A PREDICTIVE MODEL FOR PHOSPHINE CONCENTRATION IN GRAIN STORAGE STRUCTURES

P. C. ANNIS and H. J. BANKS

Stored Grain Research Laboratory CSIRO Division of Entomology
PO Box 1700 Canberra ACT 2601 Australia

The average concentration of phosphine in a structure fumigated with phosphine released from a metallic phosphide preparation is determined by the interaction of several physical and chemical parameters. A step wise mathematical model has been developed in which the time course of phosphine concentration is calculated on the basis of: the amount of phosphide applied, the rate of phosphine liberation, volume of gas space, gas loss due to leakage and the amount of phosphine sorbed on the commodity. Corrections are made for the influences of temperature and moisture on the rate of phosphine liberation and sorption. The current model is directed to treatment of wheat but is easily adaptable to other commodities with known sorption characteristics. The model enables evaluation of application rates against known toxicological objectives expressed as either target CxT products or minimum concentrations after prescribed intervals of time.