This solution, which consists in additionally adding a rinse stage after the adsorption stages, complicates the cycle of the PSA and results in generally additionally adding an adsorber. The amount of adsorbable gas to be injected is relatively high if it is desired to drive off the hydrogen from an appreciable part of the volume of adsorbent.

FR 2 836 060, for its part, cited by way of illustration of the processes which can be used in the case of H_2 PSAs, describes a fairly complex cycle which, in some alternative forms, combines both a partial recycling of the waste product and a contribution of secondary gas containing hydrogen, it being possible for the main feedstock gas and the two additional fractions to be successively introduced into the unit as a function of their respective hydrogen contents, the poorer in H_2 last, thus creating a rinse effect.

Here again, it is possible to obtain high extraction yields of hydrogen when reckoning with respect to the main feed alone but this is at the expense of a high complexity which restricts such a solution to specific cases.

The aim of the present invention is thus in this instance to present a process which makes it possible to increase the hydrogen extraction yield of an H_2 PSA or, with fixed production, to increase its productivity by deploying only very simple and relatively inexpensive means.

In one aspect, the present disclosure is directed towards a process for the production of a gas stream exhibiting a hydrogen concentration equal to or greater than 99.9% by means of a pressure swing adsorption (PSA) unit starting from a main gas stream comprising at least 70 mol% of hydrogen, characterized in that a secondary stream, representing less than 20% of the molar flow rate of the main gas stream and having a hydrogen content of less than 25 mol%, is introduced into this main gas stream upstream of the PSA.

The field of the invention is limited to the cases where the feed gas of the PSA is rich in hydrogen and where it is desired to produce pure hydrogen. These two elements, taken together, mean that, at the end of the adsorption stage, a significant amount of hydrogen remains in the adsorber, whether it is the hydrogen present in the inter- and intraparticulate spaces of the zones saturated by the various impurities or the hydrogen present in the top zone of the adsorber, in particular in the frontal zone. This is because, in view of the desired purity, it