Summary of Invention

Technical Problem

[0004]

As disclosed in PTL 1, in order to suppress agglomeration in a CFB boiler, additives such as calcium carbonate and dolomite have been supplied to the combustion chamber. However, the mechanism and conditions under which agglomeration occurs in the CFB boiler have not been fully elucidated, and it has been difficult to appropriately determine the supply timing, the supply amount, the supply manner, and the like of additives.

[0005]

Embodiments of the present invention provide a combustion device and the like that can effectively suppress the occurrence of agglomeration.

Solution to Problem

[0006]

According to a first aspect of the present invention, there is provided a combustion device that supplies a fuel into a combustion chamber in which a fluid material containing silica flows and that combusts the fuel, the combustion device including: a fuel supply unit that supplies the fuel to which an alkaline earth metal and/or an earth metal has been added into the combustion chamber such that a ratio of the alkaline earth metal and/or the

earth metal to an alkali metal in the combustion chamber exceeds a predetermined lower limit.

[0007]

As will be described later, as a result of tests in an actual CFB boiler, it was found that the occurrence of agglomeration may be related to a ratio (hereinafter also referred to as a metal ratio) of alkaline earth metals (magnesium, calcium, and the like) and/or earth metals (aluminum and the like) to alkali metals (sodium, potassium, and the like) in the combustion chamber. In the present aspect, therefore, the occurrence of agglomeration is effectively suppressed by supplying alkaline earth metals and/or earth metals such that the metal ratio in the combustion chamber exceeds a predetermined lower limit.

[0008]

According to a second aspect of the present invention, there is provided a combustion method. The method is executed in a combustion device that supplies a fuel into a combustion chamber in which a fluid material containing silica flows and that combusts the fuel, and includes: a fuel supply step of supplying the fuel to which an alkaline earth metal and/or an earth metal has been added into the combustion chamber such that a ratio of the alkaline earth metal and/or the earth metal to an alkali metal in the combustion chamber exceeds a predetermined lower limit.

[0008a]

According to a third aspect of the present invention, there is provided a combustion program causing a computer

to execute the following step in a combustion device that supplies a fuel into a combustion chamber in which a fluid material containing silica flows and that combusts the fuel, the step including: a fuel supply step of supplying the fuel to which an alkaline earth metal and/or an earth metal has been added into the combustion chamber such that a ratio of the alkaline earth metal and/or the earth metal to an alkali metal in the combustion chamber exceeds a predetermined lower limit.

[0009]

Any combination of the above components, or any expression of these components converted into methods, devices, systems, recording media, computer programs, or the like, are also included in the present invention.

## Advantageous Effects of Invention

[0010]

According to embodiments of the present invention, the occurrence of agglomeration can be effectively suppressed.

## Brief Description of Drawings

[0011]

Fig. 1 schematically illustrates a CFB boiler.

Fig. 2 is a state diagram of a eutectic system consisting of three types of components including silica derived from a fluid material, an alkali metal oxide ($K_2O$) derived from a highly alkaline fuel, and an alkaline earth metal oxide (CaO).