Incineration of Oxo-biodegradable Plastics with Energy Recovery

Calorific Value

The calorific energy recoverable by incineration of hydrocarbon-based plastics, whether oxo-biodegradable or conventional, is almost identical to that of the fossil resources from which they were originally made[1]. This must therefore be included as a benefit in Life-Cycle Assessments. In normal combustion of such plastics the effluent may contain toxic combustion-products and modern waste to energy incinerators are designed to remove these from the exit gases so that they do not escape into the environment[2].

Vegetable-based plastics have a much lower calorific value than hydrocarbon-based plastics and they normally contain absorbed water, so they are not as suitable for incineration with energy-recovery.

Oxo-biodegradable Plastics

These materials are currently and for the foreseeable future hydrocarbon-based plastics. They are designed to biodegrade like nature's wastes at the end of their useful life and this is achieved by incorporating during manufacture very small quantities of metal compounds (e.g. iron, cobalt or manganese - but not "heavy metals" ie lead, cadmium, mercury or hexavalent chromium) that are converted to the corresponding oxides during incineration of the plastics.

These end-products do not escape into the environment from a modern incinerator, but even if they did they are normally found at appreciable concentrations in most agricultural soils from which they are extracted into plants and into the water supplies. In a risk-assessment the UK Food Standards Agency has shown[3] that they are non-toxic and are absorbed by plants used for food by animals (including humans), thus providing them with essential trace-elements. Cobalamine and manganese peroxidase are particularly important in cases of vitamin deficiency.

Consequently, even in the event of accidental escape of these materials into the environment, they would present no possible hazard to animals or humans.

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[1] A. Bousted and G.F. Hancock, Energy and Packaging, Ellis Horwood, 1981
[2] G. Scott, Polymers and the Environment, Royal Society of Chemistry, 1999, p. 87-91
[3] Expert Group on Vitamins and Minerals, UK Food Standards Agency, Trace Elements, Risk Assessment, 2002, Part 3