exceptionally quick measurement procedure per container. The DX4040 requires no span gas calibrations and uses no consumables for sampling or analysis. Only a short zero calibration with nitrogen is required once per day. This means that containers can be measured quickly and with a negligible cost per measurement.

The Gasmet DX4040 provides a powerful and cost effective solution to the challenge of measuring gases inside cargo containers. The use of FTIR technology enables the simultaneous measurement of an unparalleled amount of gases for a portable device, which leads to improved safety of workers. The DX4040 is also durable, requires no calibration gases (other than N2 for zero measurement) and requires no consumables for sampling. This means that the cost of ownership for this solution is also exceptionally low.

Efficiency of phosphine and modified atmospheres against five different stored products insects

Francisco Javier Wong-Corral*[1], María Fernanda Esparza-Soltero[2], José Luis López-Valdez[1], Alberto Olguin Moreno[2]

[1]Universidad de Sonora, DIPA, México
[2]Degesch de México
Corresponding author: francisco.wong@unison.mx
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Abstract

There has been a notorious resistance to phosphine over the last decade, and a wide variety of factors can be associated with this rise to tolerance in stored products in the northwest of México, which can be due to bad exposition times and application of phosphine, and others causes; investigations were conducted in a warehouse place comparing the efficacy of phosphine with the use of mixtures gases in order to create the modified atmosphere against five diferrent adults: *Cryptolestes ferrugineus* (Stephens), *Tribolium castaneum* (Hbst.), *Rhyzopertha dominica* (Fabricius.), *Oryzaephilus surinamensis* (L.), and *Prostephanus truncatus* (Horn.). An application of 1.4 ± .21 gr/m^3 of phosphine for 72 ± 1 h exposure time could achieve 100% mortality to four species just like: of *Tribolium castaneum*, *Rhyzopertha dominica*, *Oryzaephilus surinamensis*, and *Prostephanus truncatus*. While for *C. ferrugineus* the 100% mortality could be achieved after 4.2 ± 63 gr/m^3 of phosphine for 120h exposure time.

Modeling the distribution of phosphine in cylindrical grain silos with CFD methods for precision fumigation

Efstathios Kaloudis[1], Sotiris Bantas[1], Christos G. Athanassiou[2], Paraskevi Agrafioti[2*], Vasilis Sotiroudas[1,3]

[1]Centaur Analytics, Inc., 1923 Eastman ave, Ste 200, Ventura, 93003 CA, USA
[2]Laboratory of Entomology and Agricultural Zoology, Department of Agriculture, Crop Production and Rural Environment, University of Thessaly, Phytokou str., 38446, Volos, Magnesia, Greece
[3]Agrospecom, N. Kountourioti 3, Thessaloniki, 54625, Greece
*Corresponding author: agrafiot@agr.uth.gr
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Abstract

In the present study, the distribution of phosphine gas in a cylindrical silo was modeled and compared with available sensor data. The cylindrical silo was filled with wheat and a recirculation system was used to enhance the diffusion of phosphine throughout the grain volume. A Computational Fluid Dynamics (CFD) model was developed with OpenFoam software, which accounted for gas transport in porous media and sorption effects of phosphine into the grain. A time-dependent source was used to model the phosphine release from Aluminum Phosphide bags. Furthermore, simulation results were obtained for insect mortality as a function of their exposure to phosphine gas. The phosphine concentration measurements were available from calibrated wireless sensors provided by Centaur Analytics, placed near the silo walls at various heights. As the agreement of phosphine measured data with the simulation results was satisfying, it led to considering that the proposed CFD model (equations, boundary conditions, grain properties, recirculation system approach, etc.) was accurate. Utilizing the capabilities of fumigation modeling, the phosphine concentration could then be determined for every location inside the storage volume and at any given time, thus a prediction method for fumigation