Claims

1. A process for purifying a gas mixture G-0 comprising dinitrogen monoxide, at least comprising the following steps:

   A1 contacting the gas mixture G-0 with a solvent mixture (I) at least comprising 50% by weight of water based on the overall solvent mixture (I), the pH of the solvent mixture (I) being in the range from 3.5 to 8.0, to obtain a composition (A);

   A2 desorption of a gas mixture G-1 from the composition (A) to obtain a solvent mixture (I');

   B1 contacting the gas mixture G-1 with a solvent mixture (II) at least comprising 50% by weight of water based on the overall solvent mixture (II), the pH of the solvent mixture (II) being in the range from 2.0 to 8.0, to obtain a composition (B);

   B2 desorption of a gas mixture G-2 from the composition (B) to obtain a solvent mixture (II');

   the pH being based in each case on a measurement with a glass electrode,

   and wherein the pH of the solvent mixture (I) or the pH of the solvent mixture (II) or the pH of the solvent mixture (I) and the pH of the solvent mixture (II) is adjusted by adding a base.

2. The process according to claim 1, wherein the gas mixture G-0 is the offgas of an adipic acid plant and/or of a dodecanedicarboxylic acid plant and/or of a hydroxylamine plant and/or of a nitric acid plant operated with the offgas of an adipic acid plant and/or of a dodecanedicarboxylic acid plant and/or of a hydroxylamine plant.

3. The process according to either of claims 1 and 2, wherein the solvent mixture (I) or the solvent mixture (II) or the solvent mixture (I) and the solvent mixture (II) comprises at least 80% by weight of water, based in each case on the overall solvent mixture (I) or (II).

4. The process according to any of claims 1 to 3, wherein the solvent mixture (I) or the solvent mixture (II) or the solvent mixture (I) and the solvent mixture (II) comprises less than 10% by weight of salts, based in each case on the overall solvent mixture (I) or (II).

5. The process according to any of claims 1 to 4, wherein the pH of the solvent mixture (I) or the pH of the solvent mixture (II) or the pH of the solvent mixture (I) and the pH of the solvent mixture (II) is in the range from 6.0 to 7.0.

6. The process according to any of claims 1 to 5, wherein the solvent mixture (I') is recycled into the process at least partly as the solvent mixture (I), or

wherein the solvent mixture (II') is recycled into the process at least partly as the solvent mixture (II), or

wherein the solvent mixture (I') is recycled into the process at least partly as the solvent mixture (I) and the solvent mixture (II') is recycled into the process at least partly as the solvent mixture (II).

7. The process according to any of claims 1 to 6, wherein the pH of the solvent mixture (I) or the pH of the solvent mixture (II) or the pH of the solvent mixture (I) and the pH of the solvent mixture (II) is adjusted by adding a base selected from the group consisting of alkali metal hydroxides, alkali metal carbonates, alkali metal hydrogencarbonates, alkali metal phosphates, alkaline earth metal hydroxides, alkaline earth metal carbonates, alkaline earth metal hydrogencarbonates and alkaline earth metal phosphates.

8. The process according to any of claims 1 to 7, wherein the pressure in the contacting in A1 or B1 or A1 and B1 is in a range of from 10 to 35 bar.

9. The process according to any of claims 1 to 8, wherein steps A1 and A2 or steps B1 and B2 or steps A1 and A2 and steps B1 and B2 are carried out in a dividing wall column.

10. The process according to any of claims 1 to 9, wherein the resulting gas mixture G-2 is liquefied.

Claims

[Claim 1]

A method for purifying a dinitrogen monoxide-containing gas mixture (G-0), the method including at least the following steps:

A1: A step of bringing the gas mixture (G-0) into contact with a solvent mixture (I) containing water at a quantity of at least 50 mass % relative to the overall solvent mixture (I) (the pH of the solvent mixture (I) falls within the range 3.5-8.0) so as to obtain a composition (A);

A2: A step of desorbing a gas mixture (G-1) from the composition (A) so as to obtain a solvent mixture (I');

B1: A step of bringing the gas mixture (G-1) into contact with a solvent mixture (II) containing water at a quantity of at least 50 mass % relative to the overall solvent mixture (II) (the pH of the solvent mixture (II) falls within the range 2.0-8.0) so as to obtain a composition (B); and

B2: A step of desorbing a gas mixture (G-2) from the composition (B) so as to obtain a solvent mixture (II') (the pH in each case is based on a measurement using a glass electrode),

wherein the pH of the solvent mixture (I), the pH of the solvent mixture (II), or the pH of the solvent mixture (I) and the pH of the solvent mixture (II) is adjusted by adding a base.

[Claim 2]

The method according to claim 1, wherein the gas mixture (G-0) is an exhaust gas of at least one of an adipic acid plant, a dodecanedicarboxylic acid plant, a hydroxylamine plant, and a nitric acid plant operated using an exhaust gas of at least one of an adipic acid plant, a dodecanedicarboxylic acid plant and a hydroxylamine plant.

[Claim 3]
The method according to claim 1 or claim 2, wherein the solvent mixture (I), the solvent mixture (II), or the solvent mixture (I) and the solvent mixture (II) contains water at a quantity of at least 80 mass % relative to the overall solvent mixture (I) or (II).

[Claim 4]
The method according to any one of claims 1-3, wherein the solvent mixture (I), the solvent mixture (II), or the solvent mixture (I) and the solvent mixture (II) contains salts at a quantity of less than 10 mass % relative to the overall solvent mixture (I) or (II).

[Claim 5]
The method according to any one of claims 1-4, wherein the pH of the solvent mixture (I), the pH of the solvent mixture (II), or the pH of the solvent mixture (I) and the pH of the solvent mixture (II) falls within the range 6.0-7.0.

[Claim 6]
The method according to any one of claims 1-5, wherein the solvent mixture (I') is at least partially recirculated to the method as the solvent mixture (I), or
the solvent mixture (II') is at least partially recirculated to the method as the solvent mixture (II), or
the solvent mixture (I') is at least partially recirculated to the method as the solvent mixture (I) and the solvent mixture (II') is at least partially recirculated to the method as the solvent mixture (II).

[Claim 7]
The method according to any one of claims 1-6, wherein the pH of the solvent mixture (I), the pH of the solvent mixture (II), or the pH of the solvent mixture

(I) and the pH of the solvent mixture (II) is adjusted by adding a base selected from the group consisting of an alkali metal hydroxide, an alkali metal carbonate, an alkali metal hydrogen carbonate, an alkali metal phosphate, an alkaline earth metal hydroxide, an alkaline earth metal carbonate, an alkaline earth metal hydrogen carbonate, and an alkaline earth metal phosphate.

[Claim 8]
The method according to any one of claims 1-7, wherein the pressure during the contact in step A1, step B1, or steps A1 and B1 falls within the range 10-35 bar.

[Claim 9]
The method according to any one of claims 1-8, wherein steps A1 and A2, steps B1 and B2, or steps A1, A2, B1, and B2 are carried out in a dividing wall column.

[Claim 10]
The method according to any one of claims 1-9, wherein the obtained gas mixture (G-2) is liquefied.