

## Title (en)

ELECTROCHEMICAL METHOD FOR PRODUCING PRESSURISED GASEOUS HYDROGEN BY ELECTROLYSIS THEN BY ELECTROCHEMICAL CONVERSION

## Title (de)

ELEKTROCHEMISCHES VERFAHREN ZUR HERSTELLUNG VON UNTER DRUCK STEHENDEM GASFÖRMIGEM WASSERSTOFF DURCH ELEKTROLYSE UND DANN DURCH ELEKTROCHEMISCHE UMWANDLUNG

## Title (fr)

PROCEDE ELECTROCHIMIQUE DE PRODUCTION D'HYDROGENE GAZEUX SOUS PRESSION PAR ELECTROLYSE PUIS PAR CONVERSION ELECTROCHIMIQUE

## Publication

**EP 3775324 A1 20210217 (FR)**

## Application

**EP 19720964 A 20190403**

## Priority

- FR 1852886 A 20180403
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## Abstract (en)

[origin: WO2019193283A1] The invention relates to an electrochemical method for producing gaseous hydrogen by electrolysis then electrochemical conversion of  $H^+$  ions into gaseous hydrogen, either by depolarisation with production of electrical energy (battery) or by catalysis. The aim of the invention is to improve said method in order to reach, industrially, high pressures of gaseous hydrogen, for example >80 bars. To this end, the method essentially consists in implementing, in a decoupled manner, at least one step of EI electrolysis of an electrolyte producing gaseous oxygen in a chamber EI, and at least one step of electrochemical conversion  $C^\circ$  of  $H^+$  ions into gaseous hydrogen in a chamber  $C^\circ$  containing a liquid phase L and a gaseous phase G which is not dissolved in said liquid phase. In said method: the gaseous hydrogen produced in the conversion step  $C^\circ$  is partially present in the crown of the chamber  $C^\circ$  and in the form of bubbles in the electrolyte and partially dissolved in the electrolyte which as a result becomes saturated with hydrogen; the electrolyte comprises at least one redox couple (A/B) forming at least one intermediate vector allowing the decoupling of the steps EI &  $C^\circ$ ; the interface between phase G and phase L is increased during step  $C^\circ$  in such a way as to accelerate the diffusion of the liquid phase to the gaseous phase, dissolved hydrogen potentially supersaturating the electrolyte; and the pressurised gaseous hydrogen is collected in a reservoir. The invention also relates to devices for implementing such a production method and to a kit comprising one of said devices and components of the electrolyte.

## IPC 8 full level

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