



Soy-Based Polyols for Flame-Retardant Polyurethanes

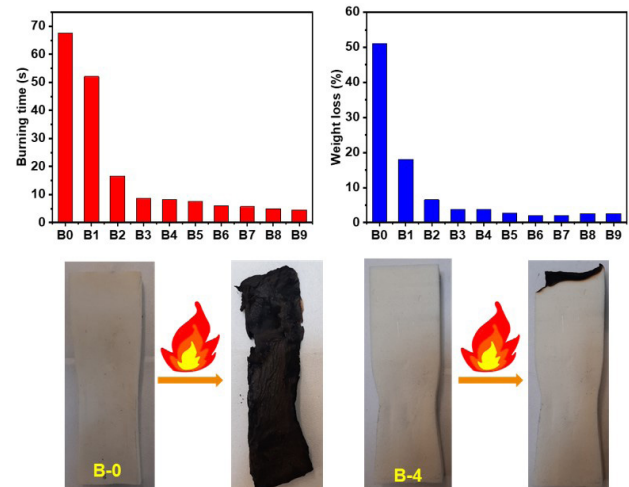
Researchers have demonstrated the use of soybean oil in developing eco-friendly, flame-retardant polyurethane (PU) foams. PUs are among the most versatile materials. Thanks to their adaptability, they are found in an abundance of commercial and industrial applications, from coatings to furniture to vehicles. However, PU foams are overtly flammable, and when they combust (or decompose), they form carbon monoxide, hydrogen cyanide, and other toxic products.

THE TECHNOLOGY

PUs variable physical and mechanical properties (e.g., density, flexibility, and rigidity) can be attributed to the diverse range of synthetic feedstocks and preparatory methods used in the manufacturing process. Recognizing that these properties depend in part on the composition of polyols (a starting chemical in the production process), the researchers sought to replace traditional petroleum-based polyols with soy-based polyols. Soybean oil was converted into polyol using a one-step process that does not require high temperature, high pressure, or solvents. The research team also added an inexpensive and environmentally friendly phosphorus-based flame retardant.

THE BENEFITS

The researchers used the soybean-oil-based polyol to develop several foams and tested their combustion behavior. The figure below shows the weight loss (in percentage) and burning time (in seconds) of foams produced with the soy-based polyol (B-4) vs. a control product (B-0). The B-4 foams showed significantly reduced weight loss and burning time, even after only 0.93% phosphorous was added. No dripping was observed during the burn test, indicating a quality product.



Weight loss and burning time of soy-based foam (B-4) and a control product (B-0)

STATUS

The technology is owned by the Missouri Soybean Merchandising Council. Airable is assisting with commercialization.

