

Title (en)
METHOD FOR ELECTROCHEMICAL HYDROGEN SEPARATION FROM NATURAL-GAS PIPELINES

Title (de)
VERFAHREN ZUR ELEKTROCHEMISCHEN WASSERSTOFFABTRENNUNG AUS ERDGAS-PIPELINES

Title (fr)
PROCÉDÉ DE SÉPARATION ÉLECTROCHIMIQUE D'HYDROGÈNE À PARTIR DE CONDUITES DE GAZ NATUREL

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Application
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Abstract (en)
[origin: WO2021198102A1] The present invention relates to a one-stage membrane method for the electrochemical separation of hydrogen from natural-gas flows in a pipeline (1) that has a positive pressure in the range of 50 mbar to 100 bar, the method having the following method steps: (i) a partial gas flow (2) is drawn from the natural-gas flow in a pipeline (1) without altering the gas composition, the mass flow of the partial gas flow being set depending on the hydrogen content in the natural-gas flow (1) such that, with a hydrogen concentration of <10 vol. %, a degree of depletion of 0.65 to 0.975 is achieved, and, with a hydrogen concentration of >10 vol. %, a degree of depletion of 0.55 to 0.925 is achieved, the degree of depletion being defined as the quotient of the desired molar H₂ product flow (6) and of the molar H₂ reactant volume flow of the partial gas flow at the inlet of the membrane unit (2); (ii) this partial gas flow (2) is compressed (3) upstream of a membrane unit (5); (iii) this partial gas flow is heated to 100 to 250 °C, either upstream of the membrane unit or in the membrane unit, and water (4) is supplied to this partial gas flow upstream of the membrane unit and/or on the permeate side of the membrane unit (4a) so that the water load is between 0.005 to 0.2 mol water/mol natural gas; (iv) this partial gas flow is supplied to an electrochemical membrane unit in which hydrogen is separated as permeate (6a) at a temperature of 100 to 250 °C; (v) the retentate (8) of the membrane unit is supplied back into the natural-gas flow, is supplied for use in a chemical process, and/or is used as fuel. The present invention also relates to a method for determining the optimised partial gas flow that is drawn from a pipeline conveying natural gas and hydrogen, in order to separate hydrogen from this partial gas flow in an electrochemical membrane unit.

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