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# Leaching Behaviour of Bottom Ash with Respect to pH and Redox Conditions

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## Introduction

How to determine the long-term leaching behaviour of bottom ash re-used in road constructions is the ultimate objective of this work. Liquid-to-solid-ratio (L/S) is the most common way to translate results from laboratory leach tests into time scales running over several decades. But are we sure that L/S is the most important factor to consider for this purpose? Or should we put more effort on simulating other solubility controlling factors?

## Questions of interest...

• Which factors/factor interactions control the leaching from ashes?

• What is the expected long-term leaching behaviour from bottom ash in road constructions considering the above?

## ...and how to answer them

Both pH and redox conditions strongly influence the solubility of metals and it was assumed that changing the atmosphere would alter the oxidizing conditions during the test. L/S is the most commonly used factor to simulate leaching over the long–term and duration of leaching is important to be able to distinguish between equilibrium and non-equilibrium conditions. Factor levels and experimental set up for the batch test is illustrated in table 1 and figure 1, respectively.

*Table 1.To evaluate the degree of control four factors were included in a two level factor designed batch test with central points. It was assumed that changing the atmosphere would lead to altered redox conditions.*

| Factor | + | - | Central points |
|---|---|---|---|
| pH | 10 | 4 | 7 |
| Atmosphere | $O_2$ | $N_2$ | $O_2/N_2$ |
| L/S *(ml/g)* | 45 | 5 | 25 |
| Time *(h)* | 72 | 6 | 39 |

$N_2/O_2$

Computer

Peristaltic pump

Automatic titrator

Wash- bottle

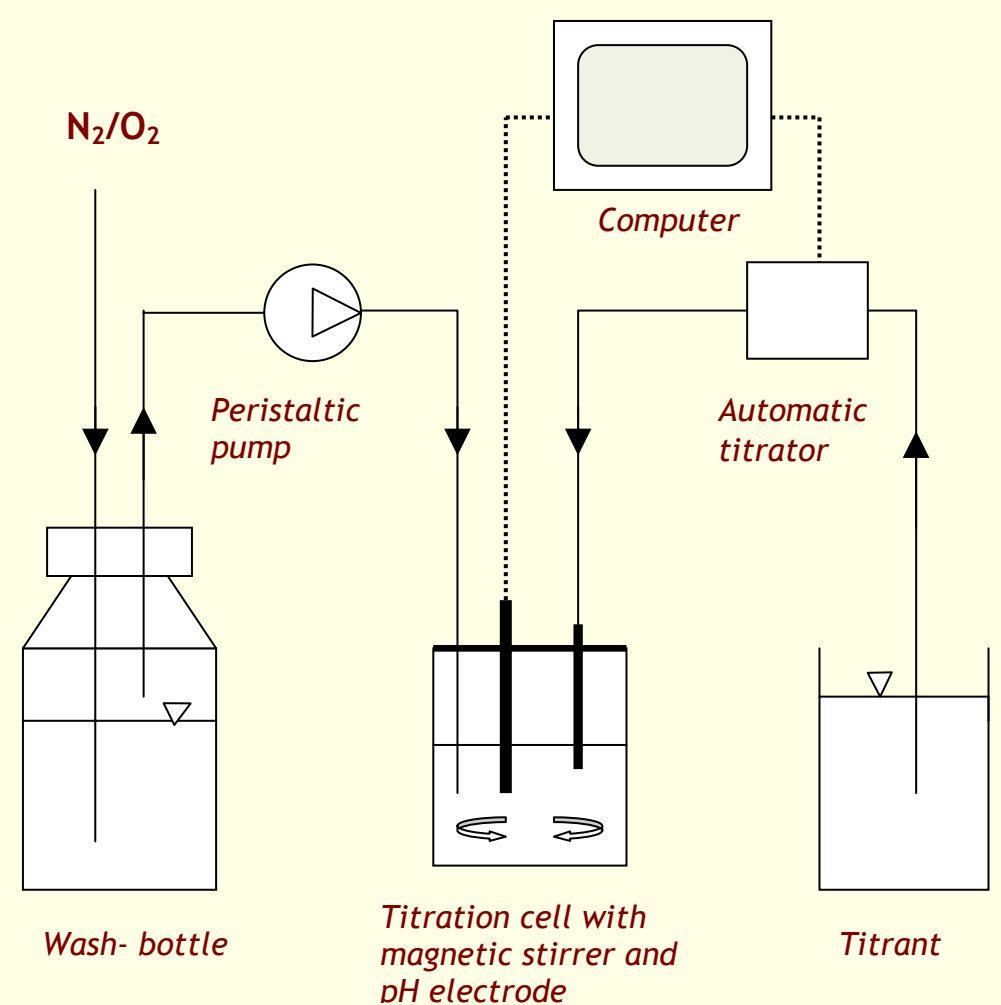Titration cell with magnetic stirrer and pH electrode

Titrant

**Figure 1**. *Experimental set-up for the batch experiment.*

## Future work...

• Statistical evaluation with multiple linear regression and multivariate analyses

• Comparison with field data from a 500 m test road having ash as filling material

• Create a leaching procedure appropriate for long-term predictions of bottom ash in road constructions