

THE MYCOMETER-TEST: A NEW RAPID METHOD FOR DETECTION AND QUANTIFICATION OF MOULD IN BUILDINGS

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INTRODUCTION

The MycoMeter-test has been developed and patented by microbiologists at the Copenhagen University. The method is based on enzymatic detection of mould (1,2). Investigations have shown that the biomass of fungal colonies growing on surfaces correlate to β -N-acetylhexosaminidase activity and that both hyphae and spores possess this activity (unpublished results). The method is currently used for screening buildings suspected for mould growth and as a tool for decision making on remedial measures. Furthermore the test is used as quality control after renovation.

KEYWORDS: microbial growth, diagnostics, measuring technique, fungi, mould.

MATERIALS AND METHODS

The test is based on a fluorometric detection of N-acetylhexosaminidase activity. Sampling is performed with a cottonswab on a defined sample area (picture below) The cottonswab is then transferred to a buffer containing a synthetic enzyme substrate and incubated for 30 minutes. The substrate is hydrolysed by the enzyme releasing a fluorophore which can be quantified using fluorimetry (Figure 1). The result of a MycoMeter-test is a fluorescence-count (FC) attained under standard conditions.

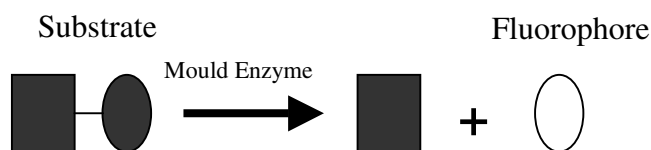
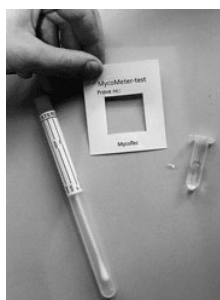


Figure 1. Tools and the principle of the method

RESULTS AND DISCUSSION

The method development is the result of two concurrent processes. One was theoretical considerations concerning quantification and delimitation of mould problems in buildings. The other process involved developing the method to a stage where it could find use as a practical tool for rapid screenings of buildings suspected for mould growth. This involved solving methodological problems related to robustness and reliability of the method as well as a continuous validation of the test in practice.

At present evidence exist that dampness and mould growth have an adverse effect on health (4,5). Growth of mould occurs in buildings where the humidity is high. Growth of mould therefore, usually indicate a technical problem (e.g. water damage or damage to the climate shield of the building). The high humidity allows germination of the omnipresent mould spores into mycelium. The phase shift from spores to mycelium and initiation of growth is concurrent with a many fold increase in the mould biomass. This is important, because, although the exact mechanisms for the adverse health effects on humans from mould exposure are not fully understood, a quantitative relation will obviously exist between the level of mould biomass present and potential health risks.

The background level of mould was defined as the mould (spores) present on clean surfaces, with no visible dust or dirt, in buildings with no mould problems. This level of mould is characterised as category A. Levels of mould above this background level can be due to either accumulated spores (e.g. in dust) (category B) or to actual growth of mould (category C). The discrimination between category B & C is possible due to the vast difference in fungal biomass in the two situations.

In practice, a number of surfaces with no dust/dirt, or with varying amounts of dust/dirt but without growth of fungi, or with mould growth was tested. The test results from clean surfaces showed a normal distribution. All fluorescence counts were less than 25 (FC). The test results on surfaces with dust but no fungal growth were described by a log normal distribution. In this case approximately 95 % of the samples showed fluorescence counts less than 450 (FC). Surfaces with fungal growth typically showed fluorescence counts ranging from 800 to 14.000 (FC). However, old dry mould growth exhibited muted signals, thus mould growth which have dried for 30 years has been analysed and showed values ranging from 180 to 600 (FC)

CONCLUSION

The MycoMeter-test can be used to provide a rapid quantification of mould in buildings. It allows for a relevant distinction between situations in which mould presence is the result of spores accumulated in dust/dirt or actual mould growth. This is important because a higher sanitation standard, in the former case, will lower the exposure level to moulds, whereas the detection of actual mould growth, necessitates remedial measures that involve sanitation, as well as identification and repair of a technical problem in the building construction.

ACKNOWLEDGEMENTS

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