

Title The influence of intensive and extensive quantities on the degassing behaviour of phosphine-based fumigation bags.

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Citation Advances in stored product protection. Proceedings of the 8th International Working Conference on Stored Product Protection, York, UK, 22-26 July 2002 (2003); 866-869

Abstract

Phosphine (PH₃) and metal phosphides are used as fumigants for pest control in a wide range of application methods. New possibilities for increasing the degassing rate of fumigation bags based on metal phosphides are discussed. The reversible and irreversible reactions during the degassing process of a fumigation bag are described in a reaction law assuming a diffusion-controlled heterogeneous process. Three possible ways to improve the degassing rate are presented: (1) if the amount of free reactive metal phosphide in fumigation bags is increased, the degassing rates will be higher and attained more quickly than before; (2) since the water uptake and release of super-absorber are reversible, the super-absorber can be used as a local water reservoir, reducing the decrease in humidity and providing the fumigation bag with a constant amount of water so that the degassing rate can be markedly increased; and (3) a generator is introduced which sucks in cold air, warms it moderately and heats only the chamber with the fumigation bags, resulting in a constant reaction that is also facilitated at low temperatures of the external surroundings.