SUMMARY

Inhibit fire with molecules from nature – application on textilespå textilier

Textiles are an indispensable part of human life and are used in many different consumer products such as clothes, blankets, carpets, bedsheets, and upholstery. Since they are combustible, they will contribute to a large fire load in a room. One way to increase fire safety in homes and public buildings is to use flame retardants. They can delay the onset of a fire, or reduce the rate of fire spread, which gives opportunity for people to extinguish the fire, or escape in time. However, many flame retardants have been banned because they are bad for the health and/or the environment.

Purpose and aim

One way to increase fire safety in a room is to treat textiles with flame retardants. This can delay the onset of a fire, or reduce the rate of fire spread. However, many flame retardants have been banned because they are bad for health and/or the environment. The aim of this project was to find new environmentally friendly and non-toxic flame retardants from bio-based resources such as agricultural waste.

Methods and implementation

Phytic acid, which is found in nuts and grains, was combined with purines, which are found in coffee, tea, and chocolate, or which are building blocks of DNA, and pieces of cloth were prepared with solutions of the substances. After an initial screening with combustion tests, the mixtures with the best flame retardant performance were selected for further testing with different calorimetric and atomic level analytical methods. Finally, medium-sized fire demonstration experiments were performed with a mock-up chair on the best mixture to validate that the small and medium-sized experiments are applicable even at scales relevant to end-use.

Results

All blends tested showed flame retardant properties, but the best results were for phytic acid with theophylline and adenine on cotton and polyester. The heat release properties were significantly improved, especially for phytic acid and adenine on cotton. Treated fabrics burned more slowly and self-extinguished. The results from the different methods correlated well with each other and methods where samples in milligram size were used could be scaled up to the medium-sized fire demonstration tests.

RESEARCH TEAM

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