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T/Dp of metals in powder and massive form: some practical considerations

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Powders and massive forms: when can they be classified differently?

- separate classification entries can be considered for metals in powder and massive form, respectively, if (EU 1997):
  - Under normal handling & use, no fine particles are formed
  - both physical forms of the metal are produced by different processes
  - it can be demonstrated that their transformation characteristics in water are different

Particles produced, e.g. zinc

- Metallic zinc is essentially re-melted for further use e.g.: galvanising kettle, (alloying) furnace, …
- it is <u>not</u> polished, grinded, machined or handled in any other way that may give rise to small (<mm size) particles
- Zinc powders are produced by specific processes

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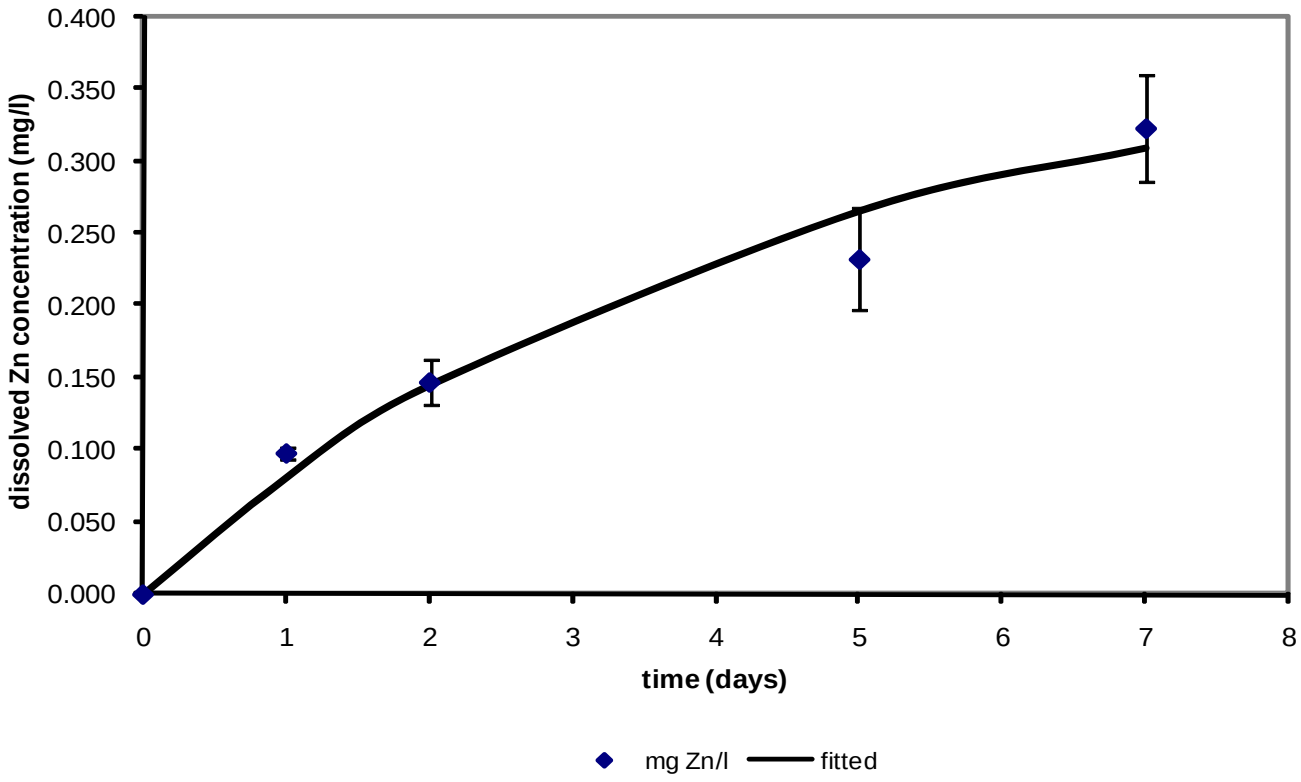
Testing transformation/dissolution in water



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Performing a T/D test: issues to watch

- Test parameters constant (pH)?
- Variability within replica's acceptable? (e.g. when testing at low pH)
- Natural background of test water
  - Work under ultra-pure conditions
  - Blancs, blancs!
- Abrasion to be avoided
  - ⇨ specific set-up for metal in massive form, mounting in epoxy holder
  - Shaken, not stirred

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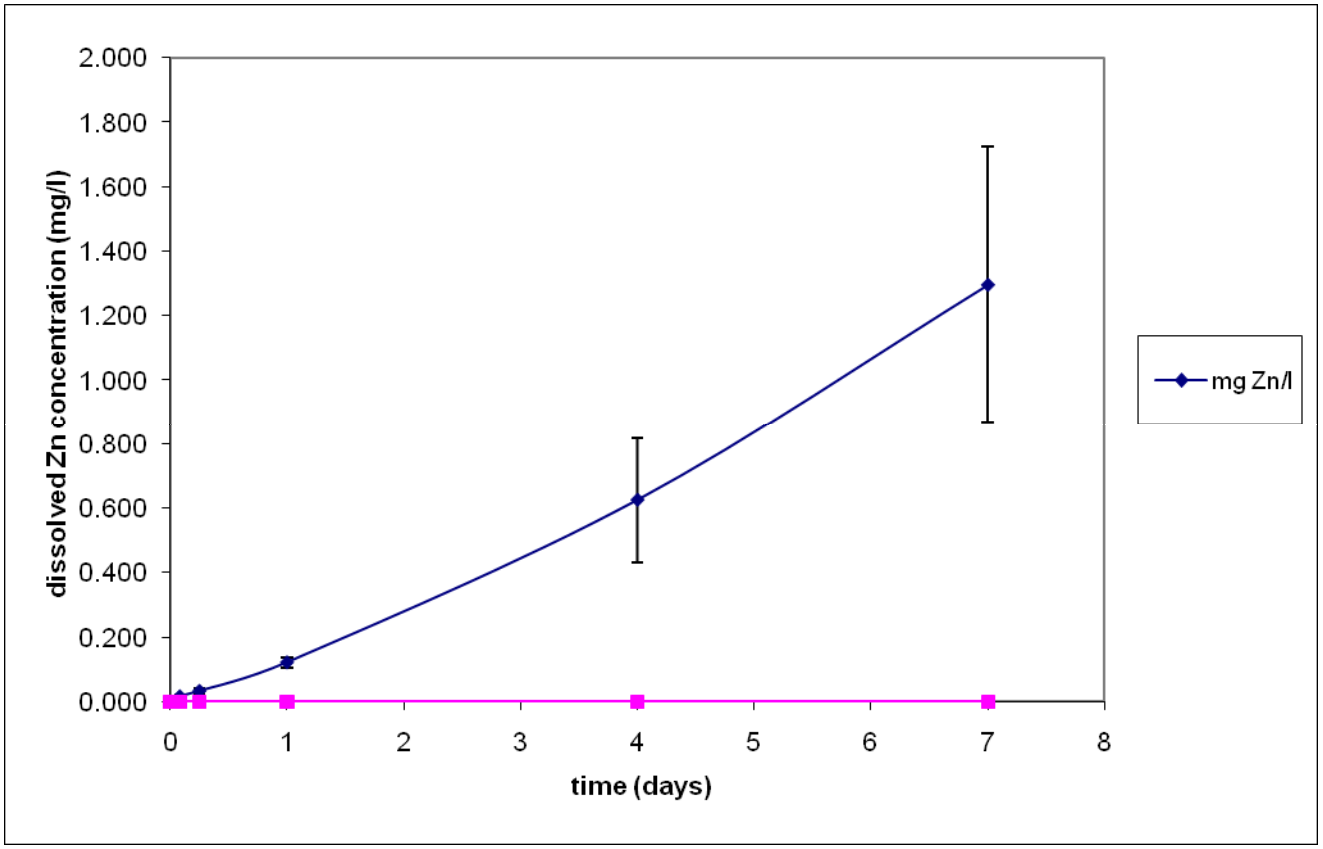
Unacceptable variability



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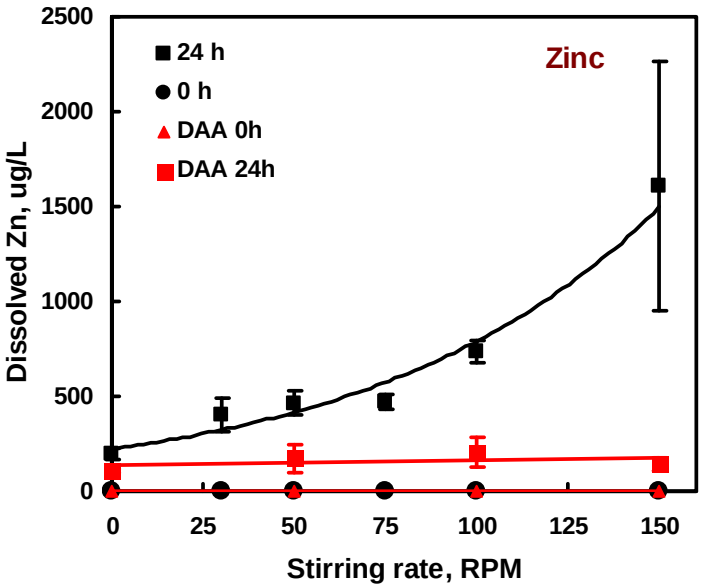
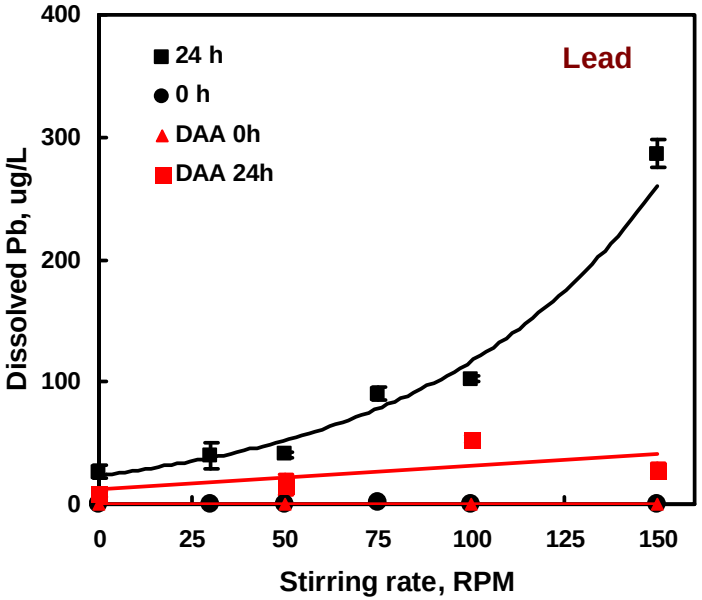
Avoiding abrasion is key





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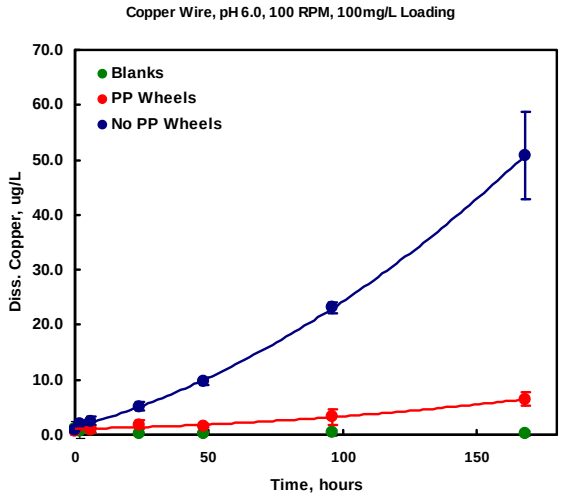
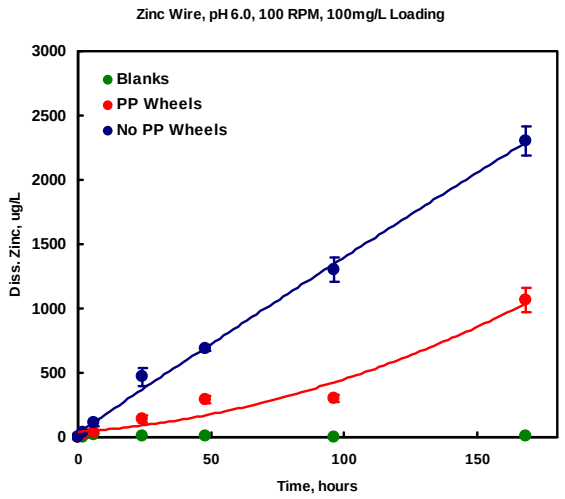
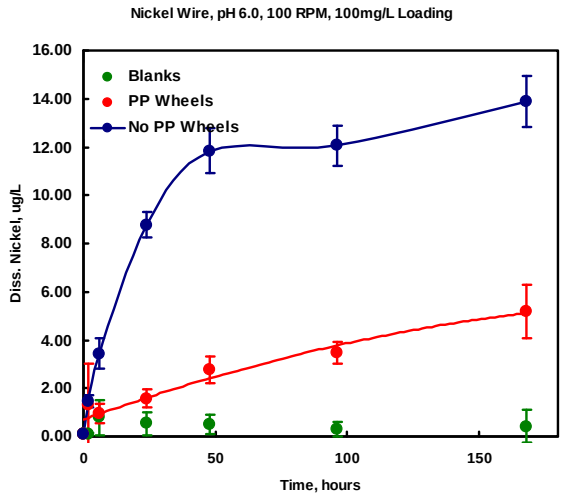
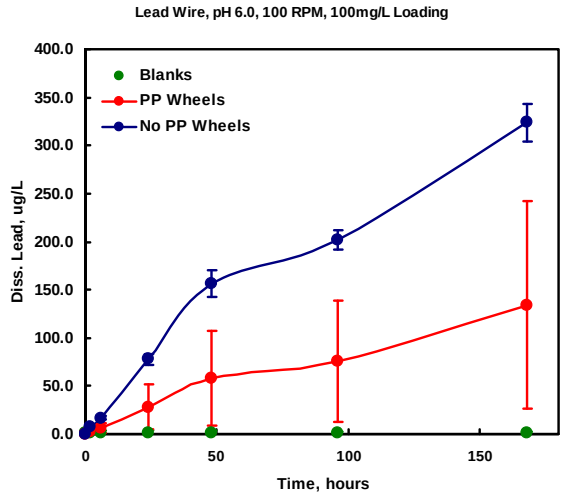
Avoiding abrasion is key (2)









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The ecotoxicity database

- The ecotoxicity reference value is the driver of the classification
- Rubbish in = rubbish out!
- When doing testing: careful design of (standard) tests
- When using existing literature data: careful check of the reliability and relevancy of the data.
  - Especially at the low effect concentration side

Revisiting acute ecotoxicity data e.g.: zinc

- Extensive data base available
  - 11 standard species
  - (75 non-standard species)
- Critical study: Norberg & Mount (1984)
  - lowest EC_{50} for *D. magna*, *D. pulex* and *C. Reticulata*
  - ⇨ driver for the ecotoxicity reference value

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Analysis of Norberg & Mount (1984)

- paper describes the development of a new test on *C. reticulata*
  - Focus on test manipulation, feeding conditions, etc
  - compared with EC_{50} of 2 other Daphnid species for 13 substances
- no reference to which test method, conditions are used in the D. studies
- no dose-response information, no test data, no statistics
- No information on culture conditions of organisms pre-test
- only 2 replicates/conc. used (should be min. 4)
- control mortality “<20%”? (D. magna > 20 %?)

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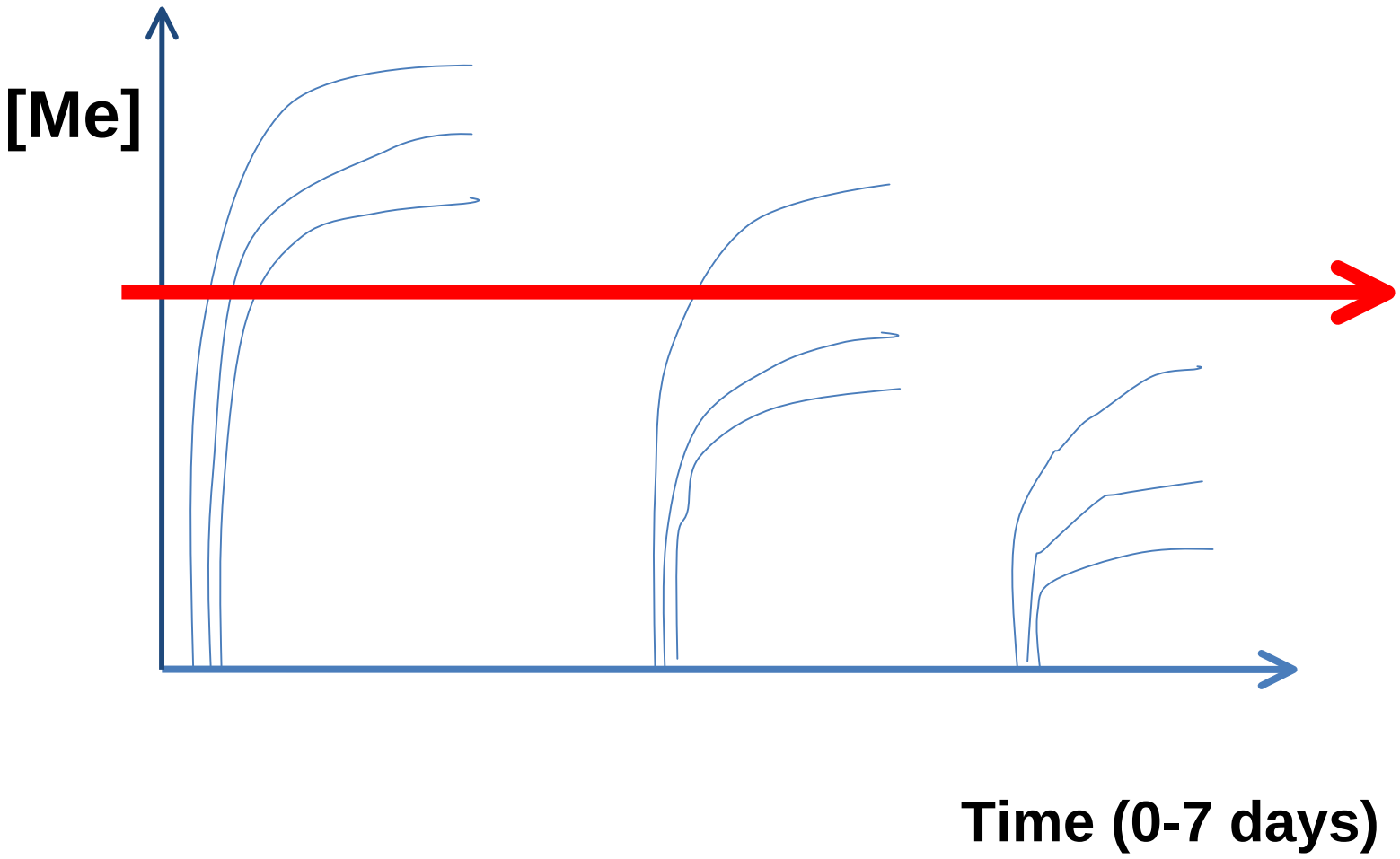
Classifying metal particles



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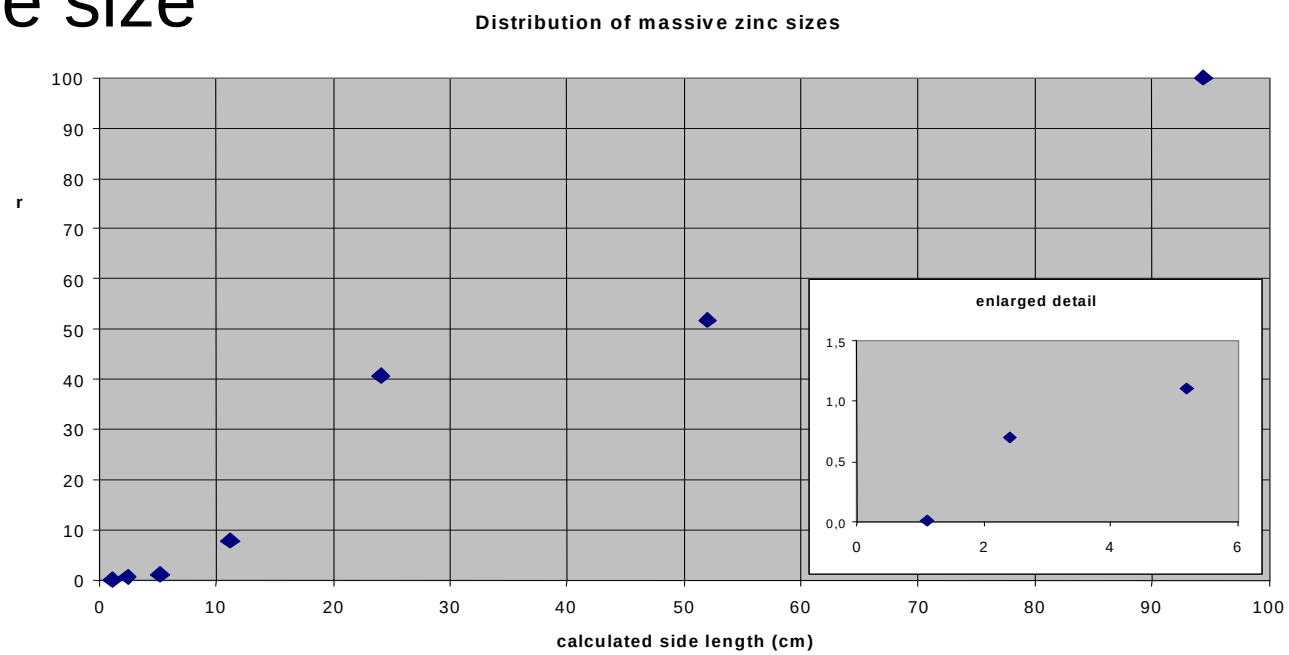
Applying the (EU 's) proportionality principle

- The EU principle of proportionality requires that regulatory and legislative measures are proportionate in their effect
- In the zinc case, > 90% are (big) ingots of variable size



Applying the (EU 's) proportionality principle (2)

- The critical particle size for zinc is << the size of the bulk of EU production
- But the default particle size for classification (RIP 3.6.): 1 mm^3 diameter
- Loading by a 1mm^3 zinc particle relates to that by a 4T zinc ingot like 1m relates to 1 x 10^6 km
- Classification of massive zinc referring to a 1 mm^3 particle size would be disproportionate in effect ?

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