



Antimicrobial

Plastic and Rubber Technology

A suite of masterbatches offering cost-effective protection against dangerous microbes on plastic products and other surfaces

Providing protection for the lifetime of the product

What is d₂p antimicrobial: d₂p AM 97000 is a plastic technology that destroys microbes

The active ingredient is an organic chemical substance, tested against bacteria (both Gram (+) and Gram (-) types), fungi, (yeasts, moulds, mildew), and algae. Independent test results, carried out according to ISO 21702-19 found a virus reduction of 99.9% in one hour.

Test methods used in assessing the level of protection:

Against Bacteria: ISO 22196
(against both Gram + and Gram – Bacteria types)

Against Viruses: ISO 21702-19
and a modified ISO 22196

Against Fungi: ASTM E-2180 and ASTM G-21

Against Algae: ASTM D-5589



Why do we need d₂p?

Microbes are everywhere. Each square centimetre of skin alone harbours about 100,000 bacteria, and a single sneeze can spray droplets infested with bacteria and viruses as far as 2 metres.

The microbial lifespan depends on many factors. Viruses must invade cells of a living host to replicate, but outside a living host they can survive for several days. Bacteria do not need a living host to reproduce.

Surfaces of almost any kind can therefore be a continuing source of infection unless they contain d₂p.

Symphony's d₂p 97000 masterbatch can offer antimicrobial protection for a wide variety of surfaces - including plastic, latex, nitrile, rubber, silicone, paint, lacquers and inks.

How does it work?

The Active Substance crosses the phase-barrier at the surface of the product, and biochemically deactivates the microorganisms - preventing them from replicating, and ultimately destroying them.

The antimicrobial effect against bacteria derives from the ability to disrupt membrane-transport by blocking the proton pump that energises the transport mechanism within the microorganism.

Viruses are neither prokaryotes nor eukaryotes because they lack the characteristics of living things, except the ability to replicate.

d₂p antimicrobial's range of applications:

The applications for this technology include the following:

- **Food:** including packaging, food containers, cutting-boards, food conveyor belts etc.
- **Medical/Hygiene:** including mattress-covers, protective equipment such as overalls, face masks, hair nets, caps, examination gloves, garbage/shopping/laundry/bags
- **Transportation:** including handrails, door handles, seats, walls etc. in cars, buses, trains and aircraft
- **Office:** including computer keyboards, mice and mouse-mats, telephones, credit cards etc.
- **Home:** including kitchen tables and worktops, door handles, household gloves, water tanks, pipes and pipe fittings, and home appliance.

Mechanism of Action

When incorporated in the material, the Active Substance is effective in two ways:

1. It will keep the plastic surface free from contamination by dangerous microbes
2. It will protect the contents of the packaging from contamination, helping to increase their shelf life.

Incorporating the Active Substance in finished products is achieved during the manufacturing process by using d₂p masterbatch at a low addition-rate of 1 – 2% by weight.

The Active Substance is stable in the substrate and will last for the lifetime of the product. It is therefore much better than spraying or wiping, which soon wears off.

It will not affect the mechanical, optical, chemical or physical properties, so the product will behave as normal, except for the powerful antimicrobial protection.

The Active Substance is registered in the EU under the BPR (Biocidal Products Regulation) and in the USA with EPA and FDA. The FDA has specifically approved Symphony's antibacterial d₂p for bread packaging.

Advantages of d₂p:

1. Easy to manufacture at little or no extra cost
2. Non-staining – no discoloration of finished products
3. Finished products are non-toxic for humans and animals
4. Antimicrobial protection for the lifetime of the product

NOTE: it is the responsibility of the user of d₂p to ensure that applicable regulations in the Country, State or Province concerned, are complied with before placing the finished-product on the market.