Claims

1. A degassing process, comprising a first degassing step for degassing a stream to be replaced in the presence of a first replacement gas; and
a second degassing step for the degassing in the presence of a second replacement gas, wherein the superficial velocity of the first replacement gas (absolute value, the unit is m/s) is V1, the superficial velocity of the second replacement gas (absolute value, the unit is m/s) is V2, and $100 \geq V2/V1 \geq 2$.

2. The degassing process according to claim 1, wherein the first degassing step has an operating temperature of 0-700°C, and an operating pressure of 0-3 MPaG, and/or, in the first degassing step, the superficial velocity (absolute value) V1 of the first replacement gas is 0.05-0.6 m/s, and the superficial velocity (absolute value) of the stream to be replaced is 0.02-0.2 m/s, and/or, the second degassing step has an operating temperature of 0-700°C, and an operating pressure of 0-3 MPaG, and/or, in the second degassing step, the superficial velocity (absolute value) V2 of the second replacement gas is 0.8-10 m/s, and the superficial velocity (absolute value) of the stream to be replaced is 0.4-6 m/s.

3. The degassing process according to claim 1, wherein in the first degassing step, the gas-solid fluidization characteristics is the bubbling or turbulent fluidization, the solid content is in the range of 0.25-0.6, and/or, in the second degassing step, the gas-solid fluidization characteristics is the turbulent or fast fluidization, the solid content is in the range of 0.02-0.3.

4. The degassing process according to claim 1, wherein the first replacement gas and the stream to be replaced are in countercurrent contact or cocurrent contact, and the second replacement gas and the stream to be replaced are in countercurrent contact or cocurrent contact.

5. The degassing process according to claim 1, wherein the first degassing step and the second degassing step are carried out in different zones of a vessel or carried out separately in different vessels, and/or, the first degassing step and the second degassing step are in the gas-phase communication, and/or, the operating pressure of the first degassing step and the operating

pressure of the second degassing step are substantially identical.

6. The degassing process according to claim 1, further comprising one or more degassing steps carried out before the first degassing step, after the first degassing step and before the second degassing step, and/or after the second degassing step.

7. A nitro compound hydrogenation reaction system, comprising at least one fluidized bed reactor and at least one degassing apparatus communicated with said at least one fluidized bed reactor, wherein at least one of the degassing apparatuses is configured to implement the degassing process of claim 1.

8. A nitro compound hydrogenation reaction process, at least comprising a hydrogenation reaction step of contacting a nitro compound as the reaction raw material with hydrogen gas and a hydrogenation catalyst to obtain a reaction product and a spent catalyst; and a degassing step of subjecting the spent catalyst to the degassing in the presence of a replacement gas, wherein the degassing step is proceeded according to the degassing process of claim 1.

9. The hydrogenation reaction process of claim 8, wherein the reaction conditions of the hydrogenation reaction step comprise: the superficial gas velocity is 0.2-0.8 m/s, the molar ratio of hydrogen gas to the reaction raw material is 6-21, the reaction temperature is 220-280°C, the reaction pressure is 0.05-1 MPa (gauge pressure), the hydrogenation catalyst is selected from at least one of a copper-based loaded catalyst, a nickel-based loaded catalyst and a noble metal-based loaded catalyst, and/or, the bulk density of the hydrogenation catalyst is 300-1200kg/m^3, and/or, the average particle diameter of the hydrogenation catalyst is 30-800μm, and the mass percent of the catalyst particles having a particle diameter of less than 80μm to the whole catalyst particles is not less than 2wt%, and/or, the replacement gas is a gas or a vapor, and/or, the nitro compound is selected from at least one of the compounds represented by formula (1),

$$R\text{-}NO_2 \qquad (1)$$

in formula (1), R is an optionally substituted $C_{2\text{-}20}$ straight, branched or cyclic hydrocarbyl.

10. The process according to claim 1, wherein the stream to be replaced is a liquid stream or solid stream, and/or said first replacement gas is a gas or vapor or steam, and/or said second replacement gas is a gas or vapor or steam, and/or $20 \geq V2/V1 \geq 2.5$.

11. The process according to claim 1, wherein the stream to be replaced is a stream of solid particles, and/or $15 \geq V2/V1 \geq 5$.

12. The process according to claim 2, wherein the first degassing step has an operating temperature of 80-400°C, and an operating pressure of 0.01-1 MPaG, and/or, in the first degassing step, the superficial velocity (absolute value) V1 of the first replacement gas is 0.1-0.3 m/s, and/or the superficial velocity (absolute value) of the stream to be replaced is 0.05-0.1 m/s, and/or, the second degassing step has an operating temperature of 80-400°C, and an operating pressure of 0.01-1 MPaG, and/or, in the second degassing step, the superficial velocity (absolute value) V2 of the second replacement gas is 1-3 m/s, and/or the superficial velocity (absolute value) of the stream to be replaced is 0.6-2.4 m/s.

13. The process according to claim 4, wherein the first replacement gas and the stream to be replaced are in countercurrent contact, and/or the second replacement gas and the stream to be replaced are in cocurrent contact.

14. The reaction system according to claim 7, wherein the at least one fluidized bed reactor comprises catalyst particles, and/or at least one degassing apparatus is disposed downstream of and in communication with said at least one fluidized bed reactor, and/or at least one degassing apparatus is configured to receive an effluent from said at least one fluidized bed reactor, and/or at least one degassing apparatus is configured to receive the spent catalyst particles from said at least one fluidized bed reactor.

15. The hydrogenation reaction process of claim 7, wherein said reaction raw material is nitrobenzene, and/or, the average particle diameter of the hydrogenation catalyst is 40-500μm , and/or the mass percent of the catalyst particles having a particle diameter of less than 80 μm to

the whole catalyst particles is 5-15 wt%, and/or, said replacement gas is selected from at least one of nitrogen gas, water vapor, carbon dioxide, methane, oxygen gas and argon gas, and/or in the structural formula (1), R is an optionally substituted C_{4-20} cyclic hydrocarbyl, or an optionally substituted C_{6-20} aryl, or an optionally substituted phenyl.