DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0006]

The invention has been made in view of the above problems, and an object of the invention is to provide a tetrafluoroborate producing method that allows high-yield, high-efficiency production of a tetrafluoroborate by a continuous process, a tetrafluoroborate-containing electrolyte, and an electrical storage device including such an electrolyte.

MEANS FOR SOLVING THE PROBLEMS

[0007]

To solve the conventional problems, the inventors have made studies on tetrafluoroborate producing methods, tetrafluoroborate-containing electrolytes, and electrical storage devices including such electrolytes. As a result, the inventors have accomplished the invention based on the finding that the object can be achieved using the features described below.

[0007a]

In a first aspect, there is provided a method for producing a tetrafluoroborate, comprising:

a first step comprising dissolving boron trifluoride gas in an organic solvent;

a second step comprising adding, to the organic solvent, a fluoride (MF_n, wherein M represents a metal or NH_4, and $1 \leq n \leq 3$) in an amount stoichiometrically equivalent to or less than the amount of the boron trifluoride so that a tetrafluoroborate solution is produced; and

a third step comprising circulating the tetrafluoroborate solution through the first step so that the boron trifluoride gas is dissolved in the tetrafluoroborate solution instead of the organic solvent.

[0008]

To solve the above problems, therefore, the invention provides a method for producing a tetrafluoroborate, which

4. The method for producing a tetrafluoroborate according to claim 1, wherein the first step and the third step are performed using an absorption tower.

5. The method for producing a tetrafluoroborate according to claim 1, wherein in the first step, the boron trifluoride gas is brought into gas-liquid contact with the organic solvent at a temperature of -40 to 100°C.

6. The method for producing a tetrafluoroborate according to claim 1, wherein in the third step, the boron trifluoride gas is brought into gas-liquid contact with the tetrafluoroborate solution at a temperature of -40 to 100°C.

7. The method for producing a tetrafluoroborate according to claim 1, wherein in the first step, the concentration of the boron trifluoride in the organic solvent is 15% by weight or less.

8. The method for producing a tetrafluoroborate according to claim 1, wherein in the third step, the concentration of the boron trifluoride in the tetrafluoroborate solution is 15% by weight or less.

~~9. An electrolyte comprising a tetrafluoroborate~~

obtained by the method according to claim 1.

10. An electrical storage device comprising the electrolyte according to claim 9.