

ON SITE PRODUCTION OF NITROGEN FOR STORED PRODUCT DISINFESTATION

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Controlled Atmosphere (CA) treatments for the disinfestation of stored products and materials are considered to be environmentally friendly, residual free and safe for workers at doses of up to 5000 ppm (CO₂) or higher (N₂). In some fields of stored product protection CAs may replace the use of toxic fumigants or contact insecticides. The use of this alternative, however, is limited to highly gastight enclosures with leakage rates that do not render the treatment uneconomical. While the costs for structural sealing and treatment supervision may not be easily reduced, the costs for gas supply especially in areas remote from industrial gas production sites could be cut by a flexible on site production.

A membrane system and a pressure swing absorption (PSA) unit were tested under semi-practical and practical conditions. It was demonstrated that at about 20°C, oxygen contents of 0.5 % were sufficient to kill the granary weevil and other stored product pests within 6 weeks in a very gastight welded steel silo bin. When nitrogen with 0.5 % residual oxygen and a flow rate of 5 m³/h was introduced from below into a grain filled 188 m³ concrete silo bin with a pressure half life of >30 s, diffusion of oxygen into the silo caused oxygen contents of 3 % at the top. It is concluded that membrane and PSA systems are valuable techniques for the on site production of large or smaller quantities of hypoxic atmospheres, but that the use of nitrogen is limited to well sealed silo bins, containers or chambers. Such gastight seals could be achieved by metal covers, glass, plastic foils or gas impermeable coatings.