Claims

1. A process for removing boron from a water stream, in which a decationized water stream is passed at least through a first strong base anion exchange bed and a second strong base anion exchange bed, which is arranged downstream, in particular directly downstream, of the first strong base anion exchange bed.

2. The process according to claim 1, characterized in that the water stream is at first passed through a weak base anion exchange bed which is arranged upstream of the first strong base anion exchange bed, before passing the first strong base anion exchange bed and the second strong base anion exchange bed.

3. The process according to claim 1 or 2, characterized in that the anion exchange beds are arranged in the form of a counter-current ion exchange unit.

4. The process according to any one of the preceding claims, characterized in that silica concentration of the water stream is monitored, preferably in an operational state of the process, upstream of the second strong base anion exchange bed.

5. The process according to claim 4, characterized in that the anion exchange beds are regenerated when the silica concentration exceeds a defined threshold value, preferably a threshold value of 20 ppb.

6. The process according to any one of the preceding claims, characterized in that boron concentration of the water stream is monitored, preferably in an operational state of the process, downstream of the second strong base anion exchange bed.

7. The process according to claim 6, characterized in that a sample of the water stream is passed through a strong acid cation exchange bed downstream of the second strong base anion exchange bed, with the strong acid cation exchange bed being preferably arranged between the second strong base anion exchange bed and a boron analyzer.

8. The process according to claim 6 or 7, characterized in that the anion exchange beds are regenerated, when the boron concentration exceeds a defined threshold value, preferably a threshold value of 100 ppt.

9. The process according to any one of the preceding claims, characterized in that the anion exchange beds are regenerated in series in a counter-current modus.

10. A decationized water treatment system, in particular for carrying out a process according to any one of the preceding claims, which comprises a first strong base anion exchange bed and a second strong base anion exchange bed which is arranged downstream, in particular directly downstream, of the first strong base anion exchange bed, characterized in that the system further comprises a silica analyzer and/or a boron analyzer.

11. The system according to claim 10, characterized in that the system further comprises a weak base anion exchange bed which is arranged upstream, in particular directly upstream, of the first strong base anion exchange bed.

12. The system according to claim 10 or 11, characterized in that the anion exchange beds are arranged in the form of a counter-current ion exchange unit.

13. The system according to any one of the claims 10 to 12, characterized in that the silica analyzer is connected to the first strong base anion exchange bed, in particular to an outlet thereof, or to a nozzle being arranged downstream of the first strong base anion exchange bed via a silica sampling line.

14. The system according to any one of the claims 10 to 13, characterized in that the boron analyzer is connected to the second strong base anion exchange bed, in particular an outlet thereof, via a boron sampling line.

15. The system according to claim 14, characterized in that the system further comprises a strong acid cation exchange bed which is arranged in the boron sampling line upstream of the boron analyzer.

Claims

1. A process for treating, in particular pretreatment, of water, preferably for obtaining ultrapure water, in which a decationized water stream is passed at least through a first strong base anion exchange bed and a second strong base anion exchange bed, which is arranged downstream, in particular directly downstream, of the first strong base anion exchange bed.

2. The process according to claim 1, characterized in that the water stream is at first passed through a weak base anion exchange bed which is arranged upstream of the first strong base anion exchange bed, before passing the first strong base anion exchange bed and the second strong base anion exchange bed.

3. The process according to claim 1 or 2, characterized in that the anion exchange beds are arranged in the form of a counter-current ion exchange unit.

4. The process according to any one of the preceding claims, characterized in that silica concentration of the water stream is monitored, preferably in an operational state of the process, upstream of the second strong base anion exchange bed.

5. The process according to claim 4, characterized in that the anion exchange beds are regenerated when the silica concentration exceeds a defined threshold value, preferably a threshold value of 20 ppb.

6. The process according to any one of the preceding claims, characterized in that boron concentration of the water stream is monitored, preferably in an operational state of the process, downstream of the second strong base anion exchange bed.

7. The process according to claim 6, characterized in that a sample of the water stream is passed through a strong acid cation exchange bed downstream of the second strong base anion exchange bed, with the strong acid cation exchange

bed being preferably arranged between the second strong base anion exchange bed and a boron analyzer.

8. The process according to claim 6 or 7, characterized in that the anion exchange beds are regenerated, when the boron concentration exceeds a defined threshold value, preferably a threshold value of 100 ppt.

9. The process according to any one of the preceding claims, characterized in that the anion exchange beds are regenerated in series in a counter-current modus.

10. A decationized water treatment system, in particular for carrying out a process according to any one of the preceding claims, which comprises a first strong base anion exchange bed and a second strong base anion exchange bed which is arranged downstream, in particular directly downstream, of the first strong base anion exchange bed.

11. The system according to claim 10, characterized in that the system further comprises a weak base anion exchange bed which is arranged upstream, in particular directly upstream, of the first strong base anion exchange bed.

12. The system according to claim 10 or 11, characterized in that the anion exchange beds are arranged in the form of a counter-current ion exchange unit.

13. The system according to any one of the claims 10 to 12, characterized in that the system further comprises a silica analyzer which is connected to the first strong base anion exchange bed, in particular to an outlet thereof, or to a nozzle being arranged downstream of the first strong base anion exchange bed via a silica sampling line.

14. The system according to any one of the claims 10 to 13, characterized in that the system further comprises a boron analyzer which is connected to the second strong base anion exchange bed, in particular an outlet thereof, via a boron sampling line.

15. The system according to claim 14, characterized in that the system further comprises a strong acid cation exchange bed which is arranged in the boron sampling line upstream of the boron analyzer.

16. Counter-current ion exchange unit, in particular for carrying out a process according to any one of the claims 1 to 9, preferably for removing boron during pretreatment of water, characterized in that the unit comprises a first strong base anion exchange bed and a second strong base anion exchange bed which is arranged downstream, in particular directly downstream, of the first strong base anion exchange bed and the unit optionally comprises a weak base anion exchange bed which is arranged upstream, in particular directly upstream, of the first strong base anion exchange bed.