purification methods. Consequently, it was possible to achieve the set objects with a pure membrane separation method.

The present ~~invention~~ disclosure therefore provides the apparatus and method claimed in the claims and also explained in more detail in the description below and the examples.

In a first aspect, there is provided a method for separating gases containing helium, characterized in that it is carried out in an apparatus which has a feed stream separation stage (1), a retentate separation stage (2) and a permeate separation stage (3), as well as at least one compressor (4) and/or at least one, preferably one or two, vacuum pump(s) (15),

the feed stream separation stage (1) separates a feed stream (5) consisting of helium and at least one other component into a first permeate stream (6) enriched with regard to helium compared to the feed stream (5), and a first retentate stream (7) depleted with regard to helium compared to the feed stream (5),

the retentate separation stage (2) separates the first retentate stream (7) into a second permeate stream (9) enriched with regard to helium compared to the first retentate stream (7), and a second retentate stream (8) depleted with regard to helium compared to the first retentate stream (7),

the permeate separation stage (3) separates the first permeate stream (6) into a third retentate stream (10) depleted with regard to helium compared to the first permeate

stream (6), and a third permeate stream (11) enriched with regard to helium compared to the first permeate stream (6),

the third permeate stream (11) is removed as product or processed further and optionally the second retentate stream (8) is removed as a first further product or processed further or discarded,

the second permeate stream (9) and the third retentate stream (10) are fed to the feed stream (5) or discarded,

the first permeate stream (6) is not subjected to a recompression,

upon recycling the second permeate stream (9) and the third retentate stream (10), the control of the gas volume recycled with the second permeate stream (9) and the third retentate stream (10) to the feed stream (5) is adjusted such that, in total, less than 50% by volume, preferably 5 to 40% by volume, very particularly preferably 5 to 30% by volume and especially preferably 10 to 25% by volume, of the volume of the crude gas stream (17) are recycled,

and

upon recycling the second permeate stream (9) and the third retentate stream (10), the helium concentration after the first recycling of the second permeate stream (9) and of the third retentate stream (10) in the feed stream (5) is increased, preferably by at least 2%, particularly preferably by at least 3%, particularly preferably by 4 to 10% and very particularly preferably by 5 to 10%, in each case compared to the concentration in the crude gas stream (17).

In a second aspect, there is provided an apparatus for separating gases containing helium, characterized in that

it has a feed stream separation stage (1), a retentate separation stage (2) and a permeate separation stage (3), as well as at least one compressor (4) and/or at least one, preferably one or two, vacuum pump(s) (15),

the feed stream separation stage (1) is designed such that it separates a feed stream (5) consisting of helium and at least one other component into a first permeate stream (6) enriched with regard to helium compared to the feed stream (5), and a first retentate stream (7) depleted with regard to helium compared to the feed stream (5),

the retentate separation stage (2) is designed such that it separates the first retentate stream (7) into a second permeate stream (9) enriched with regard to helium compared to the first retentate stream (7), and a second retentate stream (8) depleted with regard to helium compared to the first retentate stream (7),

the permeate separation stage (3) is designed in such a way that it separates the first permeate stream (6) into a third retentate stream (10) depleted with regard to helium compared to the first permeate stream (6), and a third permeate stream (11) enriched with regard to helium compared to the first permeate stream (6),

the apparatus is designed such that the third permeate stream (11) can be removed as a product or processed further and optionally the second retentate stream (8) can be removed as a further product or processed further or discarded,

the apparatus is designed such that the second permeate stream (9) and the third retentate stream (10) can be fed to the feed stream (5) or be discarded,

the apparatus is designed in such a way that the first

permeate stream (6) is not subjected to a recompression,

upon recycling the second permeate stream (9) and the third retentate stream (10), the recycling of the gas volume recycled with the second permeate stream (9) and with the third retentate stream (10) to the feed stream (5) is regulated in such a way that, in total, less than 50% by volume, preferably 5 to 40% by volume, very particularly preferably 5 to 30% by volume and especially preferably 10 to 25% by volume, of the volume of the crude gas stream (17) are recycled,

and

upon recycling the second permeate stream (9) and the third retentate stream (10), the recycling of the second permeate stream (9) and of the third retentate stream (10) is regulated such that the helium concentration after the first recycling of the second permeate stream (9) and of the third retentate stream (10) in the feed stream (5) is increased, preferably by at least 2%, particularly preferably by at least 3%, particularly preferably by 4 to 10% and very particularly preferably by 5 to 10%, in each case compared to the concentration in the crude gas stream (17).

The present ~~invention~~ disclosure is described below in detail. Beforehand, some important terms are defined.

The quotient of the permeances of two individual gases gives the **selectivity** of the membrane for separation with regard to the two gases and thus indicates how well the membrane can separate a gas mixture with regard to the two components. **Permeate** refers to the total stream which is produced on the

low-pressure side of the membrane, membrane modules or membrane separation step.

Permeate gas is used to refer to the component/components enriched in each case at the membrane, at the membrane module, or in the membrane separation step in the **permeate stream** compared with the respective entry stream.

Retentate is used to refer to the total stream which is produced on the high-pressure side of the membrane, membrane module or membrane separation step which does not pass through the membrane.

Retentate gas is used to refer to the component/components enriched in each case at the membrane, at the membrane module, or in the membrane separation step in the **retentate stream** compared to the respective entry stream.