Technology Readiness Level: 3
Analytical and Experimental Critical Function
And/or Characteristic Proof of Concept

Eltron Research & Development

Tech Brief

Catalyst for Destruction of Chemical Warfare Agents in Air at Low Temperatures

Eltron has developed a low temperature oxidation catalyst combined with high surface area oxides that preferentially form phosphates and sulfates under oxidizing conditions. The catalyst destroys the organic portion of the CWA while retaining the inorganic portion at low temperatures. Eltron's catalyst will ultimately be central to an air decontamination technology for the protection of combat personnel from chemical warfare agents (CWAs). Eltron's low temperature catalyst helps reduce operating costs by minimizing power requirements.

Benefits

- Reduces operating costs
- Destroys organics while retaining inorganic portion
- Extremely effective at low temperatures
- Preferential formation of phosphates and sulfates with metal oxide core support

Eltron's catalyst can be used to destroy dimethyl methyl phosphonate (DMMP) and chloroethyl ethyl sulfide (CEES). During development, the most active catalyst achieved greater than 99% removal of DMMP at 250℃, for 1450 minutes, at a DMMP concentration of 1581 ppm, Ct of 1.0 x107 mg@min/m^3. Similar results are obtained with the same catalyst in air saturated with water. At ambient temperatures, the same catalyst is found to have a Ct value of 4.0 x106 mg@min/m^3. With respect to the removal of CEES, the same catalyst was found to remove >95% of the CEES for more than 100 hours of operation at 350℃, CEES Ct of 1.2 x108 mg·min/m^3. *The concentrations of the stimulant in the sample flow stream were approximately 1500 ppm DMMP and 5000 ppm CEES at a constant space velocity of 6000 hr-1, 0.6 seconds residence time. In addition to various catalyst compositions, reaction temperature was also examined.*

Potential Applications and Benefits. Eltron's technology will be incorporated into an air decontamination device to be used by the Department of Defense to remove CWAs. Specific applications include personal protection, air decontamination units for tents, tanks, and helicopters, and large-scale units for barracks and command centers. In addition, this technology could be used for removing volatile organic compounds (VOCs) resulting from solvent or fuel intensive processes. **Eltron's catalyst technology exceeds current market technologies, such as 3M's C2A1 gas mask canisters which use carbon adsorbents.** Typically, catalyst oxidation occurs at approximately 760℃, but **Eltron's catalyst was found to achieve greater than 99% removal at just 250℃** .This reduces operating costs of the oxidation process by cutting fuel consumption and reducing maintenance costs of equipment due to lower thermal stress on heat exchangers, ducts and other equipment.

Stage of Development. Eltron has identified composition and preparation methods for these materials. Developing a device for implementation is still required. Eltron has the following intellectual property relating to this technology:

- 6,458,741 *Catalysts for Low-Temperature Destruction of Volatile Organic Compounds in Air*
- 6,787,118 *Selective Removal of Carbon Monoxide*
- 7,329,359 *Application of Catalysts for Destruction of Organic Compounds in Liquid Media*
- 12/257,811 *A Metal Oxide System for Adsorbent Applications*

The technologies described, and all related inventions are owned by Eltron Research & Development Inc, and protected by copyrights, trademarks, issued and pending patents, trade secrets, or other applicable intellectual property rights.

Eltron Research & Development

Eltron Research & Development Inc.
Eltron Research & Development Inc. commercializes novel technologies involving advanced materials, energy, water and environmental systems.

4600 Nautilus Court South | Boulder, CO 80301 | Phone: 303.530.0263 | www.eltronresearch.com
Copyright © 2009 Eltron Research & Development Inc. All rights reserved.