



## Nitrile and Biodegradation

### 1. What is degradation?

Degradation is the process of a material physically breaking down into smaller and smaller parts. All plastics degrade, but only some plastics can biodegrade (see question 2).

### 2. What is biodegradation?

Biodegradation can be defined as a significant change in the chemical structure of a material, caused by biological activity.

Once plastic polymers get broken down through various degradation mechanisms, some are eventually broken down to a small enough molecular weight to be metabolized by microorganisms and converted into carbon dioxide or carbon dioxide and methane. This process is called biodegradation.

There are two forms of biodegradation: aerobic, which happens in the presence of oxygen and results in a more complete and cleaner process, and anaerobic, which happens in the absence of oxygen, resulting in slower decomposition and the production of methane.

### 3. Are biodegradable products always better for the environment than non-biodegradable?

Not necessarily. The environmental impact of biodegradable products depends on how well the outputs from the biodegradation process are captured. For example, the methane produced by anaerobic biodegradation at landfill sites is more than 28 times as potent as carbon dioxide at trapping heat in the atmosphere so, if it isn't captured, it's a significant contributor to global warming. It's counterintuitive but, without proper disposal and waste capture, biodegradable products can sometimes be worse for the environment than non-biodegradable (i.e. just degradable) ones.

### 4. Are nitrile products biodegradable?

Nitrile products are not biodegradable. The raw material nitrile butadiene rubber (NBR) is a fossil-fuel-based polymer that can degrade into smaller and smaller pieces over time but can't biodegrade because its molecular structure prevents it from breaking down into fragments small enough for microorganisms to metabolize; **degradation** occurs but the small pieces of plastic remain indefinitely.

### 5. If nitrile isn't biodegradable, why have I seen claims of certain nitrile products being biodegradable?

Some manufacturers claim that additives can cause nitrile products to biodegrade. However, Ansell has not seen any evidence that these additives can change the molecular structure of nitrile and allow it to biodegrade.

Some technologies now incorporate proprietary additives or treatments designed to induce nitrile products to biodegrade but concerns exist regarding their safety and environmental impact. These concerns typically revolve around:

- **Environmental safety:** Some additives used to enhance biodegradability may not be good for the environment, so they could break down into harmful byproducts or release toxic chemicals during the degradation process
- **Efficacy of biodegradation:** The effectiveness of these additives in real-world conditions such as landfills can vary, which means the biodegradation might not occur as efficiently as intended
- **Impact on performance:** Additives could affect protective products' durability, protection level or other functional properties while in use
- **Regulatory and health concerns:** There may be regulatory challenges or health concerns associated with certain additives, especially if they come into contact with skin or are used in sensitive environments like healthcare or food processing

## 6. Are there standards for manufacturers to claim a product is biodegradable?

Yes. ASTM D5511 and ASTM D5526 are the most common standards for evaluating a product's biodegradability. They provide a framework for testing products but they don't provide an accreditation or labelling scheme. Nonetheless, PPE regulations in most markets require manufacturers to provide objective evidence before claiming their products are biodegradable, such as positive test results according to these two standards or other globally recognized equivalents.

## 7. Finally, if nitrile isn't biodegradable, then how is Ansell making their products more sustainable for customers?

We've performed extensive life cycle assessments of our products and identified the raw material and manufacturing phases as having the biggest carbon footprint. This means that by reducing the environmental impact of these phases, our protective products become much more sustainable overall. We're doing this by focusing our efforts on more sustainable manufacturing processes and improving our products' circularity.

For our manufacturing processes, we're prioritizing renewable energy and have set clear goals to reduce our dependence on fossil fuels and use energy more efficiently, as stated in our Sustainability Report.

In terms of product circularity, we're looking into how to reuse or recycle our products so that, even after disposal and end-of-life, they can still be useful or at least have a much lower environmental impact.

We're also using Ansell Earth to focus on innovative approaches to improve the sustainability of our nitrile products. This includes optimizing production processes, reducing waste, and implementing recycling programs, all designed to minimize environmental impact while maintaining the high quality and performance standards Ansell is known for. This commitment to sustainability is captured under our Ansell Earth platform, where we communicate the sustainability credentials of our products.

### Sources:

<https://echa.europa.eu/en/web/guest/hot-topics/microplastics>

[https://www.researchgate.net/publication/274432143\\_Plastic\\_Degradation\\_and\\_Its\\_Environmental\\_Implications\\_with\\_Special\\_Reference\\_to\\_Polyethylene\\_terephthalate](https://www.researchgate.net/publication/274432143_Plastic_Degradation_and_Its_Environmental_Implications_with_Special_Reference_to_Polyethylene_terephthalate)

<https://www.astm.org/d5511-18.html>

<https://www.astm.org/d5526-18.html>

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For over 130 years, Ansell has been protecting people, and our ambitions today are stronger than ever. By setting ourselves ambitious goals on protecting our environment, we seek to break new ground. With increased sustainability and ever smarter, more connected PPE, we strive to ensure the safety of workers and the environment we live in.

**Thinking of people and planet first.**

Learn more at [ansell.com/sustainability](https://ansell.com/sustainability)

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