dissolved gas concentration is high. Then, when the dissolved gas concentration is lowered in the state where the dissolved gas concentration remains high, it becomes possible to achieve the target dissolved gas concentration in the state where the fine bubbles are kept generated. Thus, it is considered that it becomes possible to continuously generate fine bubbles with stability in the range of the target dissolved gas concentration with a high cleaning capability, with the result that a high particle removal efficiency is achieved.

The ultrasonic cleaning method according to an aspect of the present invention is to irradiate ultrasonic waves to a solution having gas dissolved therein for cleaning an object to be cleaned in the solution. The method includes the following steps. Ultrasonic waves are irradiated to the solution having a first dissolved gas concentration. In a state where ultrasonic waves are being applied to the solution, a dissolved gas concentration in the solution is changed from the first dissolved gas concentration to a second dissolved gas concentration lower than the first dissolved gas concentration. Sonoluminescence continuously occurs by continuously irradiating ultrasonic waves to the solution while the dissolved gas concentration in the solution is changed from the first dissolved gas concentration to the second dissolved gas concentration~~.~~, wherein a sonoluminescence occurring state continues while ultrasonic waves are irradiated to said solution, and said second dissolved gas concentration is a concentration that sonoluminescence does not occur unless said dissolved gas concentration in said solution is changed form said first dissolved gas concentration to said second dissolved gas concentration.

According to the ultrasonic cleaning method in accordance with the present invention, after starting irradiation of ultrasonic waves in a high dissolved gas concentration at first, the dissolved gas concentration is decreased in the state where irradiation of ultrasonic waves is continued. This allows achievement of a particle removal efficiency that is higher than that in the case where ultrasonic cleaning is carried out in a constant dissolved gas concentration from the beginning. Furthermore, according to the ultrasonic cleaning method in

Claims

1. An ultrasonic cleaning method for irradiating ultrasonic waves to a solution having gas dissolved therein for cleaning an object to be cleaned in said solution, said method comprising the steps of:
- irradiating ultrasonic waves to said solution having a first dissolved gas concentration; and
- changing a dissolved gas concentration in said solution from said first dissolved gas concentration to a second dissolved gas concentration lower than said first dissolved gas concentration, in a state where ultrasonic waves are being irradiated to said solution,
sonoluminescence occurring by irradiating ultrasonic waves to said solution while said dissolved gas concentration in said solution is changed from said first dissolved gas concentration to said second dissolved gas concentration, wherein a sonoluminescence occurring state continues while ultrasonic waves are irradiated to said solution, and said second dissolved gas concentration is a concentration that sonoluminescence does not occur unless said dissolved gas concentration in said solution is changed from said first dissolved gas concentration to said second dissolved gas concentration.

2. The ultrasonic cleaning method according to claim 1, wherein irradiation of ultrasonic waves is started at a point of time when said dissolved gas concentration reaches said first dissolved gas concentration.

3. The ultrasonic cleaning method according to claim 1, further comprising the steps of:
- starting to irradiate ultrasonic waves to said solution having a third dissolved gas concentration lower than said first dissolved gas concentration; and

- changing said dissolved gas concentration in said solution from said third dissolved gas concentration to said first dissolved gas concentration in a state where ultrasonic waves are being irradiated to said solution.

4. The ultrasonic cleaning method according to claim 3, wherein the step of changing said dissolved gas concentration from said