

Rodents and insects can cause dangerous damage to plastics products such as cable insulation. Now the additives industry is fighting back with products that repel pests without causing environmental or safety concerns



Pest control for plastics

Thermoplastics may not be your idea of a tasty meal, but try telling that to rodents and insects. They are attracted by the smell, colour and texture of plastics and find plasticizers particularly morish. As a result, they can munch their way through a plastic cable jacket and wreak widespread havoc.

Earlier this year, the UK railway operator Network Rail reported that rats and mice are chewing their way through trackside cables and wires, causing major disruption to train journeys. In January, a small hole gnawed in a high-voltage power cable caused a breakdown on the West Coast mainline in Cheshire leading to 20 cancellations and 99 delays. A few weeks earlier, a similar problem in Lancashire led to 107 train cancellations and 289 delays.

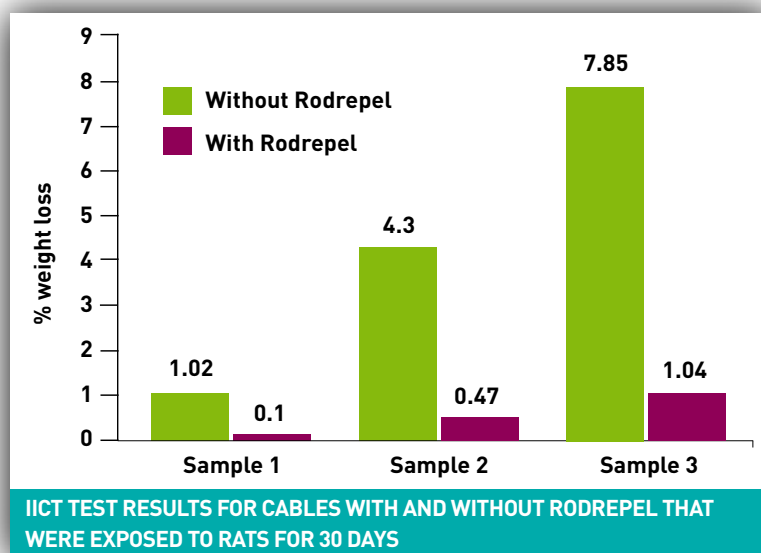
Even more danger can be caused by rats chewing their way through gas pipes. For example, this was cited as the cause of a fatal gas explosion in a home in the North East of England in 2007. In warmer climates, termites and other insects can present an additional threat to plastics insulation and products.

Protecting cables can involve a metallic or reinforced outer layer, but this is costly and restricts flexibility. Another option is the use of traditional pesticides and insecticides, but these can raise toxicity issues for other wildlife and for humans, as well as presenting potential environmental concerns. In addition, conventional

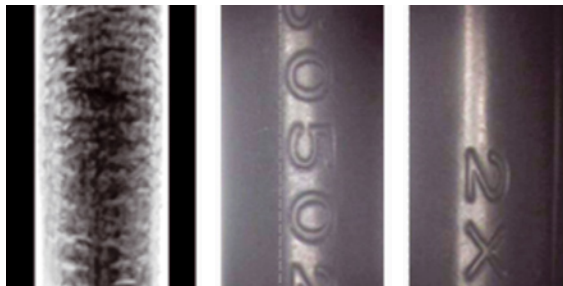
pesticides are not designed to handle the elevated temperatures of plastics processing.

C Tech of India is aiming to address these problems with polymer-specific masterbatches for repelling insects and rodents. Its Rodrepel additive masterbatches are targeted at rodents, while its Termirepel products are formulated to combat termites. Both are described as non-toxic and non-hazardous, and the company says that they are compliant with RoHS, REACH and are FIFRA exempted.

Unlike conventional pesticides, they are designed to



A cable without any Termirepel shows significant pitting after 30 days in a termite mound, whereas those with 1.5% and 3.0% Termirepel (centre and right respectively) appear untouched



provide high-temperature stability up to 400°C and beyond. Therefore, they can be extruded in plastics.

The masterbatches use a variety of mechanisms to repel insects and rodents. For example, Rodrepel uses smell as a deterrent. Rodents are also put off chewing the plastic by mechanisms like dermal irritation and an extremely bitter taste.

Termirepel acts in a similar manner by creating an unpleasant reaction within the insect trying to feed on the application. They are further deterred by mechanisms such as growth cycle inhibition.

The active ingredients do not leach out of the polymer matrix and they are effective in low dosages. Their low vapour pressure helps to avoid problems with

fumes, and they have a long active life of 5-40 years.

The performance of Rodrepel and Termirepel has been evaluated at various testing institutes. For example anti-rodent testing has been conducted at IICT, Hyderabad, India. It set up a large enclosure reproducing a natural habitat that housed at least five rodents for 30 days. Cables with and without Rodrepel were buried at various depths in the soil within the enclosure.

As shown on the previous page, the average weight loss for the control sample is extremely high compared to the average weight loss for the samples containing Rodrepel which suffered insignificant weight loss.

For the anti-termite testing, cable samples were placed in pots inside termite mounds. They were analyzed after 30 days and the results showed significant surface pitting present on the non-treated cables. In contrast, the cables containing the Termirepel masterbatch were not pitted at all and the cable identification mark could still be easily read.

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This article is based on a paper by Rishali Chalot and Sonal Sapale of C-Tech Corporation.

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