CLAIMS

1. A method of controlling an exothermic chemical reaction, comprising:

measuring a temperature of a first reactant flowing at a first flow rate;

subsequently contacting the first reactant with a second reactant flowing at a second flow rate, the contacting occurring under conditions that cause the first and second reactants to react with one another in an exothermic chemical reaction and form a reaction product in a reactor, wherein the reactor is an in-line mixer, the first reactant comprises ammonia, the second reactant comprises sodium hypochlorite, and the reaction product comprises monochloramine, wherein one or both of the first and second reactants are diluted with dilution water;

measuring the temperature of the reaction product;

determining the temperature difference between the measured temperature of the first reactant and the measured temperature of the reaction product;

adjusting the flow rate of at least one of the first reactant and the second reactant if the temperature difference reaches a pre-determined temperature difference; and

combining the reaction product with a source of industrial water, process water, cooling tower water, or potable water.

2. The method of claim 1, further comprising preparing the first reactant by diluting an ammonia solution with dilution water, wherein the temperature of the first reactant is measured at the point where the ammonia solution is contacted with the dilution water.

3. The method of claim 1, wherein the first reactant is flowing through a first conduit, the second reactant is flowing through a second conduit, the first and second conduits are each in fluid communication with a reactor, and the contacting occurs in the reactor.

4. The method of claim 3, wherein the first reactant is a diluted ammonia solution, the second reactant is sodium hypochlorite, and the reactor is configured to produce no more than ten pounds of monochloramine per day.

5. The method of claim 1, wherein the temperature difference is about 10.0 °C or less.

6. The method of claim 1, wherein the temperature difference is about 2.0 °C or less.

7. The method of claim 1, further comprising determining that the temperature difference is outside acceptable range and activating an alarm indicating that the temperature difference is outside the acceptable range.

8. The method of claim 1, further comprising determining that the temperature difference is above a maximum value and activating a first alarm indicating that the temperature difference is above the maximum value.

9. The method of claim 8, further comprising determining that the temperature difference is below a minimum value and activating a second alarm, that differs from the first alarm, indicating that the temperature difference is below the minimum value.

10. The method of claim 1, further comprising measuring the temperature of the second reactant, determining a second temperature difference between the measured temperature of the second reactant and the measured temperature of the reaction product, and adjusting the flow rate of at least one of the first reactant and the second reactant if the second temperature difference reaches a pre-determined temperature difference.

11. The method of claim 1, the in-line mixer is an in-line static mixer.