Claims

1. Method for purification of ammonia or mixtures of nitrogen and hydrogen, or nitrogen, hydrogen and ammonia, using a step of hydrocarbons and water removal by adsorption, characterised in that:

   a) ammonia or a mixture of gases under pressure of from 0.1 to 25 MPa is passed through a column packed with aluminium oxide with a specific surface area not lower than 50 $m^2/g$,

   b) the ammonia or mixture of gases is then passed through a column packed with CaO, NaOH, KOH or an NaOH/KOH melt, separately or in a mixture, at 20 to 70°C and under pressure of from 0.1 to 25 MPa,

   c) next, the ammonia or mixture of gases is passed at 170-425°C through a column packed with activated carbon having a specific area of 100 - 3000 $m^2/g$ with sodium, potassium, caesium, magnesium, calcium, strontium, barium or cerium nitrates(V) or nitrates(III) deposited on its surface separately or in a mixture, and activated before use with a stream of an inert gas or hydrogen, or their mixture, with a pressure of 0.1- 25 MPa and at 250-700°C,

   the aforementioned steps being realised in a serial process at a gas stream flow rate in the range of 100 $dm^3/h$ to 1000 $m^3/h$.

2. A method, according to claim 1, characterised in that for purification of ammonia, additionally a preliminary stage of methane removal from above the liquid ammonia is applied by removal of the gas from above the liquid in the amount of 1-100 $dm^3/h$.

3. A method, according to claim 1 or 2, characterised in that in stage a) and b), ammonia under pressure of from 0.1 to 0.8 MPa is introduced to the columns.

4. A method, according to claim 1, characterised in that in stage c), a mixture of gases is passed through a column under pressure of from 0.1 to 25 MPa.

5. A method, according to claim 1 or 2, characterised in that in stage c), ammonia is passed through a column under pressure of from 0.1 to 0.8 MPa.

6. A method, according to claim 1 or 2, characterised in that the column packing of stage a) is regenerated by passing a stream of an inert gas or hydrogen or a mixture of these gases through it at 200-700°C.

Claims

1. Method for purification of ammonia or mixtures of nitrogen and hydrogen, or nitrogen, hydrogen and ammonia, using a step of hydrocarbons and water removal by adsorption, characterised in that:

   a) ammonia or a mixture of gases under pressure of from 0.1 to 25 MPa is passed through a column packed with aluminium oxide with ~~with~~ a specific surface area not lower than 50 $m^2/g$,

   b) the ammonia or mixture of gases is then passed through a column packed with CaO, NaOH, KOH or an NaOH/KOH melt, separately or in a mixture, at 20 to 70°C and under pressure of from 0.1 to 25 MPa,

   c) next, the ammonia or mixture of gases is passed at 170-425°C through a column packed with activated carbon having a specific area of ~~100 ÷ 3000~~ 100 - 3000 $m^2/g$ with sodium, potassium, caesium, magnesium, calcium, strontium, barium or cerium nitrates(V) or nitrates(III) deposited on its surface separately or in a mixture, and activated before use with a stream of an inert gas or hydrogen, or their mixture, with a pressure of 0.1- 25 MPa and at 250-700°C,

   the aforementioned steps being realised in a serial process at a gas stream flow rate in the range of 100 $dm^3/h$ to 1000 $m^3/h$.
2. A method, according to claim 1, characterised in that for purification of ammonia, additionally a preliminary stage of methane removal from above the liquid ammonia is applied by removal of the gas from above the liquid in the amount of 1-100 $dm^3/h$.
3. A method, according to claim 1 or 2, characterised in that in stage a) and b), ammonia under pressure of from 0.1 to 0.8 MPa is introduced to the columns.
4. A method, according to claim 1, characterised in that in stage c), a mixture of gases is passed through a column under pressure of from 0.1 to 25 MPa.
5. A method, according to claim 1 or 2, characterised in that in stage c), ammonia is passed through a column under pressure of from 0.1 to 0.8 MPa.
6. A method, according to claim 1 or 2, characterised in that the column packing of stage a) is regenerated by passing a stream of an inert gas or hydrogen or a mixture of these gases through it at 200-700°C.