-34 crystals may also form in the pores of the support. The SAPO-34 membranes that form the subject of this invention can have improved selectivity for certain gas mixtures, including mixtures of carbon dioxide and methane.

■ An improved membrane water desalination process

• Patent number : WO 2007/132465

• Inventors : Y. Volkman and M. Veisman

• Applicant : Ben-Gurion University of the Negev, Research and Development Authority, Israel

• Abstract : A water treatment process is disclosed. The process involves providing a water stream, containing one or more soluble species capable of forming one or more sparingly soluble salts, and adding to this an effective concentration of at least one anti-scaling agent. The water is then passed through one or more desalination membranes, to obtain a desalinated water permeate. To obtain a concentrate that is supersaturated by one or more sparingly soluble salts, and containing at least one anti-scaling agent, an effective concentration of a ferric (Fe+3) ion is added to the concentrate, and the precipitated salts are removed (separated from the concentrate) to obtain a de-supersaturated water effluent. This effluent can be recycled or further treated in a secondary desalination stage.

■ Method of 'de-clogging' a membrane device

• Patent number : WO 2007/135333

• Inventors : W.R. Johns

• Applicant : Haemair Limited, UK

• Abstract : The subject of this patent is an

apparatus designed for use in blood/air mass exchange. It comprises a number of conduits for defining a blood flow from an inlet, and a plurality of conduits for defining an air flow from an inlet. The air-flow and blood-flow conduits are at least partially composed of a gas-permeable membrane material. The conduits are arranged relative to each other in such a way as to enable the transfer of oxygen from the air flow to the blood flow, and transfer of carbon dioxide from the blood flow to the air flow through the membrane material. The apparatus additionally comprises at least one sensor for sensing patient respiratory demand, and a way of governing the rate of blood/air mass exchange through the separate control of the levels of carbon dioxide and oxygen in the air flow.

■ Aerating device for a water filter system

- Patent number : WO 2007/135087
- Inventors : E. Brois and A. Busnot
- Applicant : OTV SA, France
- Abstract : This invention concerns an aerating device for a water filter system that uses immersed membranes (9). It is designed to be installed beneath the membranes (9). The system described uses a 'floor' (1) that separates an upper chamber, which contains the immersed membranes, from a lower chamber that houses a unit for introducing the liquid that is to be treated and an aerating gas. This floor includes a plurality of strainers (2) and a system (5) for balancing pressures between the upper and lower chambers. Each strainer (2) includes a tubular element (13) that passes through the floor and has in its upper part at least one orifice (4), and an air chamber element (3) mounted atop the upper part.

■ Method of improving the performance of a process for landfill leachate treatment

- Patent number : WO 2007/140393
- Inventors : D.A. Musale
- Applicant : Nalco Company, USA
- Abstract : A method of processing landfill leachate using a membrane-separation process is disclosed. Specifically, a number of steps are taken to process leachate. The landfill leachate is collected in a receptacle (1). In a second stage it is treated with one or more water-soluble polymers. These are selected from the group comprising amphoteric polymers, cationic polymers, zwitterionic polymers and a combination of these. As an option these water-soluble polymers can be mixed with the landfill leachate. The treated landfill leachate is then passed through a membrane - either an ultrafiltration (UF) or a microfiltration (MF) membrane. Back-flushing also can be applied to the membrane to remove solids from its surface. The accompanying figure shows the leacheate flowing through a conduit to a second unit where one or more polymers are added. The treated landfill leachate then flows into the membrane unit (6) that is submerged in a tank (11). Also, polymer (10) may be added to the tank (11) containing the submerged membrane. Optionally, the subsequent permeate (8) then flows through an additional membrane (9), which may be either a reverse osmosis or a nanofiltration membrane.

■ Fluid treatment apparatus with bioreactor and membrane filtration module

- Patent number : WO 2007/139374
- Inventors : H. Futselaar and R. Borgerink
- Applicant : X-Flow BV, The Netherlands
- Abstract : The subject of this patent is an apparatus for treating an incoming fluid. It is composed of a bioreactor with a basin (2), containing a fluid space; a membrane filtration module (12) comprising a housing (13) with one or more incorporated membranes (14); an inlet side; and a permeate side and a retentate side. The housing (13) delimits a connection chamber (18) on the inlet side of the membranes (14) into which a fluid inlet line (10) discharges (which is connected to the fluid space of the basin). A closable flushing discharge line (20) is provided, which is connected on one side to the chamber (18) and on the other side discharges outside the

fluid space. A fluid mixture feed-through line from the basin to the connection chamber is closable, and a control unit (23) is provided for periodically closing the fluid-mixture feed-through line and opening the flushing discharge line (20), and vice versa, for periodic flushing of at least the inlet side of the membranes (14) and the connection chamber (18) disposed underneath it.

■ **Bio-functional membrane and sensor arrangement**

- **Patent number** : WO 2007/137840
- **Inventors** : W. Kühlbrandt and Ö. Yildiz
- **Applicant** : Max-Planck-Gesellschaft zur Förderung der Wissenschaften EV, Germany
- **Abstract** : This invention relates to an arrangement for a bio-functional membrane (40) and sensor. It also covers a filter arrangement and describes uses of the functional membrane (40). The arrangement for the bio-functional membrane is based on a double-layer lipid membrane (41) into which a plurality of porin units (P), or the derivatives of these, are integrated as functional switchable pores (42) or channels that extend through the membrane.

■ **Method of shifting the current distribution in EDI systems**

- **Patent number** : WO 2007/143296
- **Inventors** : J. Barber
- **Applicant** : General Electric Company, USA
- **Abstract** : This patent describes a method of shifting the current distribution in electrodeionisation (EDI) systems. Details are given of an EDI apparatus (10) and method involving an ion-depleting chamber (20) for removing ions from liquids. A resistive component (32) is coupled proximate to the outlet region of the chamber so as to increase the electrical resistance of the outlet region (of the chamber) with respect to the inlet region (of the chamber). The resistive component may be coupled to the ion-selective membranes (22,24) bordering the diluting chamber (20) and/or the concentrate chambers (21). In an alternative embodiment, the resistive component may be coupled between the ion-exchanging media particles themselves, within the ion-depleting chambers. In each embodiment, the electrical resistance of the outlet region is increased with respect to the inlet region of the chamber. In this way electrical current is shifted from the outlet region towards the inlet region, thus enhancing the overall deionisation performance of the EDI device.

■ **Improved oxidiser and oxidation process for a desulfurisation system**

- **Patent number** : WO 2007/142748
- **Inventors** : G.J. Nagl, M. Reicher and D. Mcmanus
- **Applicant** : Merichem Chemicals & Refinery Services Llc, USA
- **Abstract** : This invention relates to an improved oxidiser for use in processes that treat sour gas streams containing hydrogen sulfide. Specifically, the gas-liquid oxidiser uses a hollow-fibre membrane to allow an oxygen containing gas to contact a liquid reduction-oxidation (redox) catalyst solution at high mass-transfer rates. The system produces mass-transfer rates up to 100 times greater than previously observed, claim the inventors – reducing equipment costs and the amount of excess oxygen needed to complete the oxidation of the redox catalyst, and improving overall process economics.

■ **Process for transforming expanded polystyrene into sulfonated polystyrene ionomers**

- **Patent number** : WO 2007/140567
- **Applicants/Inventors** : L.E. Roca Bruno and J.A.M Agnelli, Brazil
- **Abstract** : This patent concerns a process for transforming expanded polystyrene (ISOPOR) into sulfonated polystyrene ionomers (SPS),

neutralised with different ions of interest, ranked in the periodic table (MSPS), for use in several applications. The materials can be used in gel, solid or liquid state, for example, as agents for improving compatibility characteristics of polymers and in permselective membranes.

■ Apparatus for pervaporation control in chromatographic systems

- Patent number : WO 2008/006101
- Inventors : C.W. Sims, J. Thompson and Y. Gerner
- Applicant : Systec Llc, USA
- Abstract : A method for controlling pervaporation through a membrane has been developed and is described by this patent. It includes assessing the vapour pressure of each component material of a mobile phase disposed on a retentate side of the membrane, and maintaining a designed environment on a permeate side of the membrane. The environment maintained on the permeate side of the membrane contains partial pressures of selected component materials of the mobile phase at a level substantially equal to, or greater than, their respective vapour pressures.

■ Sulfonated polyaryletherketone-block-polyether-sulfone copolymers

- Patent number : WO 2008/005647
- Inventors : D.J. Brunelle, H. Zhou, H. Liu, J. Hung, M.E. Harmon and D.R. Moore
- Applicant : General Electric Company, USA
- Abstract : Sulfonated block copolymers suitable for use as proton exchange membranes for fuel cells form the subject of this patent. They comprise sulfonated polyaryletherketone blocks and polyethersulfone blocks. The sulfonated polyaryletherketone blocks comprise structural units of formula (1)-shown in the accompanying diagram on the previous page-wherein R1 is C1-C10 alkyl, C3-C12 cycloalkyl, C6-C14 aryl, allyl, alkenyl, alkoxy, halo, or cyano; Ar1 and Ar2 are each independently C6-C2O aromatic radicals, or Ar1 and Ar2, taken together with an intervening carbon atom, form a bicyclic C6?C20 aromatic radical or a tricyclic C6?C20 aromatic radical; M is H, a metal cation, a non-metallic inorganic cation, an organic cation or a mixture of these; and a is 0 or an integer from 1 to 4.

■ Asymmetric hollow-fibre membrane

- Patent number : WO 2008/003610
- Inventors : B. Krause, M. Hornung and H.R. Goehl
- Applicant : Gambro Lundia AB, Sweden
- Abstract : A process for manufacturing an asymmetric hollow-fibre membrane is covered by this patent. It involves a number of steps. First, a polymer solution is extruded through the outer ring slit of a hollow-fibre spinning nozzle (simultaneously extruding a centre fluid through the inner bore of the hollow-fibre spinning nozzle), into a precipitation bath. The polymer solution contains 10-26 wt% of polysulfone (PSU), polyethersulfone (PES) or polyarylethersulfone (PAES), 8-15 wt% polyvinylpyrrolidone (PVP), 55-75 wt% N-alkyl-2-pyrrolidone (NAP) and 3-9 wt% water. The centre fluid contains 70-90 wt% N-alkyl-2-pyrrolidone (NAP) and 10-30 wt% water. The precipitation bath contains 0-20 wt% N-alkyl-2-pyrrolidone (NAP) and 80-100 wt% water.

■ Improved monopersulfate treatment of membranes

- Patent number : WO 2008/006173
- Inventors : H.-J. Muller, D. Wang and A.J. Inglis
- Applicant : Siemens Water Technologies Corporation, USA
- Abstract : A method of improving the water permeability and/or cleaning a porous polymeric membrane (such as a microfiltration or ultrafiltration membrane) has been invented. It involves the step of contacting a porous polymeric membrane with a source of monopersulfate and a halide ion, such as chloride and

optionally a base. The source of monopersulfate may be potassium monopersulfate in conjunction with potassium hydrogen sulfate and potassium sulfate, that is, a triple salt of formula 2KHSO5.KHSO4.K2SO4.

■ **Methods for separating water from a mixture including a liquid hydrocarbon**

- **Patent number** : WO 2008/008749
- **Inventors** : J. Lundquist and I. Reed
- **Applicant** : Pall Corporation, USA
- **Abstract** : Arrangements and methods embodying this invention include a hydrocarbon barrier membrane for separating water from a liquid mixture which includes a liquid hydrocarbon as a continuous phase and water as a discontinuous phase. An example of the separation arrangement is shown in the accompanying figure. The arrangement (10) includes a first volume (11), which is arranged to contain the liquid mixture, including the discontinuous phase water, and a second volume (12), which is arranged to receive the water from the first volume (11). The arrangement further includes a hydrocarbon barrier membrane (13), which allows passage of the water but resists passage of the liquid hydrocarbon. The hydrocarbon barrier membrane has one surface (14), for example, an upstream or higher pressure surface, which is in contact with the first volume (11), and an opposite surface (15), for example, a downstream or lower pressure surface, which is in contact with the second volume (12). In one example of a mode of operation, the upstream surface (14) of the hydrocarbon barrier membrane is contacted by the liquid mixture. The nominal pressure at the upstream surface may be greater than that at the downstream surface (15) of the hydrocarbon barrier membrane. The resulting differential pressure drives the discontinuous phase water from the first volume through the hydrocarbon barrier membrane to the second volume when the discontinuous phase water contacts the upstream surface (14) of the hydrocarbon barrier membrane (13). However, the hydrocarbon barrier membrane resists the passage of the continuous phase liquid hydrocarbon. Consequently, substantially all of the liquid hydrocarbon is prevented from passing into the second volume. The liquid that passes through the hydrocarbon barrier membrane may be less than about 10% liquid hydrocarbon.

■ **Poly(aryl ether) with pendent sulfonic acid phenyl groups**

- **Patent number** : WO 2008/009102
- **Inventors** : B. Liu, M.D. Guiver and G. Robertson
- **Applicant** : National Research Council of Canada, Canada
- **Abstract** : This patent provides details of a sulfonated poly(aryl ether) (SPAE) that has a poly(aryl ether) (PAE) main chain and a sulfonated phenyl group pendent from the main chain. This material can be used to make proton exchange membranes, particularly for fuel cells. The pendent phenyl group can provide an easily 'sulfonable' site that may be sulfonated under mild conditions, providing the ability to precisely control the sulfonic acid content of the SPAE.

■ **Process for producing hollow-fibre membrane bundles**

- **Patent number** : WO 2008/007608
- **Inventors** : Y. Shibashi and A. Watanabe
- **Applicant** : Asahi Kasei Chemicals Corporation, Japan
- **Abstract** : This patent provides details of a process for producing hollow-fibre membrane bundles. The ends of the bundles are fixed with a casting material. The process is characterised by fixing the ends of hollow-fibre membranes with this casting material with an insert (placed in a membrane bundle) at a site closer to the centre of the bundle than the region for forming a fixed part and then removing the insert from the interior of the resulting bundle. The hollow-fibre membrane

bundle obtained by using this process can be used in various filtration applications including external-pressure filtration.

■ Desalination of sea water or brackish water

- Patent number : WO 2008/009723
- Inventors : C.J. Linderoth
- Applicant : Fip AG, Switzerland
- Abstract : This invention concerns a unit for the desalination of sea water or brackish water. It includes a means of collecting (1) the water and a means of treating it (2), for example by means of membrane filtration, distillation, refrigeration, reverse osmosis, electrodialysis or by means of an electrostatic field. In the desalination unit, the water collection means (1) comprises at least one catchment tube (3), the porous or perforated active portion (3′) of which is positioned such that it is suitable for collecting seaside water. This active portion (3′) of the catchment tube (3) is situated in a parallel, or substantially parallel, manner to the sea line, embedded in the sandy shore between 50 m below the line of the high water level (7) and 50 m above the line of the low water level (11). It is embedded at a depth (a) ranging from between 0.5 m and 3 m with respect to the ground surface, in the zone between the lines of the high water-level (7) and low water-level (11); with respect to the high water-level (6), in the zone between the line of the high water-level (7) and 50 m below the level; and with respect to the low water-level (10), in the zone between the low water-level (11) and 50 m above the level. The catchment tube(s) (3) is/are associated with a canalisation system (16, 17) and with pumping means (15) in order to recover the collected water and to ensure that it is transported to the treatment means (2) suitable for desalination.

■ Ceramic filter

- Patent number : WO 2008/010452
- Inventors : A. Chikawa and T. Tomita
- Applicant : NGK Insulators Limited, Japan
- Abstract : Disclosed is a ceramic filter that is formed on a porous substrate and has good permeability and selectivity. The ceramic filter comprises a monolith-type alumina porous substrate (2) having an average pore size of 1 mm to 30 mm; a first surface dense layer (3) having an average pore size of 0.1 mm to 3 mm, and provided on the substrate (2), a second surface dense layer (4) having an average pore size of 0.01 mm to 0.5 mm and provided on the first surface dense layer (3), a third surface dense layer (5) formed with a titania sol, having an average pore size of 0.3 nm to 20 nm and provided on the second surface dense layer (4), and a carbon membrane layer (6) which is a molecular sieve carbon membrane and provided on the third surface dense layer (5).

■ Polymer electrolyte membrane with improved dimensional stability

- Patent number : WO 2008/014281
- Inventors : R. Mehmi, D. Olmeijer, C. Castledine, D. Strait and R. Barton
- Applicant : Polyfuel Incorporated, USA
- Abstract : This invention provides details of dimensionally stable polymer electrolyte membranes (PEMs) that can be used to fabricate catalyst coated membranes (CCMs) and membrane electrode assemblies (MEAs) for fuel cells. The disclosed method of making a dimensionally stable (PEM) having in-plane dimensional stability initially involves providing a PEM having XM and YM dimensions that define the XM, YM plane of the PEM and a ZM dimension perpendicular to the XM, YM plane that defines the thickness of the PEM. The PEM is then treated to create strain in the XM, YM plane in such a way that the resulting material does not swell significantly in at least one direction in the XM, YM plane, compared with the ZM dimension, when contacted with water and methanol.

■ Removing and recovering water from polymer manufacturing

- Patent number : WO 2008/014201
- Inventors : N. Borisow, D.M. Polizzotti, P.D.

Mayovich and T.Q. HuynH

- **Applicant** : General Electric Company, USA
- **Abstract** : A method for purifying and recovering wash-water in a polymer manufacturing process has been developed. The method described uses media filtration (14) with reverse osmosis (RO) membranes (36, 44) to achieve separation and water reuse. Wash-water containing particles of polymer product and surfactants is introduced into a media filtration unit (14) that contains filter media particles (16) which are composed of a substrate and an adsorbed layer of a coagulant compound (adsorbed onto the substrate). The filtrate stream is then introduced to a staged RO (36, 44) system. This strengthens the surfactants content in the reject stream to a desired concentration, and the reject stream is preferably disposed (118) of after reaching the desired concentration, while the permeate (46) is preferably reused.

■ **Water purifier**

- **Patent number** : WO 2008/013068
- **Inventors** : M. Okuda and T. Yamamoto
- **Applicant** : Seiwa Pro Company Limited, Japan
- **Abstract** : The subject of this patent is a purifier that is easy to handle and is capable of preventing bacteria from entering water. The water purifier (1) is composed of a vessel (10) that has a water supply mechanism, and contains raw water; a membrane separation mechanism for separating a target object from the raw water, using reverse osmosis (RO); and a mechanism for pressurising the raw water in the container and supplying it to the membrane separation mechanism. Also detailed is a purified water flow-tube in which water flows, having penetrated through the RO membrane; a discharge water flow-tube to convey raw water that has not penetrated through the RO membrane; a check valve provided in the purified water flow-tube, and a body (40). To the body are connected a placement section (41b) on the upper surface of which the container is placed; a member that can be connected and removed from the water supply mechanism; and the water flow-tube. The body has an opening for delivering the purified water and another opening to which the discharge water flow-tube is connected and through which discharge water is channelled. The body is an integral part of the unit and is combined with the membrane separation mechanism, the supply mechanism, the purified water flow-tube and the discharge water flow-tube. When the container is placed on the placement section (41b) – to connect together the water supply mechanism and the connection member – the raw water inside the container is channelled to the supply mechanism side.

■ **Fluororesin polymer separation membrane**

- **Patent number** : WO 2008/012872
- **Inventors** : M. Hanakawa and S. Minegishi Bv, The Netherlands, and Shell Canada Limited, Canada
- **Applicant** : Toray Industries Incorporated, Japan
- **Abstract** : This invention concerns a fluororesin polymer separation membrane. According to the inventors, it excels in removing virus and also has a high water permeation performance, is resistant to chemicals and contaminants, and has a high physical strength. The material has been developed to be used as a filtration membrane. The fluororesin polymer separation membrane that is detailed by this patent is composed of a layer that has a three-dimensional network structure and a layer that has a spherical structure. The first layer (three-dimensional network structure) does not contain macrovoids equal to or larger than 5 μm. The membrane exhibits a filtration performance such that the efficiency of removing dextran of 7.5 × 104 molecular weight is 80% or higher. The three-dimensional network structure is produced by a coagulation process involving a solution containing a fluororesin polymer and a cellulose ester.

■ Retention of noble gases using membrane separation

• Patent number : WO 2008/012350

• Applicant/Inventor : K. Schmidt, Germany

• Abstract : This invention relates to the preparation of gas mixtures – in particular breathing gases for patients that require ventilation. The method uses selective gas separation membranes to retain noble gases in the exhaled air of ventilated patients. The membrane is integrated into a breathing device as an actively effective separation device. The membrane selectively retains the noble gases to separate them from the remainder of the expiration gases. In this way it is possible to make available a ventilation device that uses noble gases – xenon in particular – as an anaesthetic, which is particularly simple and that incurs the least possible waste during use.

■ Membrane materials made from sulfonated polyarylene compounds

• Patent number : WO 2008/012222

• Inventors : D. Lehmann, J. Meier-Haack, C. Vogel and W. ButwilowskI

• Applicant : Leibniz-Institut für Polymerforschung Dresden EV, Germany

• Abstract : This patent describes sulfonated polyarylene compounds that can be used, for example, to make ion-exchange membranes for fuel cells. It also describes a method to produce them. The aim is to create hydrolytically and thermally resistant sulfonated polyarylene compounds with a defined degree and position of sulfonation and from which membrane materials can be produced that have a better resistance to hydrolysis. This is achieved by using sulfonated polyarylene compounds of at least one of the general formulae (I) to (IV) shown below.

■ Capillary membrane filtration module

• Patent number : WO 2008/012221

• Inventors : H. Beckers and W. Doyen

• Applicant : Vlaamse Instelling voor Technologisch Onderzoek (VITO), Belgium

• Abstract : This invention concerns a filtration device for removing particles from a liquid. The device comprises a collector header and a plurality of planar membrane assemblies having an upper side and a lower side. The lower side is linked to the collector header. Each planar membrane assembly is formed as a single row of a series of capillary membranes and is linked to an individual upper header.

■ Ceramic hollow-fibre membrane and module

• Patent number : WO 2008/016292

• Inventors : R.A. Terpstra, J.P.G.M. van Eijk and M.G.C. Sars

• Applicant : Hyflux Ceparation NV, The Netherlands

• Abstract : The ceramic hollow-fibre membrane described by this patent has an external diameter of about 4 mm, a wall thickness of 0.52-0.54 mm, and is provided with a thin ceramic coating either on its inside surface or outside surface. In a method for producing these hollow-fibre membranes, a paste is introduced into three spinnerets, which produce three continuous fibres that are cut at desired lengths. Subsequently, the fibres are laid against each other on a heating plate in a furnace to remove internal stresses. The fibres are then placed in a burn-off furnace in which hot air is circulated to remove the binder system. Subsequently, they are stacked in an installation in which they are sintered. Following this stage, a ceramic powder coating is applied either on the inside or outside of the fibre membrane, and then the coating is dried and sintered.

■ Electro-deioniser

• Patent number : WO 2008/016055

• Inventors : H. Kaku and M. Osawa

• Applicant : Kurita Water Industries Limited, Japan

• Abstract : The electro-deioniser (1) detailed by

this patent comprises a negative electrode (11) and positive electrode (12). Alternately arranged concentrating compartments (15) and desalination compartments (16) are interposed between these electrodes. These are created by alternately disposing multiple, anion-exchange membranes (13) and cation exchange membranes (14). Each of the concentrating compartments is fitted with a bipolar membrane (20) to partition its interior space into a negative electrode side and a positive electrode side. Each of the desalination compartments is divided into at least two layers consisting of (from the upstream side, in the direction of the flow of the water to be treated) a first layer and second layer, and is packed with ion exchanger (30), composed of anion exchanger (30A) and cation exchanger (30B). This is done so that the ion exchanger which fills the first layer contains the cation exchanger in an amount of 50 vol% or more, while the ion exchanger which fills the second layer contains the anion exchanger (30A) in an amount of 50-80 vol%. Accordingly, the electro-deioniser can be operated in a stable manner for a prolonged period while preventing the generation of scale in both the concentrating compartments and desalination compartments.

■ **Membrane reactor for the treatment of liquid effluents**

- **Patent number** : WO 2008/015142
- **Inventors** : S. Heng, K.L. Yeung and J.-C. Schrotter
- **Applicant** : OTV SA, France
- **Abstract** : The subject of this patent is a membrane reactor for treating liquid effluents containing organic pollutants. The patent describes a type of reactor that contains at least one porous membrane (3) for the diffusion of an oxidising gas. It also includes at least one selective membrane (2, 4) and a reaction space (31) into which liquid effluents are injected. The reactor is able to extract retentates from the reaction space. A second space (32) is available for recovering the treated effluents. This space is separated from the reaction space by a selective membrane or membranes.

■ **Membranes with controlled permeability**

- **Patent number** : WO 2008/018879
- **Inventors** : D.A. Gough, J.Y. Lucisano, J.T Lin and H.-M. Tsay And D. Lim
- **Applicant** : The Regents of the University of California, USA
- **Abstract** : A membrane for use in an 'implantable' glucose sensor forms the subject of this patent. It includes at least one cross-linked, substantially hydrophobic polymer and at least one cross-linked substantially hydrophilic polymer. The first and second materials are different polymers and form an interpenetrating polymer network, semi-interpenetrating polymer network, polymer blend, or copolymer. The membranes are generally characterised by providing a permeability ratio of oxygen to glucose of about 1 to about 1000 in units of (mg/dl glucose) per (mmHg oxygen). Details of three methods of making membranes from hydrophobic and hydrophilic monomers, formed into polymer networks, are provided. According to at least two of the methods, the monomers may be substantially immiscible with one another.

■ **Device for producing drinking water**

- **Patent number** : WO 2008/017094
- **Applicant/Inventor** : H.-P. Bierbaumer, Austria
- **Abstract** : This patent describes a device (1) for at least partially separating a solvent from a solution (6). It comprises at least one membrane filter unit (2) that has a solution feed element (8), a solvent outflow and a concentrate outlet (5) for a concentrate produced from the solution. Upstream of the solution feed element (8), at least one unit (7) is arranged on the membrane filter device for generating a rotating or swirling flow in the solution. Optionally, magnets, a laser and/or

a gas suction device are arranged on the device which can be operated in the bypass flow.

■ Chemically cross-linked polymeric membranes

- Patent number : WO 2008/021070)
- Inventors : C.Y. Sabottke, B.K. Kaul and D. Peiffer
- Applicant : Exxonmobil Research and Engineering Company, USA
- Abstract : This invention relates to the fabrication of a polymeric membrane and a process for using the polymeric membrane for separating components of a feed-stream. More particularly, but not by way of a limitation, this invention relates to the fabrication of a polymeric membrane and a process for using it in the separation of aromatics from a hydrocarbon-based feed-stream. According to the inventors, the membranes described possess low, soft segment glass transition temperatures and improved separation characteristics.

■ Carbon nano-composite membranes

- Patent number : WO 2008/020825
- Inventors : H.C. Foley, R. Rajagopalan and A.R. Merritt
- Applicant : The Pennsylvania State Research Foundation, USA
- Abstract : Gas permeable, carbon-based, nano-composite membranes form the subject of this patent. The material from which the membranes are made, is composed of a nano-porous carbon matrix that includes a pyrolysed polymer, and a plurality of nano-particles of carbon or an inorganic compound disposed in the matrix. The matrix is prepared by pyrolysing a polymer, and nano-particles of the particulate material are disposed in the polymer prior to pyrolysis. The particles may be disposed in a precursor of the polymer (which is subsequently polymerised) or in the polymer itself.

■ Removing boron from sea water using RO membranes

- Patent number : WO 2008/020104)
- Inventors : E. Palacios Doñaque, M. Fariñas Iglesias and E. Palacios Jimenez
- Applicant : Acciona Agua SAU, Spain
- Abstract : This invention relates to a method for removing boron from sea water using reverse osmosis (RO) membranes. The process involves adding to the sea water a composition that comprises at least one metal, with at least one anti-fouling/dispersant agent, and a second stage in which an 'alkalinising' agent is added in order to achieve a pH of 8-9.5. There also may be a third stage in which the sea-water fluoride content is increased (after the second stage), or a third stage in which an alcohol of high molecular weight is added to the water.