CLAIMS

1. A method for separating lithium from a lithium solution containing lithium by 200 mg/L or more and fluorine by 20 mg/L or more and having a pH of 10.5 or higher but 12.5 or lower, the method comprising:

a first removal step comprising adding calcium hydroxide, which solidifies the fluorine contained in the lithium solution, to the lithium solution and removing the fluorine solidified to obtain a F-removed liquid; and

a second removal step comprising adding carbon dioxide, which solidifies calcium in the calcium hydroxide remaining in the F-removed liquid, to the F-removed liquid and removing the solidified calcium to obtain a calcium-removed liquid.

2. The method for separating lithium according to claim 1, wherein in the second removal step, a carbon dioxide gas is added as the carbon dioxide to the F-removed liquid.

3. The method for separating lithium according to claim 1 or 2, wherein a pH of the F-removed liquid is 12 or higher.

4. The method for separating lithium according to any one of claims 1 to 3, further comprising treating a lithium ion secondary battery to obtain the lithium solution.

5. The method for separating lithium according to claim 4, wherein in the treating of the lithium ion secondary battery, a thermal treatment of heating the lithium ion secondary battery is performed and then the lithium contained in the lithium ion secondary battery is allowed to leach into water to obtain the lithium solution.

6. The method for separating lithium according to claim 5, wherein a temperature in the thermal treatment of the lithium ion secondary battery is 750°C or higher.

7. The method for separating lithium according to claim 5 or 6, wherein pulverizing a thermally treated product of the lithium ion secondary battery is followed by subjecting a minutely granulated product to leaching with water, where the minutely granulated product is recovered through classification in a range of 0.6 mm or more but 2.4 mm or less.

8. The method for separating lithium according to any one of claims 4 to 7, wherein the lithium ion secondary battery contains at least one selected from the group consisting of cobalt, nickel, and manganese.

9. The method for separating lithium according to any one of claims 1 to 8, wherein in the first and second removal steps, the solidified fluorine and the solidified calcium are removed through solid-liquid separation.

10. The method for separating lithium according to any one of claims 1 to 9, further comprising after the second removal step, warming the calcium-removed liquid to recover lithium carbonate.

11. The method for separating lithium according to claim 10, wherein a temperature of the calcium-removed liquid during the warming is adjusted to 60°C or higher.

12. The method for separating lithium according to claim 10 or 11, wherein in the warming the calcium-removed liquid, the calcium-removed liquid is subjected to evaporative concentration to recover the lithium carbonate.

13. The method for separating lithium according to claim 12, wherein a crystallized liquid obtained by recovering the lithium carbonate through the evaporative concentration of the calcium-removed liquid is added again to the lithium solution in the first removal step.

14. The method for separating lithium according to any one of claims 1 to 13, wherein in the first removal step, an aluminum compound is added in addition to the calcium hydroxide.

15. A method for separating lithium from a lithium solution containing lithium by 200 mg/L or more and fluorine by 20 mg/L or more without removing fluorine, the method comprising:

adding carbon dioxide to the lithium solution to obtain a solution in which carbonate ions are dissolved; and

warming the solution to precipitate lithium carbonate, followed by solid-liquid separation, to separate the lithium.

16. The method for separating lithium according to claim 15, wherein a pH of the lithium solution is 12 or higher.

17. The method for separating lithium according to claims 15 or 16, wherein the carbon dioxide is added by bubbling a carbon dioxide gas.

18. The method for separating lithium according to any one of claims 15 to 17, wherein a temperature of the lithium solution during the warming is 60°C or higher.

19. The method for separating lithium according to any one of claims 15 to 18, wherein the lithium carbonate is precipitated through evaporative concentration of the solution in which the carbonate ions are dissolved.

20. The method for separating lithium according to any one of claims 15 to 19, wherein in the adding the carbon dioxide, a concentration of the carbonate ions in the lithium solution after addition of the carbon dioxide is 3000 mg/L or higher.

21. The method for separating lithium according to any one of claims 15 to 20, wherein in the adding the carbon dioxide, a concentration of the carbonate ions in the lithium solution after addition of the carbon dioxide is 6000 mg/L or higher.

22. The method for separating lithium according to any one of claims 15 to 21, further comprising treating a lithium ion secondary battery containing at

least one selected from the group consisting of cobalt, nickel, and manganese, to obtain the lithium solution, wherein the treating the lithium ion secondary battery includes:

heating the lithium ion secondary battery at 750°C or higher;

pulverizing a thermally treated product of the lithium ion secondary battery, followed by classification in a range of 0.6 mm or more but 2.4 mm or less; and

subjecting a minutely granulated product to leaching with water, where the minutely granulated product is recovered through the classification.