



Swansea University  
Prifysgol Abertawe

# Swansea University

## Waste Management Guidance Note WMGN33 Waste Nano-objects, Agglomerates and Aggregates (NOAA)

<b>Author:</b>	Fiona Wheatley
<b>Approved by:</b>	Fiona Abbott
<b>Creation date:</b>	01/08/2019
<b>Review date:</b>	01/08/2020

<b>Waste Management Guidance Note WMGN33 Waste Nano-objects, Agglomerates and Aggregates (NOAA)</b>	
Location Generated	<b>CAT 2 laboratory</b>
EWC	Various
Transport Class & UN Number	Various
Type	Hazardous
Disposal Method	Incineration
Bin/Bag Type	Red Bag / Yellow lidded clinical boxes

This Waste Management Guidance Note has been developed in accordance with [BIS \(PD 6699-2:2007\)](#)<sup>1</sup>, PAS 138:2012<sup>2</sup>, [UKNSG 2016](#)<sup>3</sup> and [Technical Guidance WM3](#)<sup>4</sup> guidance.

### **Duty of Care Requirements**

#### **EWC 06 Wastes from Inorganic Chemical Processes**

EWC 06 07 ; wastes from Manufacture, Formulation, Supply and Use (MFSU) of halogens and halogen chemical waste

#### **EWC 07 Wastes from Organic Chemical Process**

EWC 07 01 ; wastes from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals

### **Description;**

Nano-objects, Agglomerates and Aggregates (NOAA) are less than 100nm and greater than 1nm (PAS 138:2012) and are applicable to engineered materials that consist of nano-objects such as nanoparticles, nanofibers, nanotubes and nanowires, as well as aggregates and agglomerates of these materials.

There is currently no regulatory framework in the UK specifically for nanomaterial. Currently the manufacture of nanomaterials falls under the Control of Substances Hazardous to Health (COSHH) Regulations (2002), and the disposal of laboratory waste nanomaterial under the Waste Regulations (2011). It is a legal requirement under the Hazardous Waste Regulations to segregate hazardous wastes from non-hazardous wastes. Incorrectly disposing of hazardous waste via a non-hazardous waste stream can lead to legal and financial penalties dependent upon the severity of the noncompliance.

<sup>1</sup> BIS Nanotechnologies – Part 2: Guide to safe handling and disposal of manufactured nanomaterials

<sup>2</sup> PAS 138:2012 Disposal of manufacturing process waste containing manufactured nano-objects. Guide

<sup>3</sup> UK Nano Safety Group - Working Safely with Nanomaterials in Research & Development Second Edition May 2016

<sup>4</sup> Guidance on the classification and assessment of waste (1st Edition v1.1 ) Technical Guidance WM3

**BIS (PD 6699-2:2007) outlines that it is a reasonable worst case assumption to consider all nanomaterial waste as potentially hazardous.** This also applies to any material that has come into contact with dispersible engineered NOAAs (that has not been decontaminated), which should be considered as belonging to a nanomaterial-bearing waste stream.

### **Waste items;**

- pure NOAAs (nano-objects, agglomerates and aggregates)
- items contaminated with NOAAs, such as containers, wipes and disposable PPE
- liquid suspensions containing NOAAs
- cleaning solutions used for decontaminating
- solid matrices with NOAAs that are friable or have a nanostructure loosely attached to the surface such that they can reasonably be expected to break free or leach out when in contact with air, water, or other media when subjected to reasonably foreseeable mechanical forces.
- solid matrices with NOAAs that are non-friable

Material from hazardous or potentially hazardous nanomaterial-bearing waste streams must be disposed of as hazardous waste, and should not be put into the any other University waste stream or disposed down the drain.

NOAA can be in different forms, as produced (e.g. as a powder), or as used (e.g. embedded in a solid matrix or attached to a substrate), suspended in a gas or in a liquid; or as waste. Each of these different stages will have its own exposure pattern. Thus, the NOAA's physical form (i.e. exposure availability) should be characterised throughout the product lifecycle.

Any material that has come into contact with dispersible engineered NOAAs (that has not been decontaminated) should be considered as belonging to a nanomaterial-bearing waste stream. This includes PPE, wipes, blue roll, blotters and other disposable laboratory materials used during research activities.

Equipment used to manufacture or handle hazardous or potentially hazardous nanomaterials should be decontaminated before it is disposed of correctly (see [WMGN17](#) for guidance on electrical items) or reused.

Wastes resulting from decontamination (cleaning solutions, rinse waters etc.) should be treated as nanomaterial-bearing waste, and disposed of as hazardous liquid waste via the University's chemical waste stores.

**Table1: Summary of treatment and control conditions for laboratory waste nanomaterials**

<b>Waste Nanomaterial</b>	<b>Pre-treatment Prior to Disposal</b>	<b>Containment</b>	<b>Level of Engineering Controls</b>	<b>Method of Disposal</b>	<b>Final Waste Treatment Process (Offsite)</b>
<p><b>Unbound pure NOAAs</b></p> <p>(nano-objects, agglomerates and aggregates)</p>	Decant in Fume Hood into appropriate sealed bottle	Drip tray	Inside a LEV enclosure or glove box or vented fume cupboard with the hood down	Liquid waste disposal – see <a href="#">EMS 8.1.5</a>	Incineration
<p><b>Bound NOAAs in Liquid suspensions</b></p> <p>(including inks)</p>	Decant in Fume Hood into appropriate sealed bottle	Drip tray	<p>Inside a LEV enclosure or glove box or vented fume cupboard with the hood down</p> <p>Liquid placed into appropriate sealed Winchester/bottle/drum etc.</p>	<p>Liquid waste disposal – see <a href="#">EMS 8.1.5</a></p> <p><b>Soft Solids</b></p> <p>Chemical only – red bags. See <a href="#">WMGN21</a></p>	Incineration
<p><b>Bound NOAAs</b></p> <p>Solid matrices with NOAAs that are <b>friable</b></p>	<p>Wet/moisten.</p> <p>Allow to dry naturally in vented fume cupboard or place into <b>plastic tube</b></p>	Secondary containment before disposal into in sealed zip bag. Where practical this must be done in a vented fume cupboard.	Inside a LEV enclosure or glove box or vented fume cupboard with the hood down	<p><b>Soft Solids</b></p> <p>Chemical only – red bags. See <a href="#">WMGN21</a></p> <p><b>Sharps</b></p> <p>Infectious &amp; Chemical – Yellow clinical box. See <a href="#">WMGN26</a></p>	Incineration

<p><b>Bound NOAAs</b></p> <p>Solid matrices with NOAAs that are <b>non-friable</b></p> <p>e.g. silicon wafer substrate / SPE / polymer (non-sharp)</p>	<p>Wet/moisten</p> <p>Allow to dry naturally in fume cupboard</p>	<p>Single containment (if non-sharp)</p> <p>Secondary's continent if sharp before disposal to red bag – examples provided only</p>	<p>General ventilation</p>	<p><b>Soft Solids</b></p> <p>Chemical only – red bags. See <a href="#">WMGN21</a></p>	<p>Incineration</p>
<p><b>Unbound NOAAs</b></p> <p>Non-solid matrices e.g. blue towels after cleaning</p> <p><b>laboratory consumables</b></p> <p>e.g. silicon substrate / SPE / paper towels / gloves / masks</p>	<p>NA</p> <p>Allow to dry in a vented fume cupboard</p>	<p>Secondary containment before disposal into in sealed zip bag where practical. This must be done in a vented fume cupboard or with other suitable form of local exhaust ventilation (LEV)</p>	<p>Inside a LEV enclosure or glove box or vented fume cupboard with the hood down</p>	<p><b>Soft Solids</b></p> <p>Chemical only – red bags. See <a href="#">WMGN21</a></p> <p><b>Sharps</b></p> <p>Infectious &amp; Chemical – Yellow clinical box. See <a href="#">WMGN26</a></p>	<p>Incineration</p>

**Disposal Instructions**

**Red bag and liquid NOAA waste**



**External Storage for disposal**

**Singleton Campus**  
Grove chemical waste store

**Disposal Instructions**

**Yellow lidded clinical for chemical and infectious contaminated sharps and solids**



**External Storage for disposal**

**Singleton Campus**  
Grove chemical waste store

<p><b>Bay Campus</b> Bay chemical waste store - Engineering Service Yard</p> <p>See <a href="#">EMS 8.1.5 Chemical Waste Store User Procedure</a> for disposal guidance</p>	<p><b>Bay Campus</b> Bay chemical waste store - Engineering Service Yard</p> <p>See <a href="#">WMGN26 Infectious and Chemically Contaminated Solid Waste and Sharps Waste (Yellow lidded clinical waste box)</a></p>
<p><b>Disposal Cost</b></p> <p>Charge for this service may apply, please contact <a href="mailto:estates-waste@swansea.ac.uk">estates-waste@swansea.ac.uk</a></p>	
<p><b>For further guidance:</b> please contact <a href="mailto:Estates-Waste@Swansea.ac.uk">Estates-Waste@Swansea.ac.uk</a> and the local University's Biological Safety Officer</p>	