

## ENVIRONMENT AGENCY INTERIM ADVICE on Wastes containing unbound Carbon Nanotubes - 19 May 2008

The purpose of this briefing sheet is to raise awareness of the classification and handling of waste containing or comprised of unbound (i.e. not fixed within a matrix and capable of being inhaled) Carbon Nanotubes (CNT). It is particularly relevant to those involved in synthesis or use of carbon nanotubes or in the management of the wastes produced.

### Key issues

Carbon nanotubes (CNT) are a specific type of nanoparticle. Presently there is limited information on the human health effects and environmental impact of nanoparticles in general and CNT in particular. Where wastes containing CNT are generated the producer or holder of the waste has a duty to correctly classify this waste and ensure that it is managed correctly.

From the List of Wastes the appropriate entry for carbon nanotube waste is either **16 03 03 inorganic wastes containing dangerous substances** ( a hazardous entry) or **16 03 04 inorganic wastes other than those mentioned in 16 03 03** (a non-hazardous entry) .

Based on the information that is available it would appear that wastes containing carbon nanotubes may display hazardous properties either as irritant (H4)<sup>1</sup> or toxic (H6)<sup>2</sup> or carcinogenic (H7)<sup>3</sup> . We therefore consider that a precautionary approach should be adopted and CN waste, **where the CN is unbound**, be coded under **16 03 03\* inorganic wastes containing dangerous substances** of the Lists of Wastes and so be classified as hazardous waste. Given that the material may display physiological properties similar in nature to asbestos a threshold of 0.1% (weight/weight) would seem appropriate. We will keep this position under review.

This has been done to ensure a high level of protection for people and the environment.

### Disposal Options

From the available information waste can be rendered safe by incineration by exposure to temperatures above 850 deg C for at least 2 seconds or by being treated chemically in such a way as to destroy the nanodimensional structure which renders the material toxic. Based on current knowledge we consider high temperature incineration at a hazardous waste incinerator as the preferred disposal method although other technologies may be suitable if it can be demonstrated that they render the wastes safe. We suggest producers contact HTI operators before consigning their waste.

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<sup>1</sup> <http://www.cheaptubesinc.com/cntmaterialsafetydatasheet.htm>

<sup>2</sup> <http://toxsci.oxfordjournals.org/cgi/reprint/kfg243v1.pdf>

<sup>3</sup> <http://www.advisorybodies.doh.gov.uk/pdfs/mut0515.pdf>