biothene® – the degradable alternative

Plastic and its impact on the environment is moving rapidly up the green agenda. About 13 billion single-use bags are given out to UK shoppers every year and takes hundreds of years to decay.

In his 2008 Budget speech the UK chancellor Alistair Darling announced that laws will be introduced by 2009 to tax disposable plastic bags if shops do not do more to charge for their use.

Biothene®, a new oxy-biodegradable polythene, is a radical solution to the problem.

Biothene® is a material which starts to degrade upon exposure to sunlight and is accelerated by heat. Once the material has been broken down into small particles these degrade biologically into a non-toxic residue within 12 – 18 months.

The original idea was first developed in the 1970s by The Royal College of Forestry in Stockholm and in the last five years developed further to make it more widely available worldwide.

Biothene® not only promotes the wider use of degradable products, it also promotes a more detailed approach to sustainable packaging. Key promotional points are:

- multi-use heavy duty packaging promoted over single-use disposable packaging
- litter education promoted to reduce the environmental effects on wildlife
- manufacturers of Biothene® are encouraged to reduce their carbon emissions in its production and where possible Biothene® is manufactured in or near the country of destination.

Comments from industry analysts:

"Environmental issues are now at the top of everyone's agenda and our new degradable Biothene product will make a significant contribution to helping us to live more sustainably.

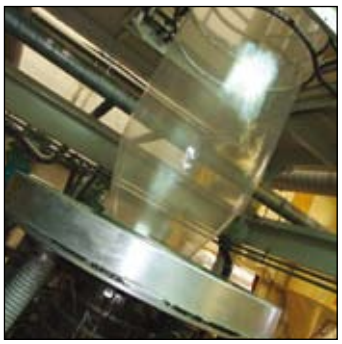
"Now we can also manufacture polythene products which will naturally and safely break down at the end of their useful life – and Biothene can be used for food packaging too.

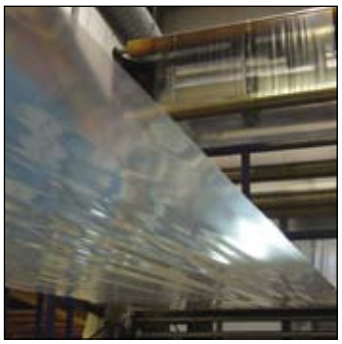
"Many people will be happy to do without carrier bags completely, but for those who do need to use a bag Biothene is a great biodegradable alternative.

"A sturdy carrier bag which can be re-used several times before degrading harmlessly is much better for the environment than a cheap plastic bag which stays in the environment for hundreds of years.

"We live in a consumer world and having no method of carrying our shopping is unrealistic. Biothene provides a solution that will help to reduce the harm done to the countryside caused by normal plastic bags.

"Biothene is not the full answer, however. It requires an improved litter and recycling policy from the Government to tackle the existing plastic bags that have already been used."





biothene® – technical data

Biothene® is an additive which degrades polythene under the influence of light and heat. The addition of 2% to 3% Biothene® will produce a photochemically and thermally degradable film.

Polythene containing Biothene® will not degrade before being exposed to UV light. Once the polythene has been exposed to UV light, the degradation reaction will be triggered and continues even in the dark, for instance in conditions to be expected when buried in a landfill site. Degradation will be accelerated by heat.

Many studies have shown that, once the polythene has been transformed into a fine powder, biological degradation will take place. The end products of biodegradation will be carbon dioxide and water, with a very small residue of non-toxic inert mineral material.

Biological degradation can start when the molecular weight has been drastically reduced and when the surface area of the disintegrated plastic has been enlarged.

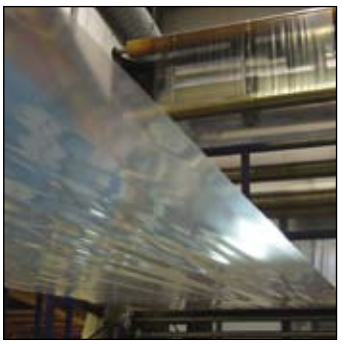
The residues of degraded polythene are non-toxic.

Biothene® can be used in LDPE, LLDPE, HDPE and PP blown or cast films.

Physical properties

Carrier	PE
Specific Gravity (g/cm3)	0.92
Bulk Density (g/l)	0.550
Moisture Content (%)	<0.15
Colour	Light brown pellets

Biothene® contains active metal ions embedded in the polythene. Degradation begins only after the metal ions have been activated by exposure to a UV light or heat source.



The degradation speed is mainly dependent on:

- the concentration of Biothene®
- the thickness of the film
- the type of resin
- the presence of antioxidant and pigments
- the temperature
- the type of exposure

Food contact

The active ingredients of Biothene® are approved for use in food contact applications according to directive 2002/72/EC, which is the consolidation directive incorporating 90/128/EC and its amendments. There are no specific migration limitations.

Manufacturing Properties

No alterations are needed to the machine settings in the manufacturing process as the physical manufacturing properties of the film are not changed. Biothene® is added to the film in the same way as a colour additive and does not have any harmful effect on the machines or their running.

biothene® – frequently asked questions

How long does it take to degrade?

This depends on the condition the Biothene is in and the thickness of the material. If it is kept in a box out of direct sunlight and heat it can be kept for up to 18 months or more. If it is left in the open and subject to heat and light it will degrade within approximately 18 months. Even if the bag is used and then put in landfill or somewhere dark it will still degrade as the process has already been triggered by the initial contact with the sunlight.

How does it work?

The active agent is a metal ion and a catalyst which is added to the polythene when it is extruded. These react with sunlight and this reaction starts to break down the molecular chains in the material.

How long has it been established?

The original concept was developed in the 1970s by The Royal College of Forestry in Stockholm. It was however not until 2002 that the product was further developed and improved to be able to be used more widely.

Can it be classed as compostable?

No. According to the EN 13432 compostable classification the material must break down within 3 months to be classed as compostable. Because we are aiming at a reusable material we wanted the material to last longer than 3 months so for classification purposes it cannot be classed as compostable.

Are there any harmful residues left after it has degraded?

No. The products produced are water, carbon dioxide and a small amount of inert mineral oxides which naturally occur in the environment such as SiO2 and Fe304 etc.

These residues are non-toxic to the environment.

Can it be used for food contact?

Yes. It complies with the EU directive 2002/72/EC and 2004/19/EC relating to plastic materials that come into contact with foodstuffs.

Is it made from corn starch?

No. The corn starch material has some major environmental and practical issues. The material is made from corn-based crops and the increased use of these for non-food use is causing concerns. The price of the corn/wheat is being forced up by the increased use of bio-fuels and starch based materials, which means we are making it harder for the third world countries to source their essential basic food ingredients. Also there are areas of rain forest and natural habitats being cut down to grow these extra crops. Also in the process of degrading corn starch emits methane, which is according to the AEAT report more than 23 more times potent for global warning than CO2. There are also concerns that GM corn is being used to make the material which in turn has its issues.

Are paper alternatives better than Biothene for the environment?

No. 70% more atmospheric pollution is caused by making paper bags and 300% more energy. Also when they degrade they emit methane.

Paper products can not be reused as many times as Biothene as they are not as strong and break down if they get wet.

On average, it would cost approximately 7 times more to transport the same number of paper products as it would Biothene due to the bulkiness of the paper.

Are cotton/nylon products better than Biothene?

There are a lot of drawbacks with the nylon/cotton products. Firstly their convenience. It is not always possible to have one or enough of them when you are out shopping. Many people shop spontaneously and it is not always possible to have them to hand. They are also a lot bulkier than Biothene and carrying a large number of these to do your weekly shopping is also inconvenient. Finally these bags are not generally waterproof and items inside them can possibly get water damaged.

Is there a classification or standard that exists for Biothene?

We are currently working towards a British Standard BS 8472:200X for degradable polythene.

How does it differ in looks and feel different to normal polythene?

Biothene differs only in that is has a very slight brown tint. It is not noticeable on individual bags but can be seen if stacked together. Otherwise it has the same strength, feel and other properties of normal polythene.

Can it be recycled?

Because the material degrades there is no need for it to be recycled. It is a material which can be reused multiple times and then left to degrade afterwards.

What can Biothene be used for?

Anything that polythene is used for at present. This includes food, retail, cosmetics, pharmaceutical, medical, agricultural, mailing/postal and many others.

Where can I buy it?

Visit **www.biothene.com** and click on approved suppliers in the area where you live.