



Assessment of Leaching Behaviour tests of Waste Materials Used in road Construction

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Content

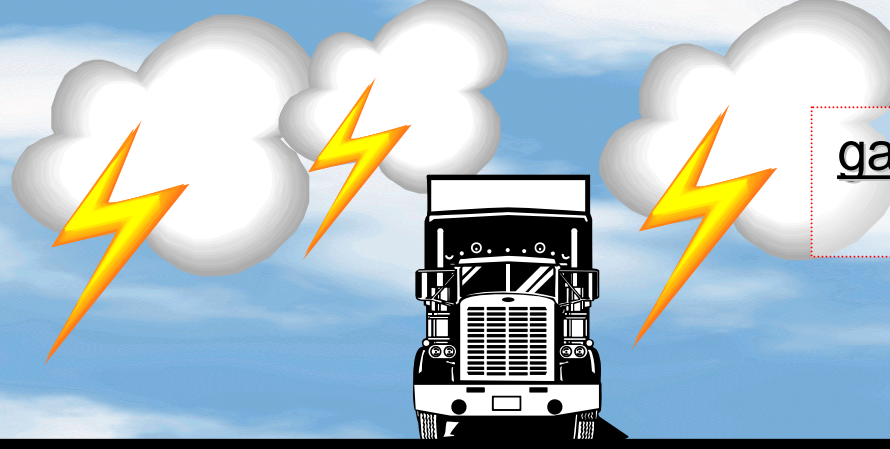
1- Context

2- Assessment of leaching behaviour tests

3- Results / Conclusions

Liquid species
H₂O, Cl⁻, SO₄⁻, ...

gaseous species
O₂, CO₂, ...



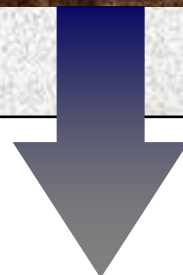
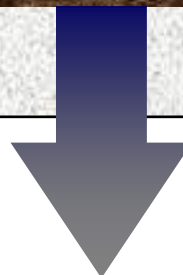
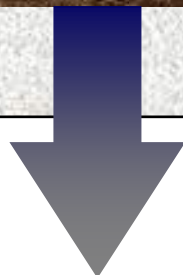
solid species



Road structure

waste

MOBILISATION + TRANSPORT polluting elements

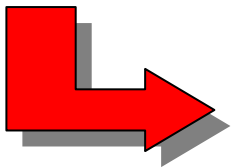


Soil, surface and groundwater

1- Context - Leaching behaviour

FOR GRANULAR WASTE :

- **MOBILISATION** ⇒ mainly controlled by elements **SOLUBILITY**
- **TRANSPORT** ⇒ mainly controlled by **CONVECTION**
(carrying of solubilised elements in the movement of the water)



Liquid / Solid ratio (L/S)

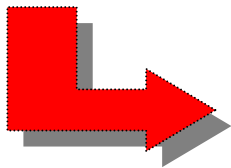
⇒ *main parameter to simplify and accelerate the release of polluting elements*

1- Context - Leaching behaviour

Methodology :

XP EN 12920 (1998) → EN 12920 (2006)

- *characterisation of scenario of exposure*
- *characterisation of waste*
- *parameters influencing the leaching behaviour*
- *modelling and validation of the leaching behaviour*



No test available ...

... for determination of waste leaching behaviour
under specific conditions (ex: road scenario)

1- Context - Leaching behaviour

Test methods :

- **"Compliance" tests**

Release of polluting elements under “severe” standardised conditions (*fragmentation, stirring, high Liquid / Solid ratio*)

Leaching test

XP X31-210 (1992) → EN 12457-2 (2002)

- **"basic characterisation" tests**

Kinetic release of polluting elements under standardised conditions (*low and variable Liquid / Solid ratio*)

Up flow percolation test

CEN / TS 14405 (2005)

1- Context - Leaching behaviour

Up flow percolation test
Draft CEN/TC292/WG6 (1997)



Up flow percolation test
Standardised conditions
CEN / TS 14405 (2005)

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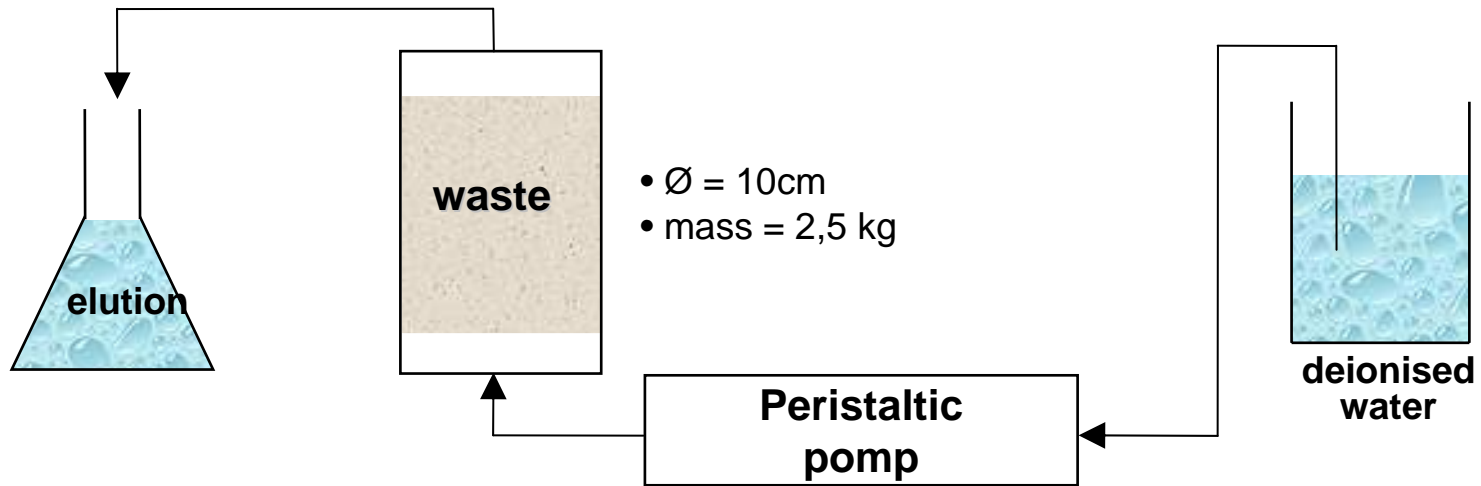
Results of experimental instrumented roads
(very low L/S day => L/S year < 0,04)

Main constituent of road	Surface of the instrumented road (m ²)	time (months)	Average L/S day
MSMA	160	75	$9,3 \cdot 10^{-5}$
Natural Gravel	160	75	$1,1 \cdot 10^{-4}$
Ash gravel	100	13	$1,8 \cdot 10^{-6}$
MSMA	150	20	$9,1 \cdot 10^{-5}$



Up flow percolation test
Adapted for road scenario

2- Assessment of Leaching behaviour tests



- percolation speed = 0,12 à 1,2 l/day
- L/S day = 0,05 à 0,5



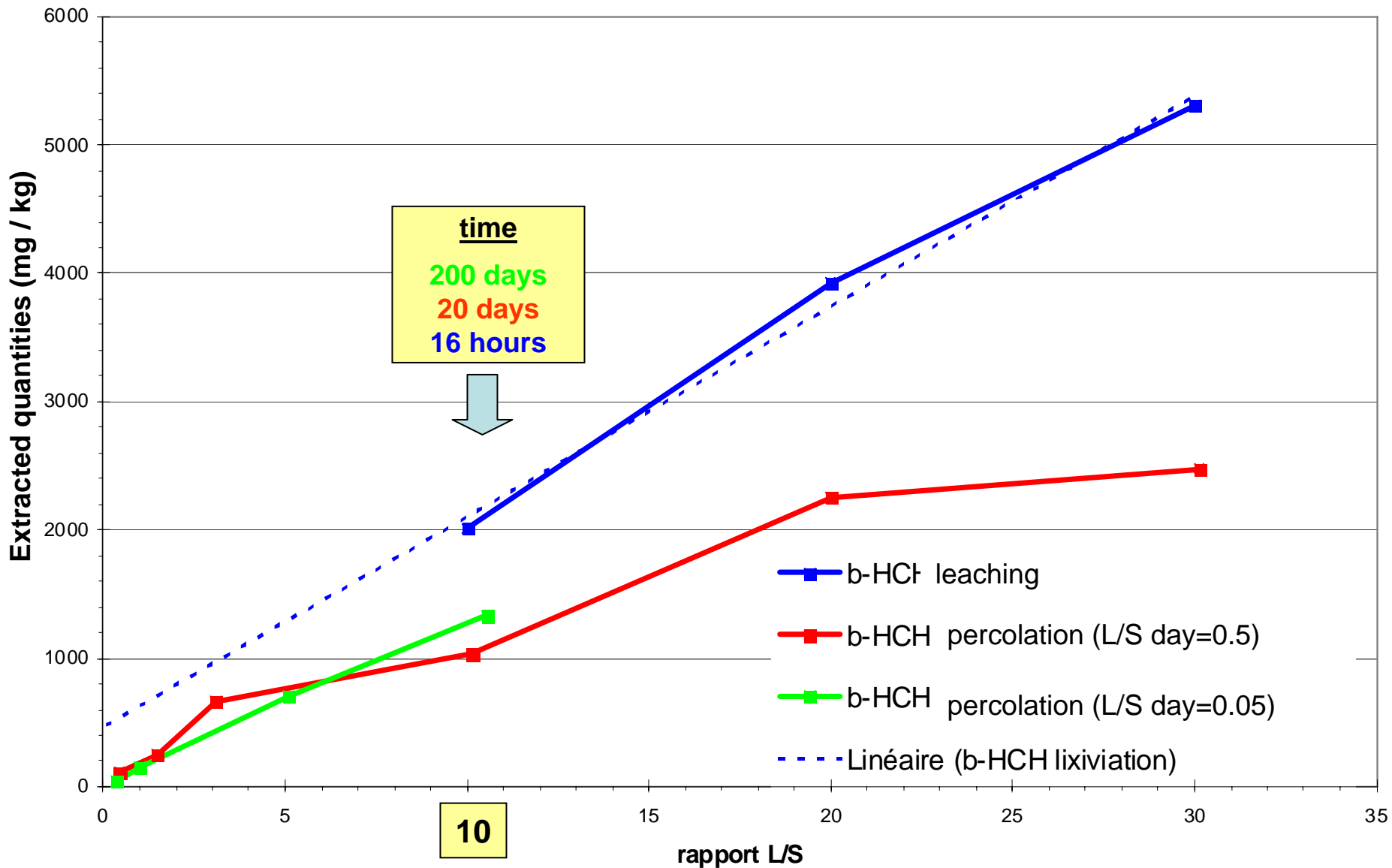
2- Assessment of Leaching behaviour tests

	“Adapted“ procedure to road scenario	“standardised” procedure (NF CEN/TS 14405)
masse / volume sample	around 2,3 kg	30 cm in 5 layers
Diameter of column	10 cm	5 ou 10 cm
Initial saturation	3 jours	3 jours
Speed of percolation (L/S ratio / day)	0,125 to 1,2 l/day (0,05 à 0,5)	1,1 l/day
Duration of test (L/S=10)	20 to 200 days	30 days
number of extractions (L/S)	4 to 6 (0,3; 1; 3; 5; 10; 20; 30)	7 (0,1; 0,2; 0,5; 1; 2; 5; 10)
compaction (mass dame)	density = 1,5 to 1,9 (3,7 kg)	- (0,5 kg)

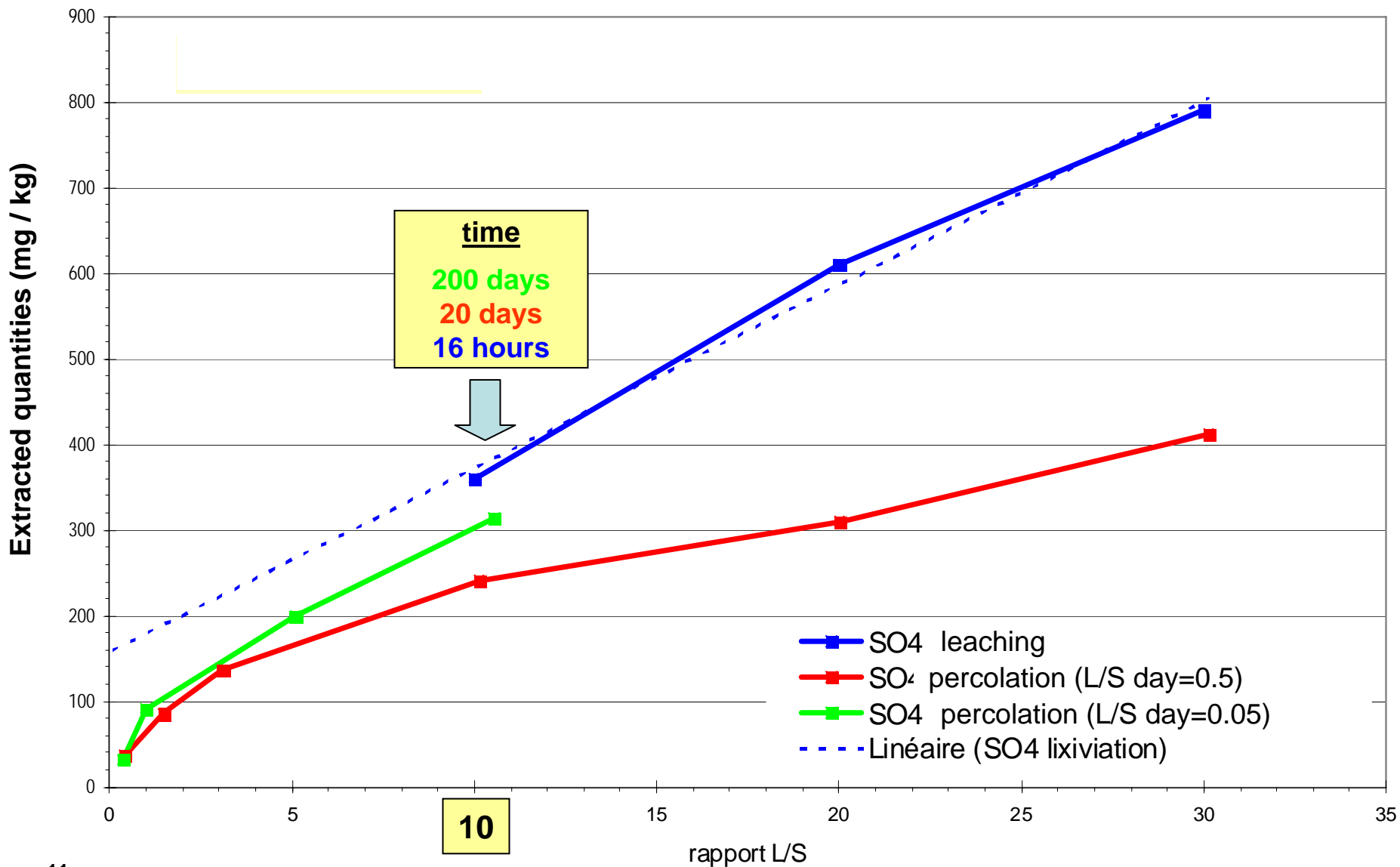
Nature of wastes tested :

- polluted concrete materials (b-HCH)
- Municipal Solid Waste Incinerator Ash

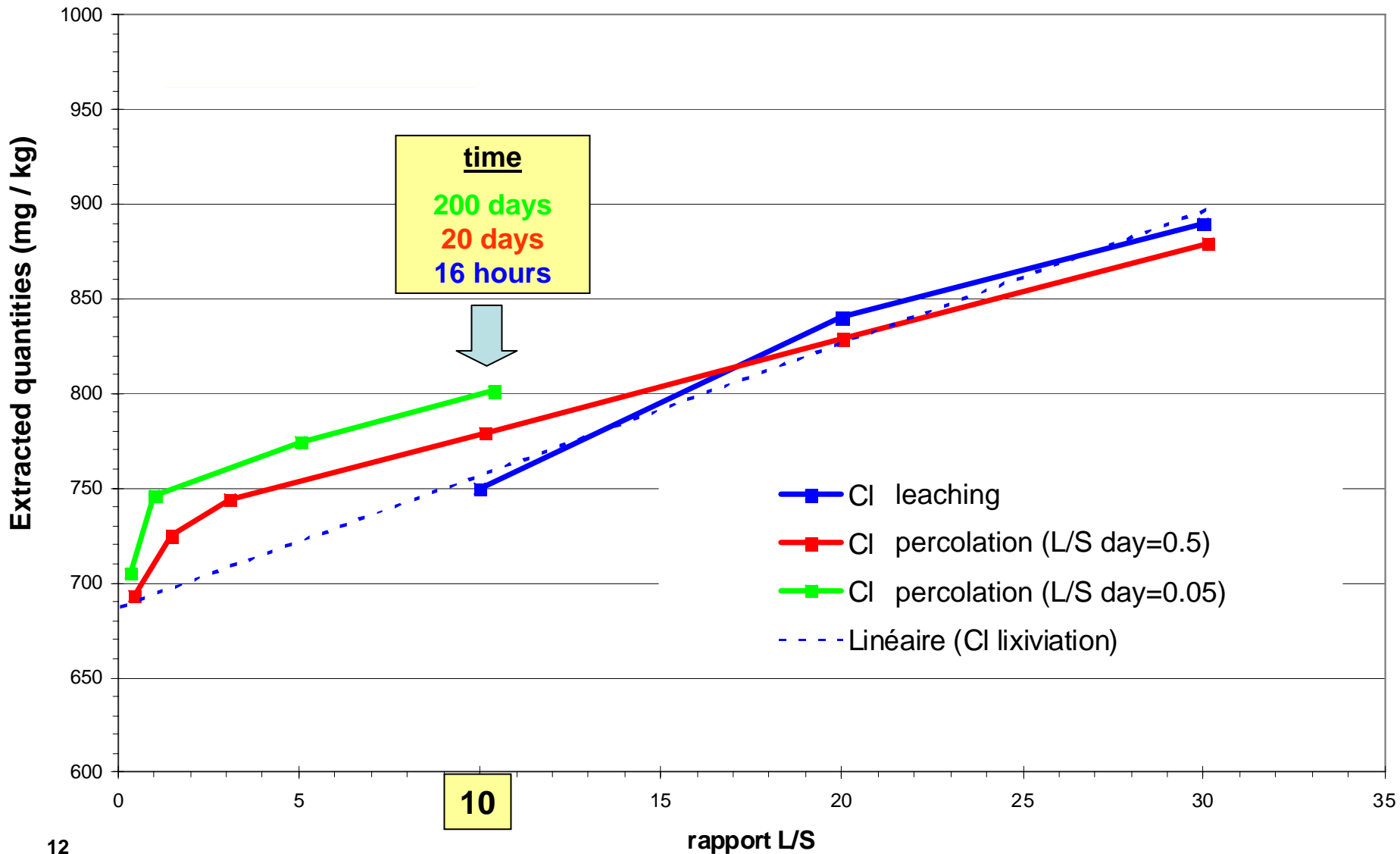
➡ Liquid / Solid ratio day (0,05 → 0,5)
low solubility species



➡ **Liquid / Solid ratio day (0,05 → 0,5)**
slightly solubility species



➡ Liquid / Solid ratio day (0,05 → 0,5)
very soluble species



3- Results / conclusions

- **low to moderate influence** :

- L/S ratio
- level of compaction
- size of column
- grading of sample
(*for superficial nature of pollutant*)

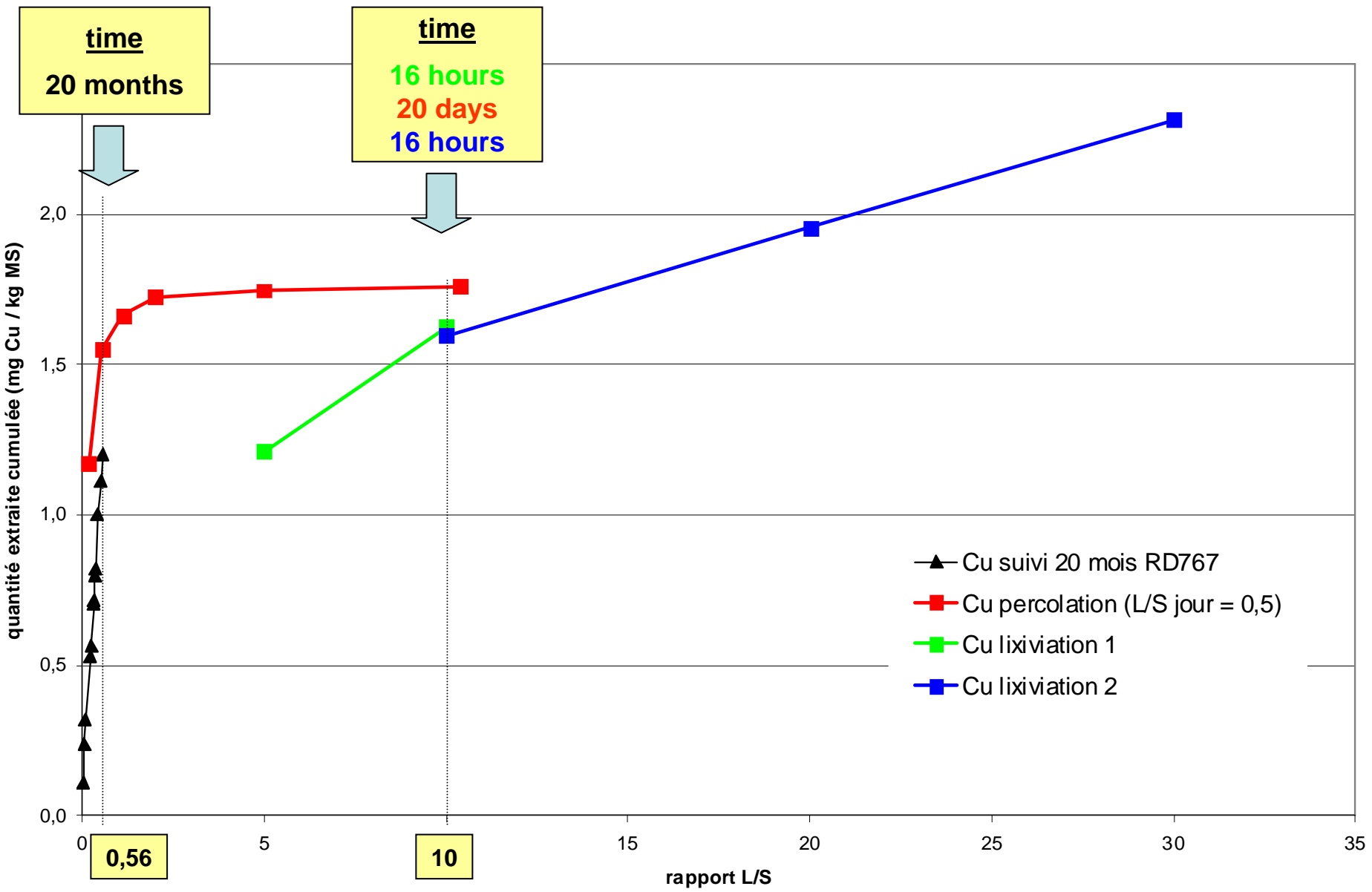
⇒ Interest of “road scenario” / “standardised” percolation test ?

3- Results / conclusions

- **Percolation test only tool to predict the short term release of polluting elements**

⇒ Validation of leaching behaviour on experimental road
(Municipal Solid Waste Incinerator Ash)







3- Results / conclusions

- **“Compliance” leaching test can be an interesting tool to predict the long term release of polluting elements**