



# Challenges arising from the assessment of the ecotoxicity of waste in industrial settings & approaches for waste classification taken by Member States

**Mélissa Zill**  
Scientific Officer

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# Classification of waste - Fluff-light fraction

19 10	wastes from shredding of metal-containing wastes	
19 10 01	iron and steel waste	ANH
19 10 02	non-ferrous waste	ANH
19 10 03*	fluff-light fraction and dust containing hazardous substances	MH
19 10 04	fluff-light fraction and dust other than those mentioned in 19 10 03	MNH
19 10 05*	other fractions containing hazardous substances	MH
19 10 06	other fractions other than those mentioned in 19 10 05	MNH

Fluff-light fraction is a **mirror entry** in the list of waste.

'Mirror entries', where waste from the same source might under the LoW be allocated to a hazardous entry or to a non-hazardous entry depending on the specific case and on the composition of the waste.

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# Classification of waste - Fluff-light fraction

**Fluff-light fraction** = mix of different complex material: plastics, foam, textiles, rubber, glass, sand, dust and metals.

The composition (and hazardousness) of the fluff-light fraction largely **depends of the input** to the shredding process (end-of-life vehicles, waste electrical and electronic equipment...) and on the separation techniques that are used.

**Fluff-light fraction has a complex composition, which complicates the use of chemical analysis to assess its ecotoxicity, because not only the concentration of the relevant substances has to be measured, but also their presence.**



# Calculation method - Fluff-light fraction

'Waste which fulfils any of the following conditions shall be classified as hazardous by HP 14:

- Waste which contains a substance classified as ozone depleting assigned the hazard statement code H420 in accordance with Regulation (EC) No 1272/2008 of the European Parliament and of the Council (\*) and the concentration of such a substance equals or exceeds the concentration limit of 0,1 %. [ $c(H420) \geq 0,1 \%$ ]
- Waste which contains one or more substances classified as aquatic acute assigned the hazard statement code H400 in accordance with Regulation (EC) No 1272/2008 and the sum of the concentrations of those substances equals or exceeds the concentration limit of 25 %. A cut-off value of 0,1 % shall apply to such substances. [ $\Sigma c(H400) \geq 25 \%$ ]
- Waste which contains one or more substances classified as aquatic chronic 1, 2 or 3 assigned to the hazard statement code(s) H410, H411 or H412 in accordance with Regulation (EC) No 1272/2008, and the sum of the concentrations of all substances classified as aquatic chronic 1 (H410) multiplied by 100 added to the sum of the concentrations of all substances classified as aquatic chronic 2 (H411) multiplied by 10 added to the sum of the concentrations of all substances classified as aquatic chronic 3 (H412) equals or exceeds the concentration limit of 25 %. A cut-off value of 0,1 % applies to substances classified as H410 and a cut-off value of 1 % applies to substances classified as H411 or H412. [ $100 \times \Sigma c(H410) + 10 \times \Sigma c(H411) + \Sigma c(H412) \geq 25 \%$ ]
- Waste which contains one or more substances classified as aquatic chronic 1, 2, 3 or 4 assigned the hazard statement code(s) H410, H411, H412 or H413 in accordance with Regulation (EC) No 1272/2008, and the sum of the concentrations of all substances classified as aquatic chronic equals or exceeds the concentration limit of 25 %. A cut-off value of 0,1 % applies to substances classified as H410 and a cut-off value of 1 % applies to substances classified as H411, H412 or H413. [ $\Sigma c(H410) + \Sigma c(H411) + \Sigma c(H412) + \Sigma c(H413) \geq 25 \%$ ]

Where:  $\Sigma$  = sum and  $c$  = concentrations of the substances.'

Drawbacks of this method:

- Calculation method is **not adapted for complex waste** with unknown composition.
- Calculation method **does not take into account the M-factors**: under/overestimation of the ecotoxicity.
- Organic compounds are difficult to analyse.



# Biotest – HP 14 - Fluff-light fraction

Text of Regulation 2017/997 – Recital 8.

If both biotests and chemical analysis are performed to assess HP14, the results of the biotests prevail.

(8) When a test is performed to assess waste for the hazardous property HP 14 'Ecotoxic', it is appropriate to apply the relevant methods established in Commission Regulation (EC) No 440/2008 (?) or other internationally recognised test methods and guidelines. Decision 2000/532/EC provides that, where a hazardous property of waste has been assessed by a test and by using the concentrations of hazardous substances as indicated in Annex III to Directive 2008/98/EC, the results of the test are to prevail. Furthermore, Article 12 of Regulation (EC) No 1272/2008, in particular Article 12(b) and the methodologies for its application, should be taken into account. It is appropriate for the Commission to promote the exchange of best practices with regard to test methods for the assessment of substances as concerns the hazardous property HP 14 'Ecotoxic' with a view to their possible harmonisation.

Calculation method is well defined and can be applied in all EU MS.

**Biotests are not:**

- Battery of biotests ? Organisms ? Types of tests ?
- Interpretation of the results ? Concentration limits ?

More fundamental question: **should the bioavailability of substances be considered to classify waste ?** Classifying waste taking into account the form in which it is generated ?

(cf Consultation on the Options to address the interface between chemicals, products and waste legislations)



# European Union perspective on HP 14 assessment

- **9 April 2018:** European Commission published a notice on technical guidance for classification of waste.
- **5 July 2018:** Regulation 2017/997 entered into force.
- **November 2018:** Not all Member States have issued national guidelines / initiated specific actions

## Concerning the biotests – Guidance of the European Commission :

Recital (8) of Council Regulation (EU) 2017/997 reiterates the text of the Annex to the LoW which states that where a hazardous property of a waste has been assessed by a test and by using the concentrations of hazardous substances as indicated in Annex III to the WFD, the results of the test should prevail. Currently the Commission cannot provide specific recommendations regarding the approach to be followed for the ecotoxicological characterisation of waste using biotests.

Until further EU guidance is available, it is up to the Member States to decide, on a case-by-case basis, on the acceptability and interpretation of results resulting from the ecotoxicological characterisation of waste using biotests including, where appropriate, considerations about bioavailability and bioaccessibility.



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## INERIS Proposed battery of biotests (official position of France):

Test by step	Test	Standard	Type	Expression of results of the test <sup>1</sup>	Concentration limit <sup>4</sup>	Duration	Cost 2017 (small series)	Total duration	Total cost (cumulative)
Test 1	Freshwater algal growth inhibition test with <i>Pseudokirchneriella subcapitata</i>	EN ISO 8692 (2012)	Aquatic tests (liquid waste or leachate of solid waste)	Eluate concentration which results in 50% inhibition of population growth (EC <sub>50</sub> )	EC <sub>50</sub> < 10%	72 h	350 €		
Stop with one positive test 1								3 days	350 €
Test 2	Inhibition of the light emission of <i>Vibrio fischeri</i> (Luminescent bacteria test)	EN ISO 11348-3 (2007)	Aquatic tests (liquid waste or leachate of solid waste)	Eluate concentration which results in 50% inhibition of light emission (EC <sub>50</sub> )	EC <sub>50</sub> < 15%	30 min	120 €		
Stop with one positive test 2								3 days	470 €
Test 3	Effects of chemicals on the emergence and growth of higher plants ( <i>Brassica rapa</i> )	EN ISO 11269-2 (2012)	Terrestrial tests (solid waste)	Waste concentration which results in 50% inhibition of growth (EC <sub>50</sub> )	EC <sub>50</sub> < 15%	14 days	420 €		
Stop with one positive test 3								17 days	890 €
Test 4	Inhibition of the mobility of <i>Daphnia magna</i>	EN ISO 6341 (2012)	Aquatic tests (liquid waste or leachate of solid waste)	Eluate concentration which results in 50% inhibition of mobility (EC <sub>50</sub> )	EC <sub>50</sub> < 10%	48 h	110 €		
Stop with one positive test 4								19 days	1 000 €
Test 5	Avoidance test with earthworms ( <i>Eisenia fetida</i> )	ISO 17512-1 (2007)	Terrestrial tests (solid waste)	Waste concentration which affects behaviour by 50% (EC <sub>50</sub> )	EC <sub>50</sub> < 5%	48 h	600 €		
Stop with one positive test 5								21 days	1 600 €
Test 6	Soil contact test with <i>Arthrobacter globiformis</i>	ISO 18187 (2014)	Terrestrial tests (solid waste)	Waste concentration which results in 50% inhibition of enzyme activity (EC <sub>50</sub> )	EC <sub>50</sub> < 5%	8 h	825 €		
L'utilisation de l'ensemble de la batterie jusqu'à la mise en oeuvre test 6								22 days	2 425 €

Aquatic

Aquatic

Terrestrial

Aquatic

Terrestrial

Terrestrial

# Response of Austria to French proposal

Substances considered in the calculation method have the following harmonised classifications under the CLP Regulation:

Hazard Class and Category Code(s)	Hazard statement Code(s)	Description	Concentration limit (Individual substance or sum of substances)
Ozone 1	H420	Harms public health and the environment by destroying ozone in the upper atmosphere	≥ 0,1 %
Aquatic Acute 1	H400	Very toxic to aquatic life	≥ 25 %
Aquatic Chronic 1	H410	Very toxic to aquatic life with long lasting effects	≥ 0,25 %
Aquatic Chronic 2	H411	Toxic to aquatic life with long lasting effects	≥ 2,5 %
Aquatic Chronic 3	H412	Harmful to aquatic life with long lasting effects	≥ 25 %
Aquatic Chronic 4	H413	May cause long lasting harmful effects to aquatic life	≥ 25 %

→ Tests on terrestrial organisms (*Brassica rapa*, *Eisenia fetida*, *Arthrobacter globiformis*) goes beyond the formulae specified in Regulation 2017/997.

→ « Unless aquatoxicity tests for HP14 have been harmonised at EU level or EU guidance criteria for the evaluation of biotest results been fixed, Austria is not willing to go beyond what is legally required. The above-mentioned drastic consequences for the waste management sector, when introducing mandatory terrestrial bio-tests cannot be justified by scientific reasoning only”.





# Austrian approach to HP 14

Official guidelines have been published by the BMNT (Ministry in charge of sustainability) in July 2018.

If the **composition of waste is known** → apply the calculation method

If the **composition is unknown or complex** (case of the fluff light fraction) → calculation method not possible without a comprehensive chemical and/or biological testing.

## Frequency of testing:

- If process remains the same with constant quality
  - If biotests and calculation are negative : testing HP14 every 4 years
  - If calculation results close to the limit values or if biotests show significant impact: testing HP14 every 2 years
- If waste is produced in batch – every batch has to be tested.

## Position of Austria on biotests:

- If significant impact on one or more organism: determination of the EC50
- Concentration limit 100 mg/l (if above: ecotoxic by HP14, if below: not ecotoxic)

## 3 Test organisms for aquatic toxicity

### Luminescent bacteria (*Vibrio fischeri*)

EN ISO 11348-2, (1) , (3) - duration: 30 min (ACUTE AQUATOXICITY)

→ Significant effect: EC > 20% inhibition of light emission

### Daphniae (*Daphnia magna*)

EN ISO 6341 - duration: 24h / 48 h (ACUTE AQUATOXICITY)

→ Significant effect: EC > 10% inhibition of the mobility

### Algae:

*Pseudokirchneriella subcapitata* or *Desmodesmus subspicatus* or *Selenastrum capricornutum*

These algae show different sensitivities for different substances !

EN ISO 8692 - duration: 72 h (ACUTE + CHRONIC AQUATOX)

→ Significant effect: EC > 20% growth inhibition

## Concerning fluff-light fraction:

Recent sampling / analysis campaign in collaboration with the industry. The first results seem to show that fluff light fraction is non-hazardous. It seems that Austria will take the position that **fluff-light fraction is non-hazardous** and is working on a national list of waste.



## United Kingdom

Previous position of the authorities (from 2005, will be reviewed and repealed):  
**the residues from treatment of NH waste are NH.**

Position of the Environment Agency (EA) on biotests: will only accept results on higher organisms (e.g fish) – but these tests can only be performed by actors who have a license issued by the Home Office, which costs 250 k£.

➔ **It seems that biotests will not be used in the UK for the assessment of HP14.**

Collaboration between the Environment Agency and the trade association member of EuRIC to develop a **sampling and testing methodology for nationwide project to determine hazardous status of fluff-light fraction.**

Around 12-15 sites will be tested: weekly tests on 1<sup>st</sup> month, monthly tests from 2<sup>nd</sup> to 6<sup>th</sup> months.

➔ Cost will be minimum 250k £.

If conclusion shows clearly non-hazardousness of fluff-light fraction, ongoing monitoring by operators would be **less frequent** than if the result is borderline hazardous.

## Nordic countries



**FI:** Research study to characterise the chemical composition of shredder waste in collaboration with car recycling companies



**SE:** Focus on the fly ashes, as incineration= main route for fluff-light fraction. Assessment mainly done by chemical analysis.  
Biotests: gene response to exposure to eluate of sorting residues on daphnia, fish and worm.



## Germany

- Already existing guidance document from UBA (2014)
- Seem to be aligned with the French proposal for the battery of biotests.
- Authorities requirements towards shredders of metal waste vary from one Länder to another (no position at Federal State level for now).



## The Netherlands

Implementation of HP14 criteria will be done looking at the national « **Soil Quality Decree** »

**Collaborative approach** with the industry actors (waste and recycling federations, landfill, incinerations).

Development of a **national guideline** for waste classification based on:

- Commission guidance notice (April 2018)
- Other existing national guidelines (UK, Flanders)
- Current practices in the Netherlands.



# Consequence of having different approaches in different Member States – Industry perspective

Calculation method is applied equally in all EU MS, but not necessarily adapted to assess the ecotoxicity of fluff-light fraction.

Member States are developing their own national guidelines and batteries of biotests.

**→ Will the assessment of the hazardousness / the decision made in one Member State be recognised as valid in another Member State ?**

Not all shredding facilities perform post-shredder treatment → need to transfer the waste → issues arise when different classifications are used in different countries.



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# In conclusion

- Each approach (calculation method / biotests) to classify fluff light fraction has its drawbacks.
- Beyond the technical arguments on the assessment of the ecotoxicity, classification of waste has far-reaching consequences for the actors in the industry, because reclassification of waste as hazardous means that the facilities must have permits to handle hazardous waste.
- Need to collect data across the EU to reach a conclusion on the ecotoxicity of fluff-light fraction



**Thank you for your attention.**

**Mélissa Zill – Scientific Officer**

[mzill@euric-aisbl.eu](mailto:mzill@euric-aisbl.eu)

<https://www.euric-aisbl.eu/>



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**EuRIC - European Recycling Industries' Confederation AISBL**  
Bluepoint Brussels • Boulevard Auguste Reyers 80 • 1030 Brussels • Belgium  
T. +32 2 706 87 20 • M. +32 471 689 319

[euric@euric-aisbl.eu](mailto:euric@euric-aisbl.eu)