Environmental Sustainability Bulletin 06/19

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These bulletins summarise key ideas and solutions to environmental and sustainability matters, allowing wider dissemination of lessons learnt from them. The information below has been provided in good faith by IMCA members and should be reviewed individually by recipients, who will determine its relevance to their own operations.

The effectiveness of these bulletins depends on receiving reports from members in order to pass on information and continue to present innovative solutions. Please consider adding the IMCA secretariat (sustainability@imca-int.com) to your internal distribution list for similar internal reports and/or manually submitting information on specific solutions that you consider may be relevant. All information can be anonymised or sanitised, as appropriate.

A number of other organisations issue environmental sustainability updates and similar documents which may be of interest to IMCA members. Where these are particularly relevant, these may be summarised or highlighted here. Links to known relevant websites are provided at www.imca-int.com/links. Additional links should be submitted to sustainability@imca-int.com.

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Plastics: A Briefing on Biodegradability

Plastic is the broad name given to different long-chain polymers with high molecular weight. Some of the most commonly used are PE (polyethylene), PVC (polyvinyl chloride) and PET (polyethylene terephthalate), polypropylene and polystyrene. The increasing accumulation of waste plastic, particularly in the marine environment, has become a global environmental threat. It has been estimated that the production of plastic waste we generate annually is enough to wrap around the earth 10 times! [1]

It is important that IMCA members play their part in minimising or eliminating plastic waste. This briefing is the first of a series intended to provide members with helpful pointers and hints for reducing the use of plastics in their operations.

What does “biodegradable” mean?

A biodegradable material is one that can be broken down into smaller component parts by micro-organisms, in the presence of oxygen (air), water, and sunlight. The absence of oxygen, water or sunlight will hinder the process of biodegradation. Some materials ‘biodegrade’ faster than others – for example, vegetables may break down in a month or so while leather shoes may take over a century.

Many plastics, particularly those named above, **do not biodegrade at all**, regardless of environmental conditions. Other plastics may do so very slowly *if exposed* to air, water and sunlight. Some modern plastics have been engineered to biodegrade reasonably quickly – but *only if* they are disposed of in a large composting facility that designed to speed up biodegradation. They are unlikely to biodegrade in modern landfill or in the subsea environment.

Biodegradable plastic?

So-called biodegradable plastics do not ‘biodegrade’ but only break down into smaller and smaller particles, becoming microplastics or even nanoplastics. It is these tiny particles that are harmful to the environment. The breakdown of plastics, whether ‘biodegradable’ plastic or otherwise, is dependent on two things:

- The chemical composition of the plastic;
- The environment in which it is disposed of.

The only difference between so-called ‘biodegradable’ plastic and non-biodegradable plastic is the speed with which this breakdown happens. The breakdown of plastic, ‘biodegradable’ or otherwise, will be **hindered or even stopped** by conditions in the marine or subsea environment. It is important to note that nanoparticles originating from plastics can present a whole new range of issues in the subsea environment, by entering the food chain if eaten by marine species.

Compostable plastics

Compostable plastics are made of different materials other than the long chain polymers used to make conventional plastics. They are made of 'natural' materials such as corn starch or plant-based materials. Under the right conditions – in the land environment – such plastics will decompose into the original carbon, water and oxygen. That decomposition depends on the presence of oxygen and the presence of sunlight. Such plastics that get into the marine or subsea environment will be to a degree deprived of oxygen and sunlight, and will not decompose so easily, if at all. The challenge is to find source materials that can be formed into plastics, that will decompose in the marine and subsea environment – that is, that are 'compostable' offshore.

Some 'bioplastics' made from materials kinder to the environment are becoming available. One such bioplastic is PLA (Polylactide acid) which looks and behaves like PE and polythene and is widely used for food containers. Unfortunately, not all bioplastics compost easily or completely. Some will 'compost' only in industrial scale composters or digesters, but not on ordinary home compost heaps or in conventional landfills. Some bioplastics, in their decomposition in landfills, produce methane which is of course a much more powerful greenhouse gas than CO_2.

Some biodegradable plastics and bioplastics need exposure to UV (ultraviolet) light or relatively high temperatures and can still take many years to break down. Even then, they may leave behind micro-fragments or toxic residues. Bioplastics may be made from plants such as corn and maize, so land that could be used to grow food for the world is being used to 'grow plastic' instead. Bioplastics and biodegradable plastics cannot be easily recycled. To most people, PLA looks very similar to PET (polyethylene terephthalate) but, if the two are mixed up in a recycling bin, the whole collection becomes impossible to recycle. There are fears that increasing the use of PLA may undermine existing efforts to recycle plastics.