CLAIMS

1. A method for recovering a usage gas from a gas mixture consisting of a usage gas and at least one secondary gas, comprising at least the steps:

A) compression of the gas mixture in a compressor (11),

B) transfer of the compressed gas mixture into a pressure vessel (93),

C) cooling of the compressed gas mixture in the pressure vessel (93) until the usage gas goes over into the liquid phase and a gas phase containing secondary gas remains, with the pressure in the pressure vessel (93) being set so that it is at least twice as high as the vapor pressure of the usage gas at the prevailing temperature in the pressure vessel (93) and the pressure in the pressure vessel (93) is at least 5% lower than the vapor pressure of the secondary gas at the prevailing temperature in the pressure vessel (93),

D) removal of the gas phase containing secondary gas from the pressure vessel (93),

E) transfer of the liquefied usage gas from the pressure vessel (93) into a purification vessel (95),

F) heating of the liquefied usage gas in the purification vessel (95),

G) extraction of the gas phase from the purification vessel (95) until the internal pressure in the purification vessel (95) corresponds to the vapor pressure of the usage gas at the prevailing temperature in the purification vessel (95).

2. The method as claimed in claim 1, characterized in that the transfer B) of the gas mixture into the pressure vessel (93) is carried out periodically and a disengagement time is allowed to pass before the removal D) of the gas phase containing secondary gas from the pressure vessel (93).

3. The method as claimed in either of the preceding claims, characterized in that the transfer E) of the liquefied usage gas is carried out when the pressure vessel is filled to more than 0.75 +/- 20% kg/l with gas mixture.

4. The method as claimed in any of the preceding claims, characterized in that the heating F) of the liquefied usage gas in the purification vessel (95) is effected by a heat exchanger as heating appliance which utilizes the waste heat arising during the cooling C) of the compressed gas mixture in the pressure vessel and supplies it to the purification vessel (95).

5. The method as claimed in any of the preceding claims, characterized in that the gas phase taken off from the purification vessel (95) during the extraction G) is recirculated to the pressure vessel (93).

6. The method as claimed in any of the preceding claims, characterized in that the vapor pressure curve of the usage gas runs below the vapor pressure curve of the secondary gas.

7. The method as claimed in any of the preceding claims, characterized in that the internal pressure and the temperature in a treatment vessel are measured continuously by sensors during the extraction G) of the gas phase from the purification vessel (95) and a control based on the measured values from these sensors stops the extraction G) as soon as the vapor pressure of the usage gas has been attained in the purification vessel (95).

8. A plant for performing a method according to any one of claims 1 to 7, wherein the plant comprises at least the following components:

- a compressor (11) for compressing the gas mixture,
- a pressure vessel (93) for accommodating the compressed gas mixture,
- where the pressure vessel (93) has a cooling unit (931) for cooling the compressed gas mixture
- and the pressure vessel (93) has a removal conduit (1401) for a gas phase containing secondary gas

- and the pressure vessel (93) is connected via a transfer conduit (1351) to a purification vessel (95), which conduit serves to transfer a liquefied usage gas,

- where the purification vessel (95) is provided with a heating appliance (951) for heating the liquefied usage gas,

- an extraction unit which is located on an extraction conduit (1331) and draws off the gas phase from the purification vessel (95)
- and also a dispensing conduit (1361) wherein
- purified usage gas can be dispensed via the dispensing conduit (1361) and wherein
- at least one temperature sensor and/or at least one pressure sensor is arranged in the purification vessel, which is integrated in a control circuit for controlling the heater.

9. The plant as claimed in claim 8, characterized in that a regulating unit which draws off the gas phase from the purification vessel (95) until the internal pressure in the purification vessel (95) corresponds to the vapor pressure of the usage gas at the prevailing temperature in the purification vessel (95) is provided on the extraction unit.