

# CLP biotest concentration limits – implications for H14 classification test procedures

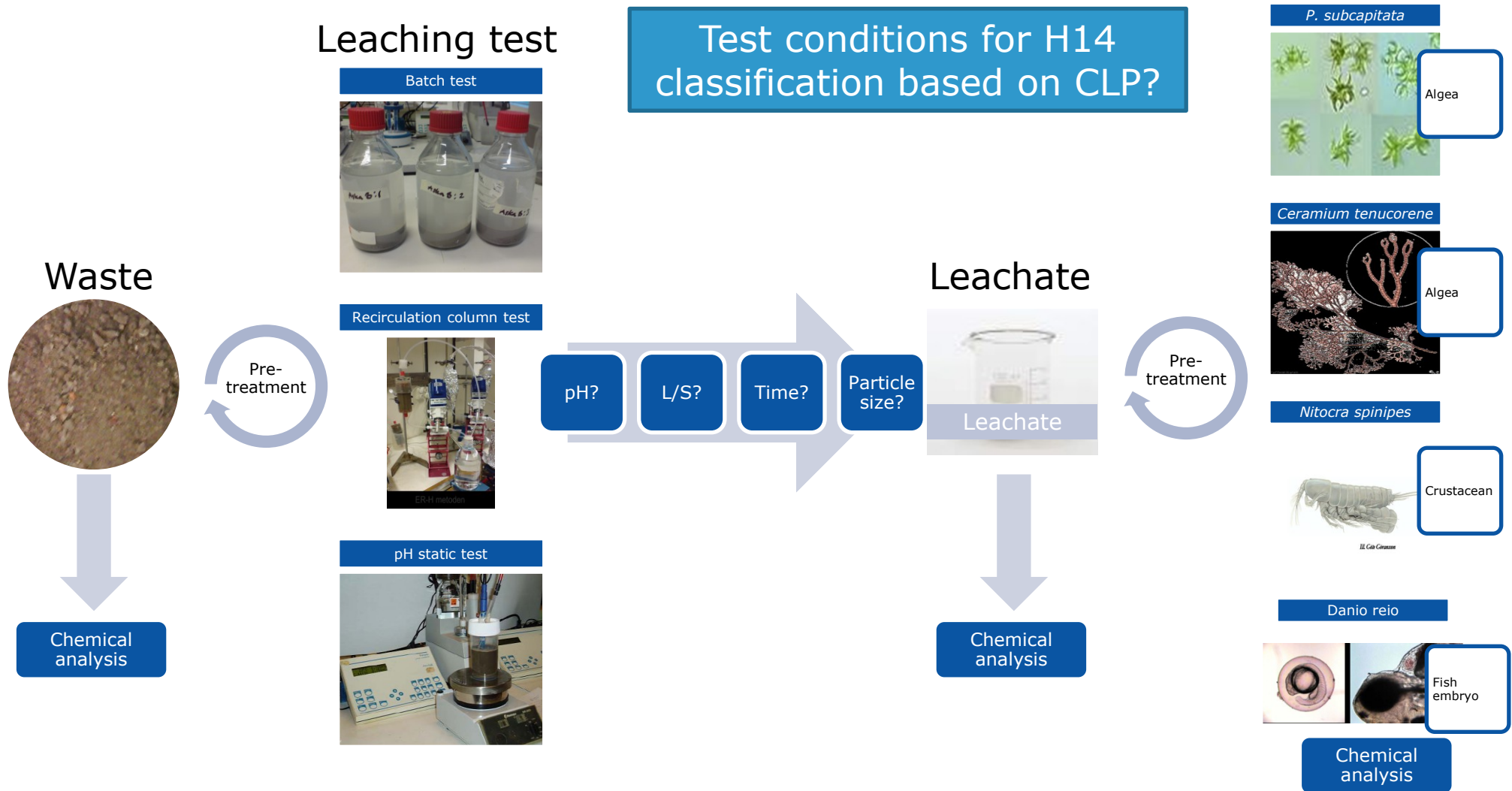
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# Test procedure - risk and hazard assessment of waste



**Practical implications of the application of CLP concentration limits**

Kristian Hemström, Vienna, 25 October 2011

# Concentration limits for environmental hazards in CLP- *Hazardous to the aquatic environment*

<b>Acute aquatic hazard</b>	<b>Acute 1</b>			
L(E)C50, mg/l	≤1			
<b>Long-term aquatic hazard</b>	<b>Chronic 1</b>	<b>Chronic 2</b>	<b>Chronic 3</b>	<b>Chronic 4</b>
Rapidly degradable substances NOEC / ECx, mg/l	≤0,01	≤0,1	≤1	-
Non-rapidly degradable substances NOEC / ECx, mg/l	≤0,1	≤1	-	-
Chronic toxicity data not available L(E)C50, mg/l	≤1 <sup>1)</sup>	≤10 <sup>1)</sup>	≤100 <sup>1)</sup>	2)
<b>No need to classify</b>				
NOEC / ECx, mg/l	>1	>1	>1	>1

<sup>1)</sup> If potential for bioaccumulation and/or not rapidly degradable.

<sup>2)</sup> If potential for bioaccumulation and not rapidly degradable.

# Concentration limits for environmental hazards in CLP- *Hazardous to the aquatic environment*

What categories should trigger a hazardous waste classification?

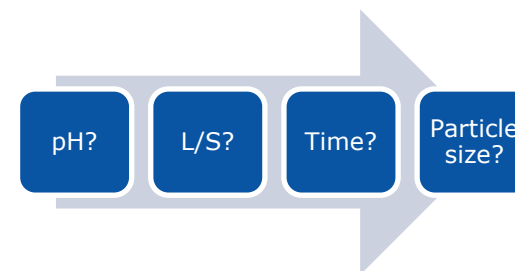
Acute aquatic hazard	Acute 1			
L(E)C50, mg/l	≤1			
Long-term aquatic hazard	Chronic 1	Chronic 2	Chronic 3	Chronic 4
Rapidly degradable substances	≤0.01	≤0.1	≤1	
NOEC / ECx, mg/l	≤1 <sup>1)</sup>	≤10 <sup>2)</sup>	≤100 <sup>2)</sup>	≤1000 <sup>2)</sup>
<b>No need to classify</b>				
NOEC / ECx, mg/l	>1	>1	>1	>1

Chronic test NOEC/ECx > 1 mg/l –  
Not hazardous to the aquatic environment

1) If potential for bioaccumulation and/or not rapidly degradable.

2) If potential for bioaccumulation and not rapidly degradable.

# Test conditions in the Transformation/dissolution (T/D) protocol referred to in CLP



*ANNEX 10 UN GHS: GUIDANCE ON TRANSFORMATION/DISSOLUTION OF METALS AND METAL COMPOUNDS IN AQUEOUS MEDIA*

Test	Loading rate (mg/l)	L/S ratio (l/kg)	pH (highest dissolved conc)	Time	Classification (simplified) (if $C_{WAF} > L(E)C_x$ or NOEC)
Screening	100	10 000 l/kg	6-8.5	24 h	Acute 1 or Chronic
Full test	1	1 000 000 l/kg	6-8.5	7 days	Acute 1 or Chronic 1
Full test	10	100 000 l/kg	6-8.5	7 days	Chronic 2
Full test	100	10 000 l/kg	6-8.5	7 days	Chronic 3
Full test	1	1 000 000 l/kg	5.5-8.5	28 days	Chronic 4

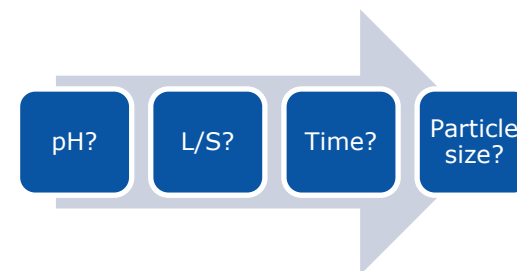
Standardized leaching tests for waste usually L/S 0.1-10  
(based on risk assessment methods)



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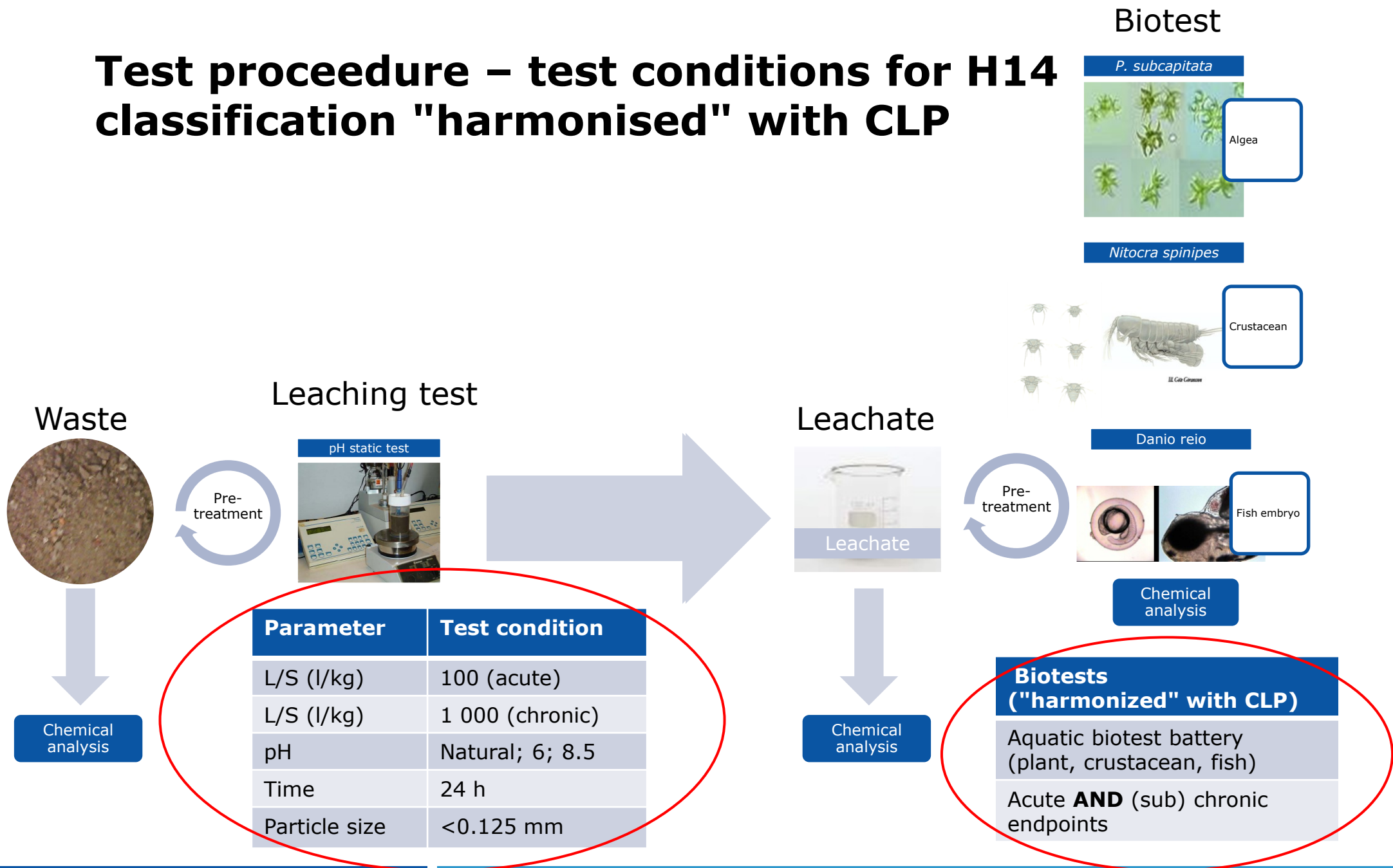
# Test conditions in the Transformation/dissolution (T/D) protocol referred to in CLP



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Screening	100	10 000 l/kg	6-8.5	24 h	Acute 1 or Chronic
Our proposal	10 000 (acute) 1 000 (chronic)	<b>100 (acute)</b> <b>1 000 (chronic)</b>	<ul style="list-style-type: none"> <li>• Natural</li> <li>• 6</li> <li>• 8.5</li> </ul>	24 h	
Full test	1	1 000 000 l/kg	6-8.5	7 days	Acute 1 or Chronic 1
Full t	<div style="background-color: #0056b3; color: white; padding: 10px;"> <p>Waste often heterogenous mixtures</p> <ul style="list-style-type: none"> <li>- practical challenges (repeatability, reproducibility and robustness at L/S 10 000-1000 000?)</li> <li>- safety factors motivated compared to CLP (how large ?)</li> </ul> </div>				
Full t					
Full t					

# Test procedure – test conditions for H14 classification "harmonised" with CLP



Practical implications of the application of CLP concentration limits

Kristian Hemström, Vienna, 25 October 2011

# Test procedure – test conditions for H14 classification "harmonised" with CLP

NO toxic response – NOT hazardous waste

Chronic test NOEC/ECX > 1 mg/l (L/S 1000 000 l/kg)  
Not hazardous to the aquatic environment in CLP

Toxic response - further testing (higher L/S ?)

## Biotest

*P. subcapitata*



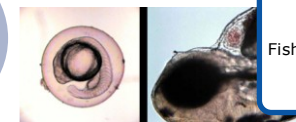
Algae

*Nitocra spinipes*



Crustacean

Danio reio



Fish embryo

Chemical analysis

## Biotests ("harmonized" with CLP)

Aquatic biotest battery (plant, crustacean, fish)

Acute **AND** (sub) chronic endpoints

## Waste

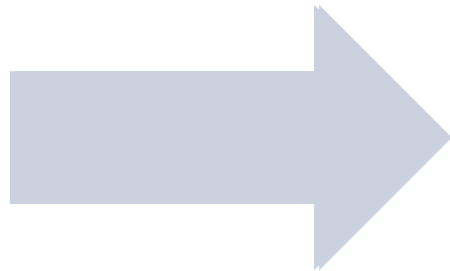


Chemical analysis

## Leaching test



pH static test



## Leachate



Chemical analysis

Parameter	Test condition
L/S (l/kg)	100 (acute)
L/S (l/kg)	1 000 (chronic)
pH	Natural; 6; 8.5
Time	24 h
Particle size	<0.125 mm

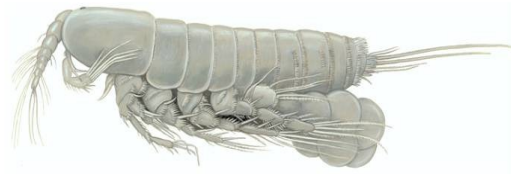
## Practical implications of the application of CLP concentration limits

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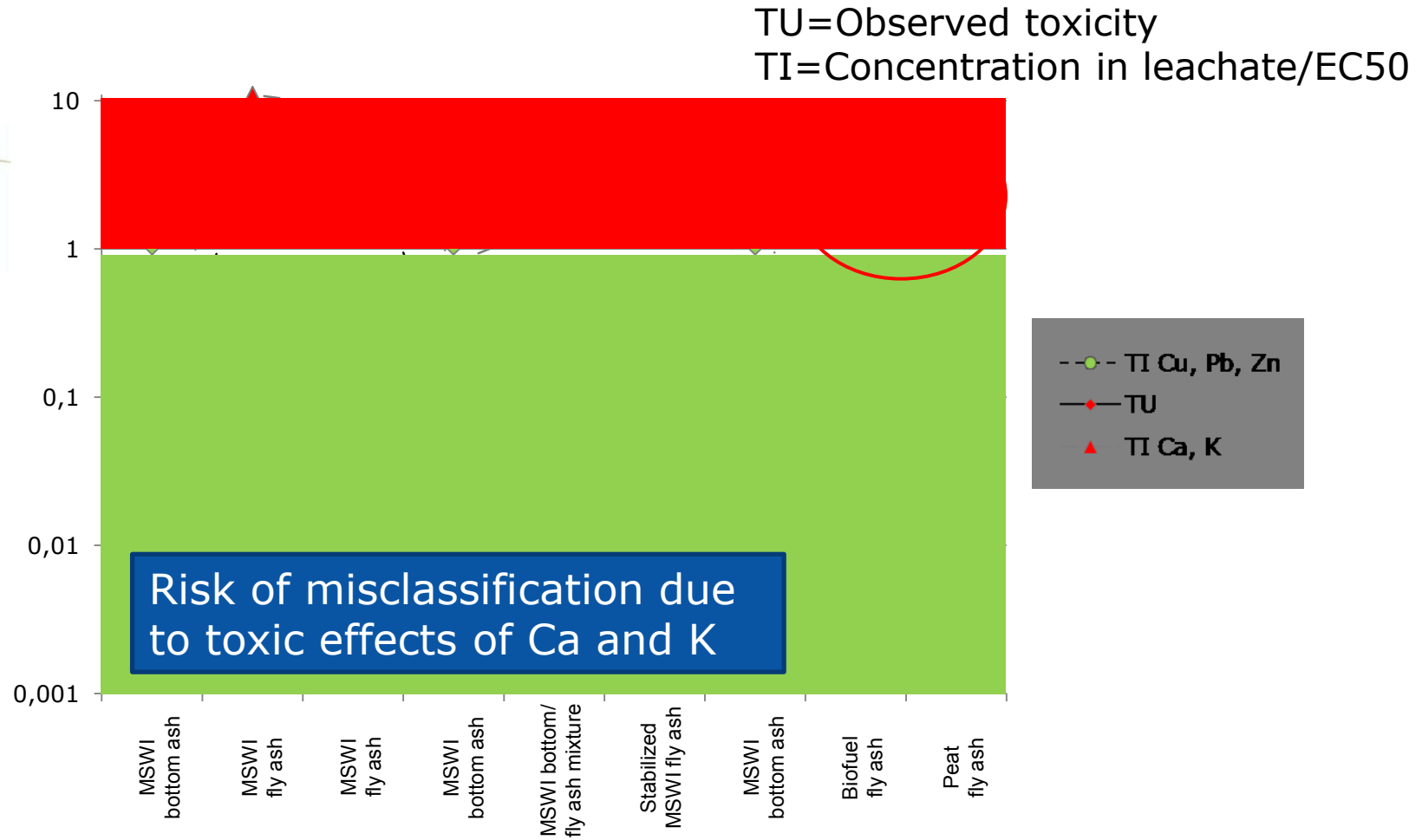
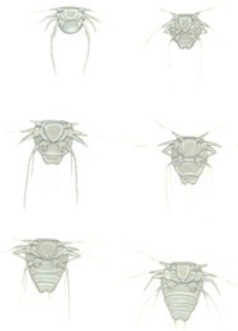


# Our experiences from biotests of ashes using L/S 10

## Acute toxicity *N.spinipes*



Ill. Göte Göransson



Practical implications of the application of CLP concentration limits

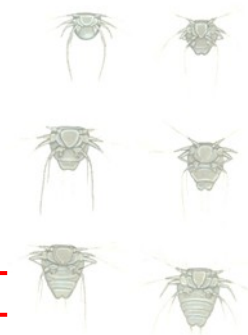
Kristian Hemström, Vienna, 25 October 2011

# Our experience from biotests of ashes using L/S 10

## Subchronic toxicity *N.spinipes*

Ash 1 (NOEC =1.3% eluate) Ash 2 (NOEC =1.3% eluate) Ash 3 (NOEC =0.5% eluate) Ash 4 (NOEC =>50% eluate) Ash 5 (NOEC =20% eluate) Ash 6 (NOEC =8% eluate) Ash 7 (NOEC =8% eluate) Ash 8 (NOEC =8% eluate) Ash 9 (NOEC =20% eluate)

	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$	$HQ_{(sub)chronic}$
Zn	0.00012	0.21	0.029	0.0098	0.012	0.001	0.0019	0.00067	0.0017
Cu	0.0031	0.13	0.00017	0.15	0.037	0.0049	0.4	0.0013	0.0033
K	0.011	1.4	0.19	0.2	3.2	3.2	0.15	6.2	0.34
Ca	0.0072	0.35	0.16	1.9	0.56	0.83	0.22	0.048	1
Al	6.2	0.0013	0.00032	0.16	1.8	0.71	8.9	0.73	0.082
Pb	0.000024	0.36	0.28	0.00037	0.11	0.0003	0.0011	0.000059	0.0081



Risk of misclassification due to toxic effects of Ca, K and Al

# Conclusions

- Classification of H14 (=hazard) based on concentration limits in CLP require other test strategies than those commonly used for characterization of waste (=risk), e.g. other L/S, pH and particle size
- Risk of misclassification of waste due to toxic effects caused by substances not classified as hazardous (e.g. Ca, K, Al, pH, salinity)
- Our proposal can be used to classify waste as **non**-hazardous with reference to CLP, but not as hazardous
- Further studies needed...



**Thanks for contributions  
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ITM**

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**Thank you for your attention!**