





Wir schaffen Wissen - heute für morgen

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PSI toolbox regarding trace elements: Alkali, CI, metals





- PSI diagnostic toolbox
- SID for alkali measurement
- GC-ICP/MS
- Summary



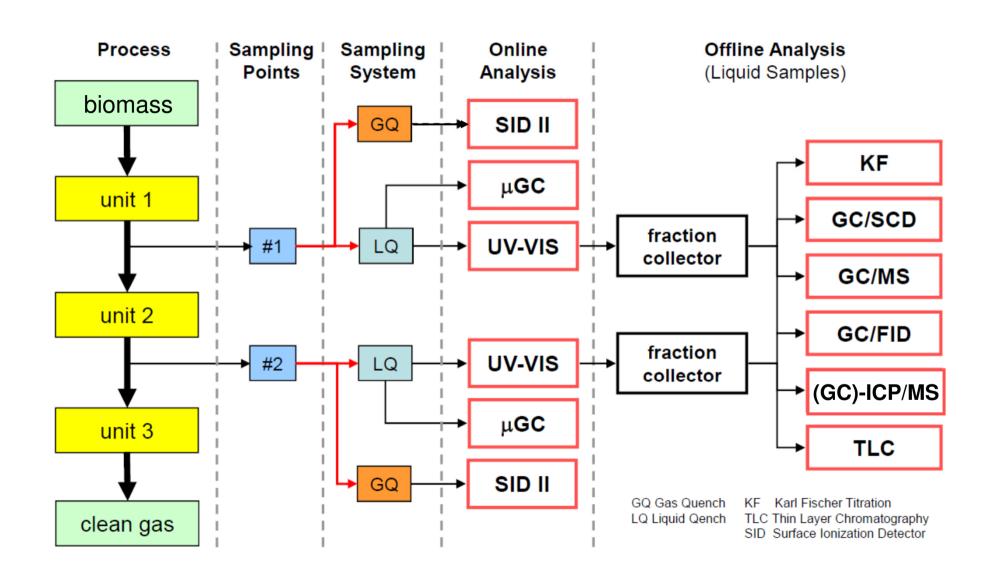


PSI diagnostic toolbox



PSI's diagnostics toolbox









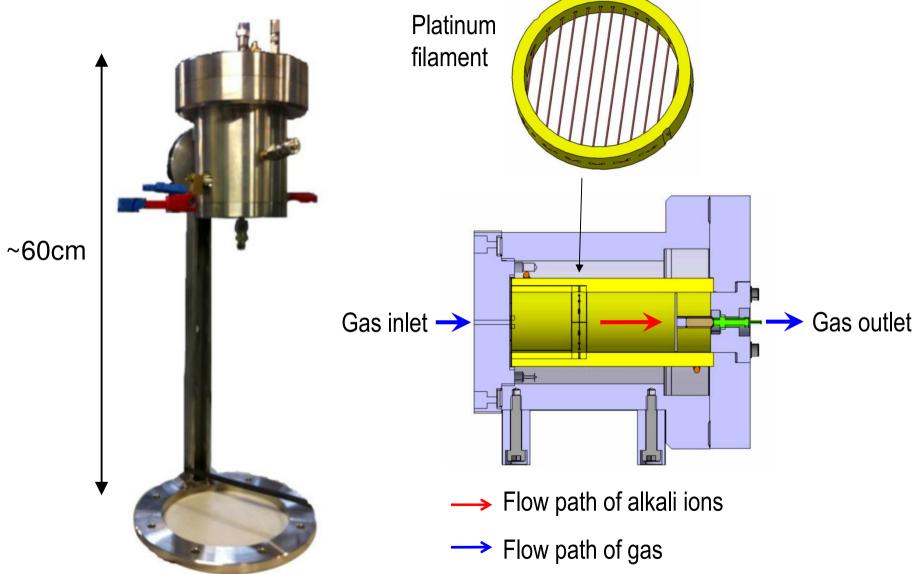
SID for alkali measurement



Design of the SID II alkali detector





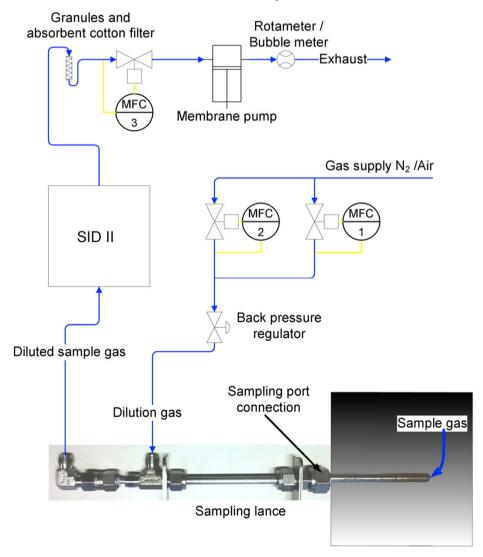




Design of Gas Quench & Calibration of SID II

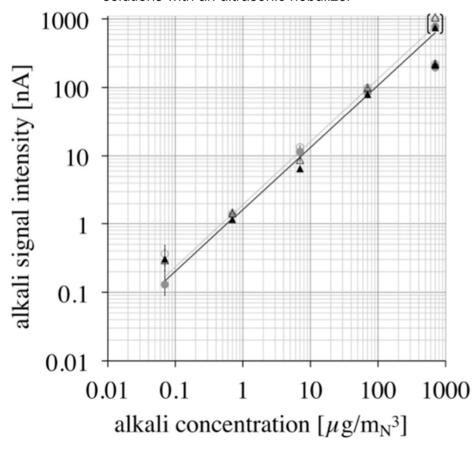


Gas Quench System



Calibration

Calibration curves conducted by dispersing aqueous solutions with an ultrasonic nebulizer



 Δ Sodium in air, \blacktriangle sodium in nitrogen,

Potassium in nitrogen o Potassium in air,



Example of measurements with the SID II



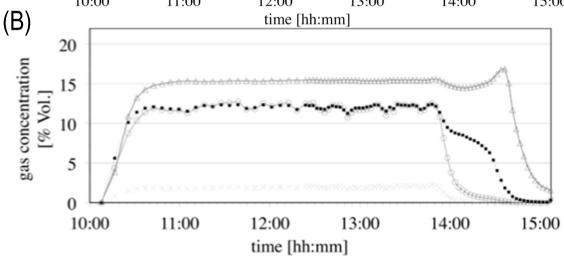
Measurements at a bubbling fluidized bed (1 kg/h) using wood pellets as feedstock





(A) 300
250
200
100
100
100
10:00 11:00 12:00 13:00 14:00 15:00
time [hh:mm]

Gas analysis with μGC



"hydrogen "methane 'carbon monoxide 'carbon dioxide



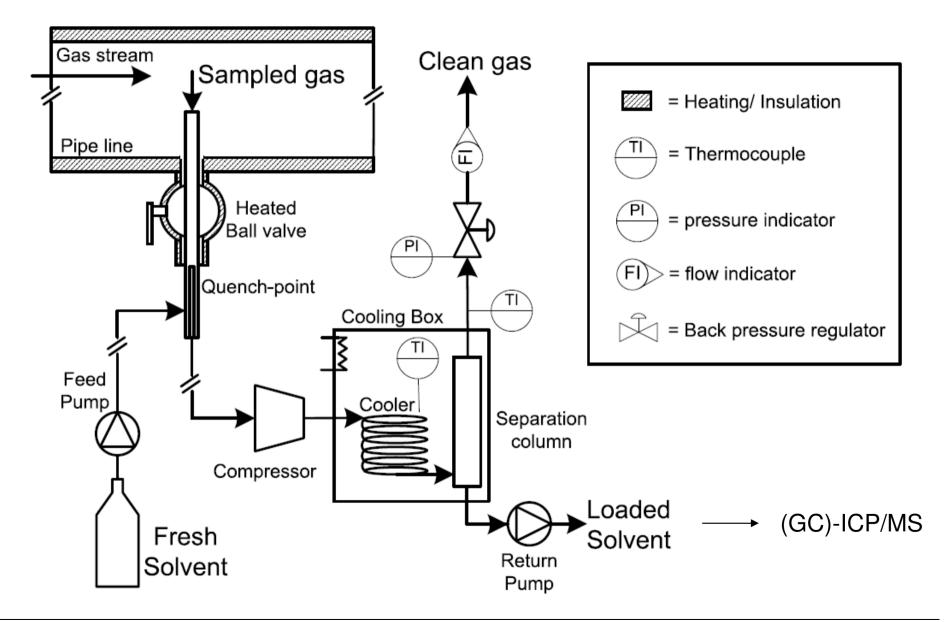


GC-ICP/MS



Liquid quench (LQ) sampling system



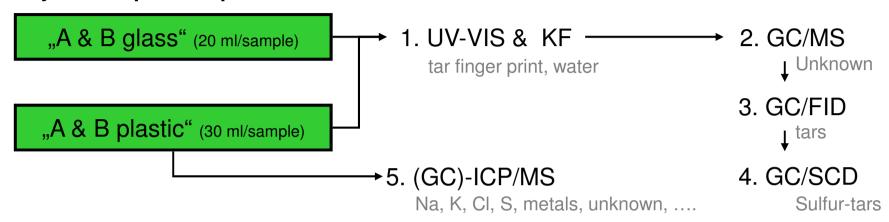




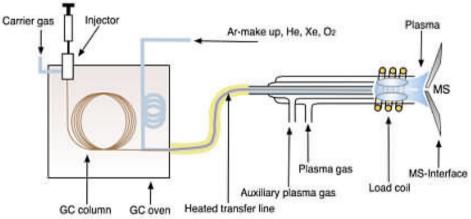
Procedure in the lab for liquid samples



Analysis of liquid samples











Summary



Summary



- Measuring trace elements like alkali, CI or metals needs other analytical instruments, that those commonly known today
- Sampling and Quantification of these trace elements is to some extend similar or follows the sample principals as for tar measurement
- A lot of work is ahead of us, getting these trace elements properly quantified
- Maybe the development of the "sulfur protocol" is a good starting basis for the development of protocols for the other trace elements.