

PAUL SCHERRER INSTITUT



Wir schaffen Wissen – heute für morgen

Paul Scherrer Institut

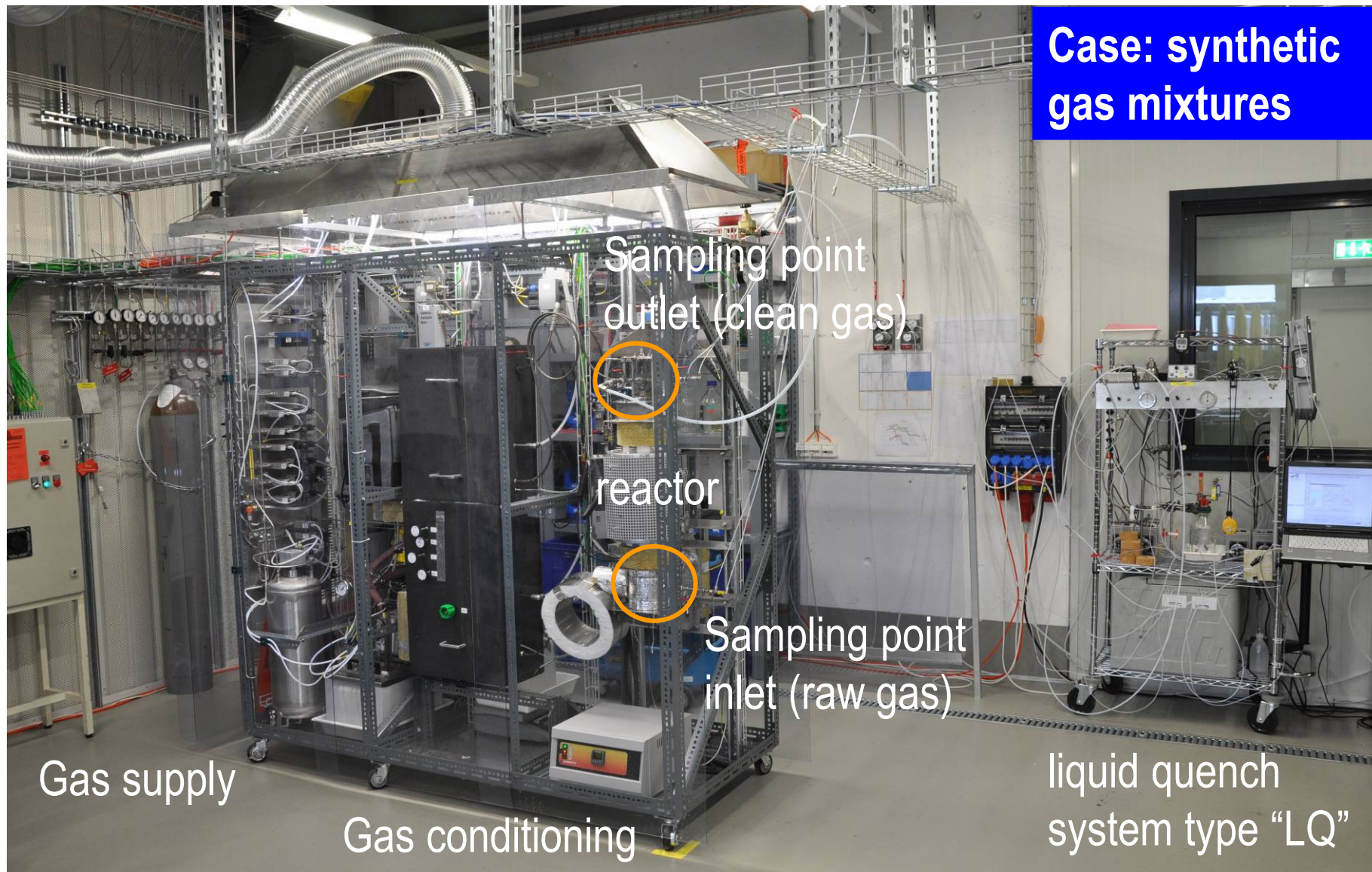
Dr. Serge Biollaz

PSI proposal as a host for round-robin tests @ PSI

- Experimental setup for round-robin test to improve gas analysis tools (sampling & analytical instruments)
 - Test gas generator
 - BFB gasifier (1kg/h, ambient pressure)
- PSI diagnostic toolbox in place for round-robin tests
- Expected results/data of a round-robin test

Experimental setup for round-robin test to improve gas analysis tools (sampling & analytical instruments)

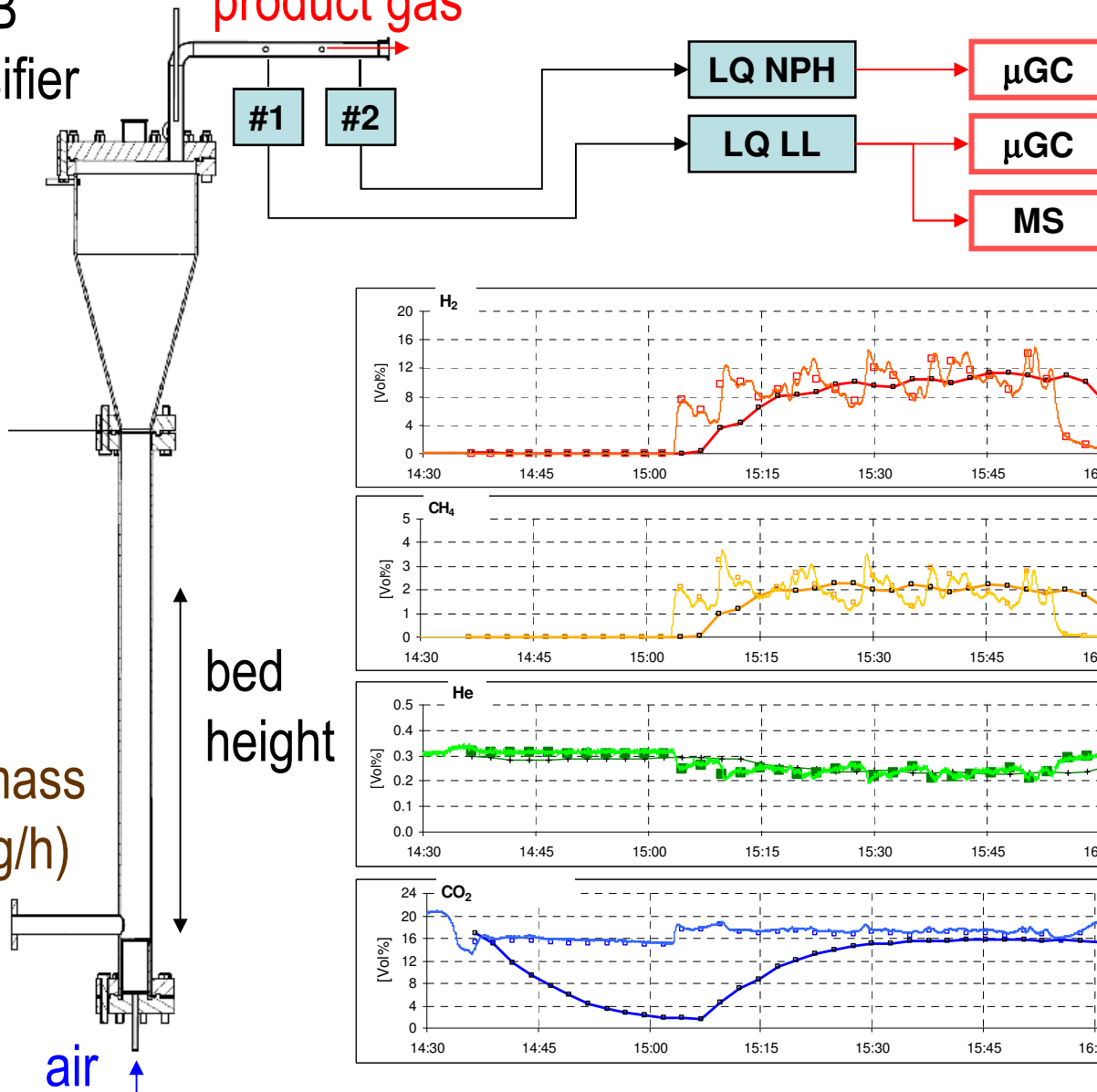
Test gas generator for synthetic gas mixture



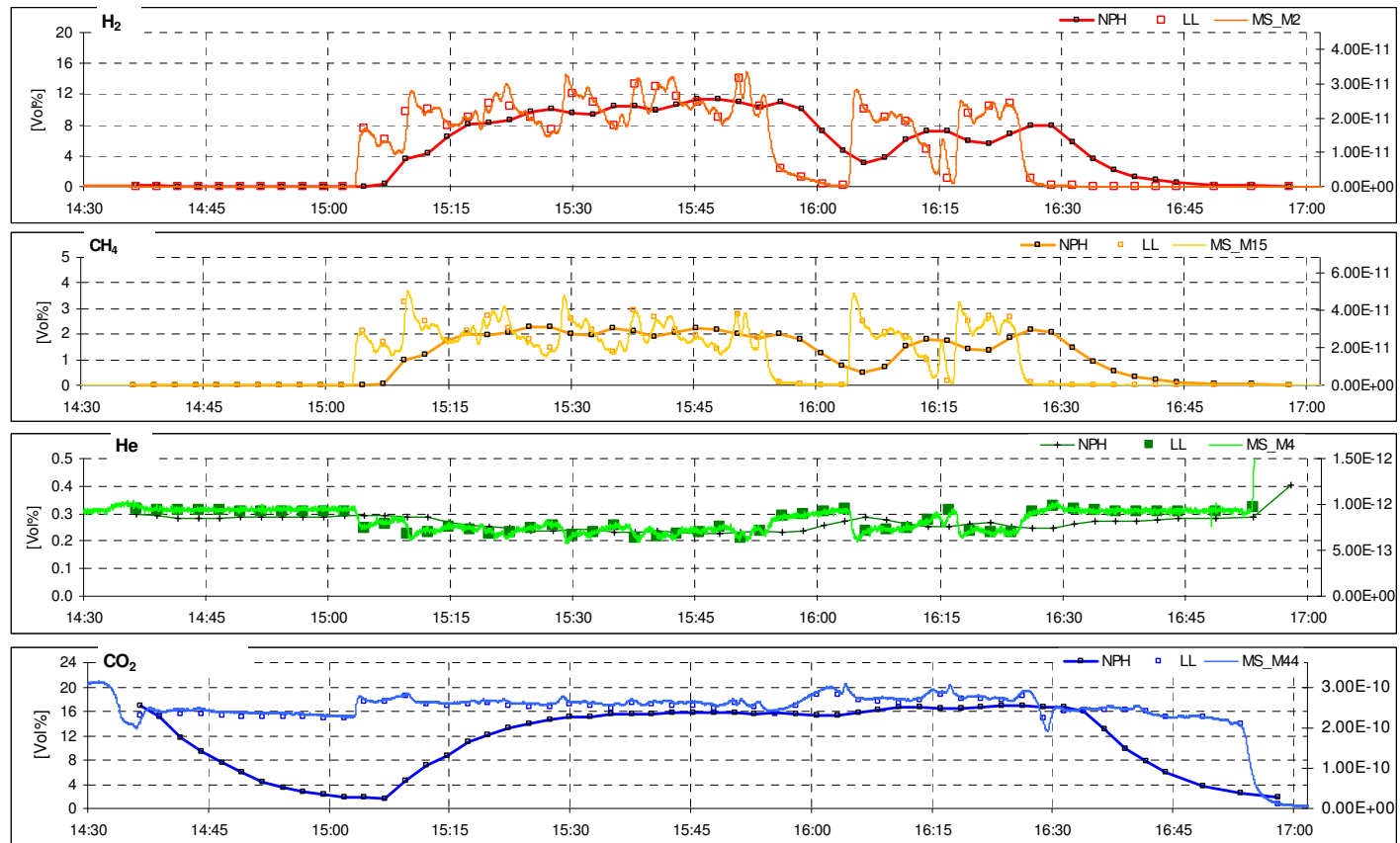
BFB gasifier: Test gas generator for real gas mixture

BFB
gasifier

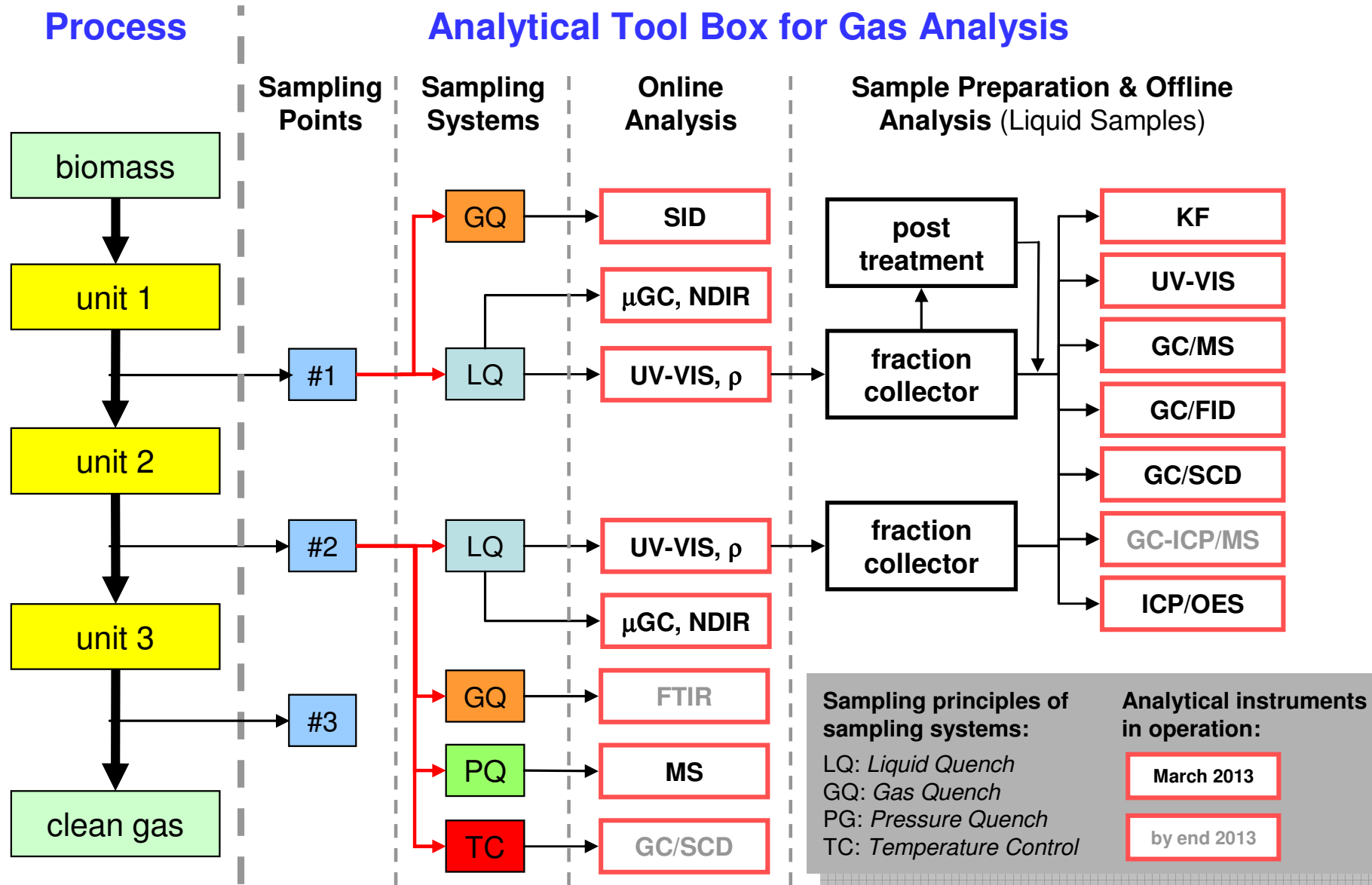
product gas



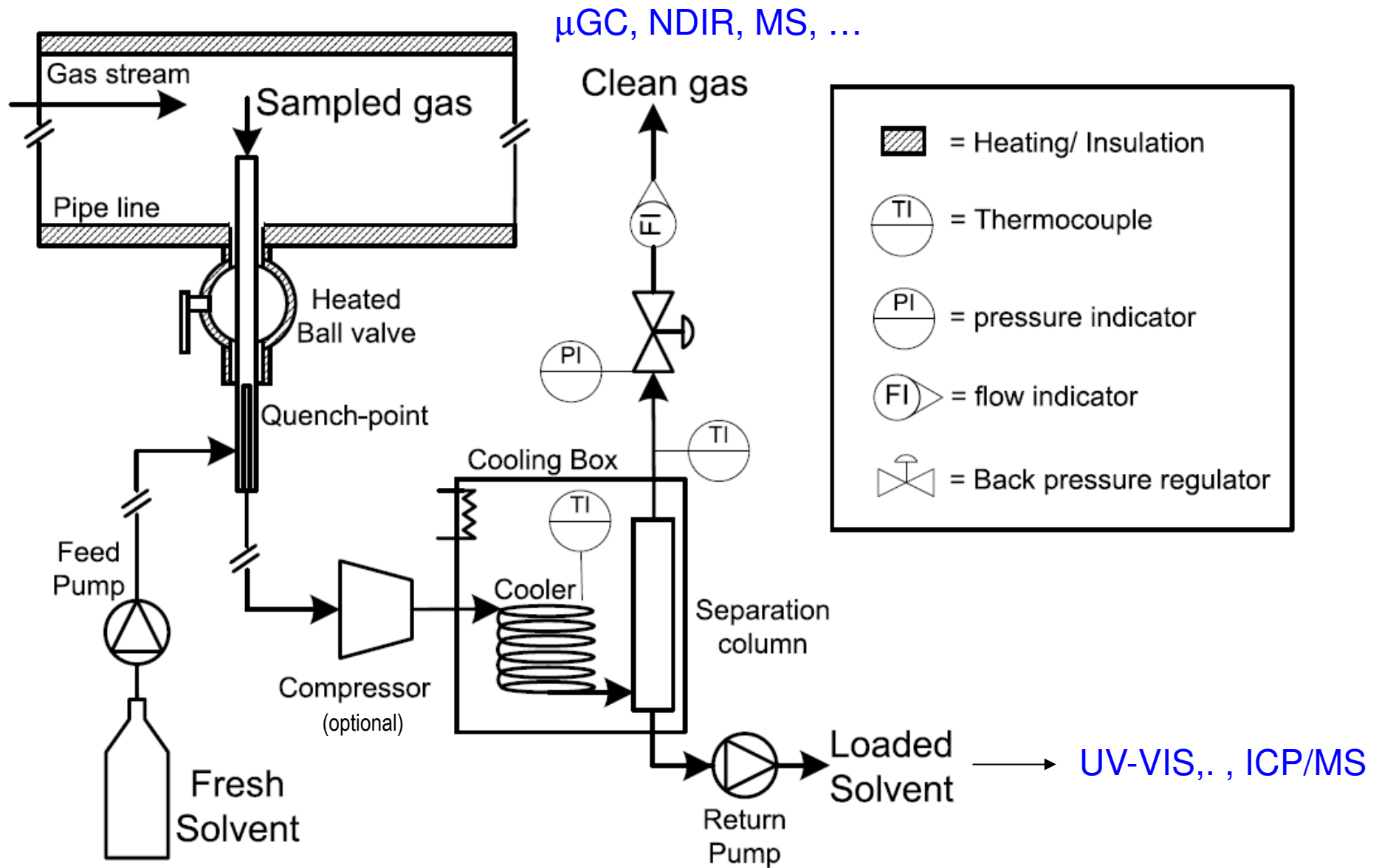
Case: real gas mixtures



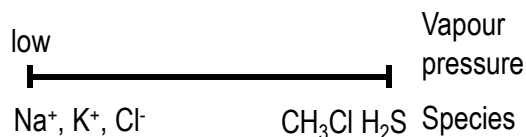
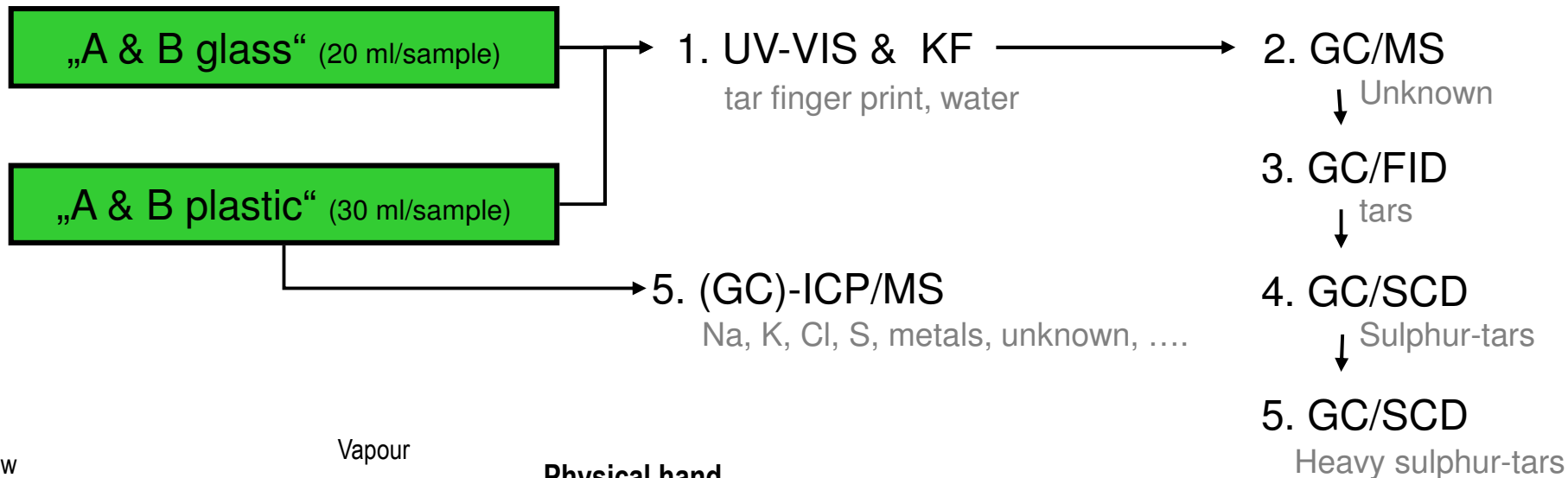
PSI diagnostic toolbox in place for round-robin tests



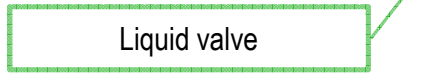
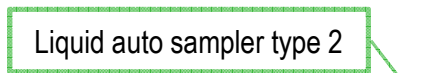
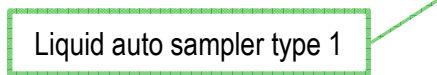
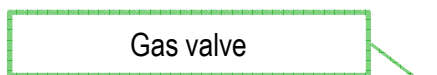
Liquid quench (LQ) sampling system: Principal



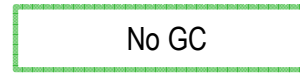
Analysis of liquid samples



Physical hand over of sample

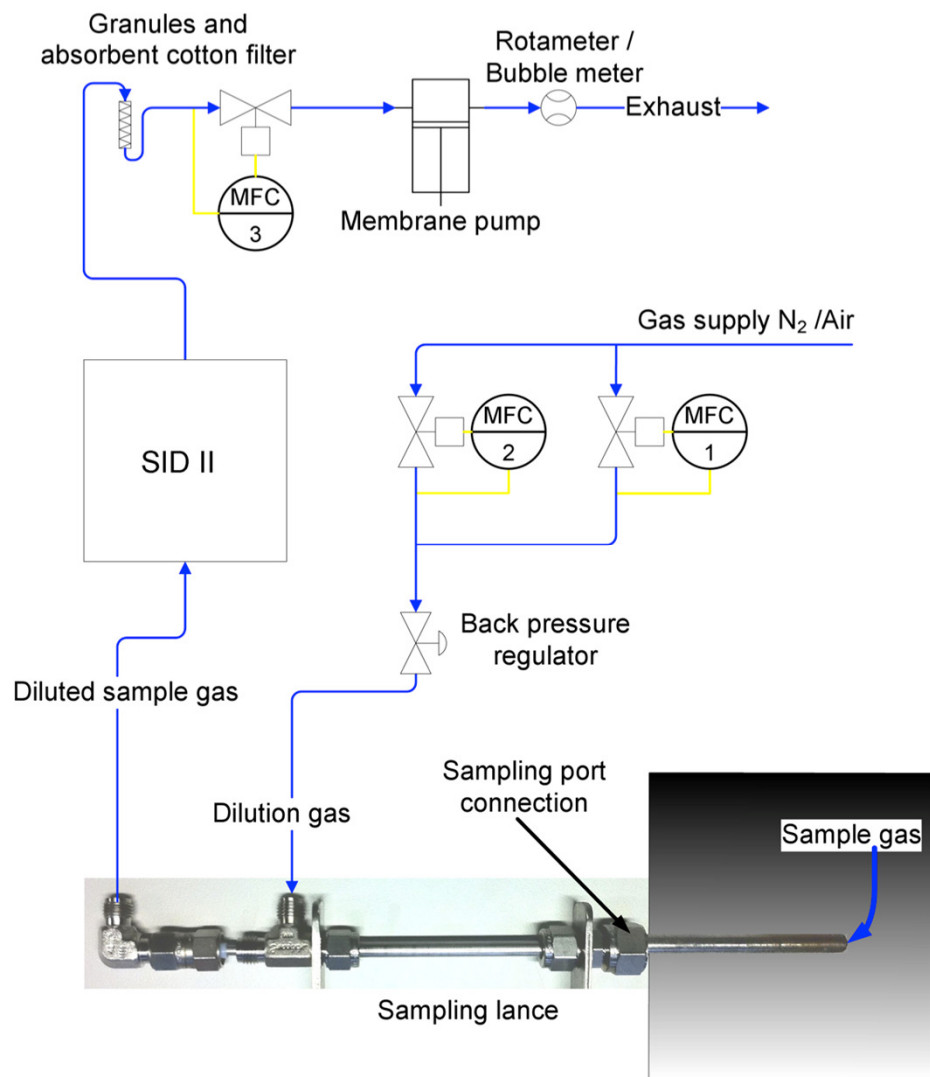


GC



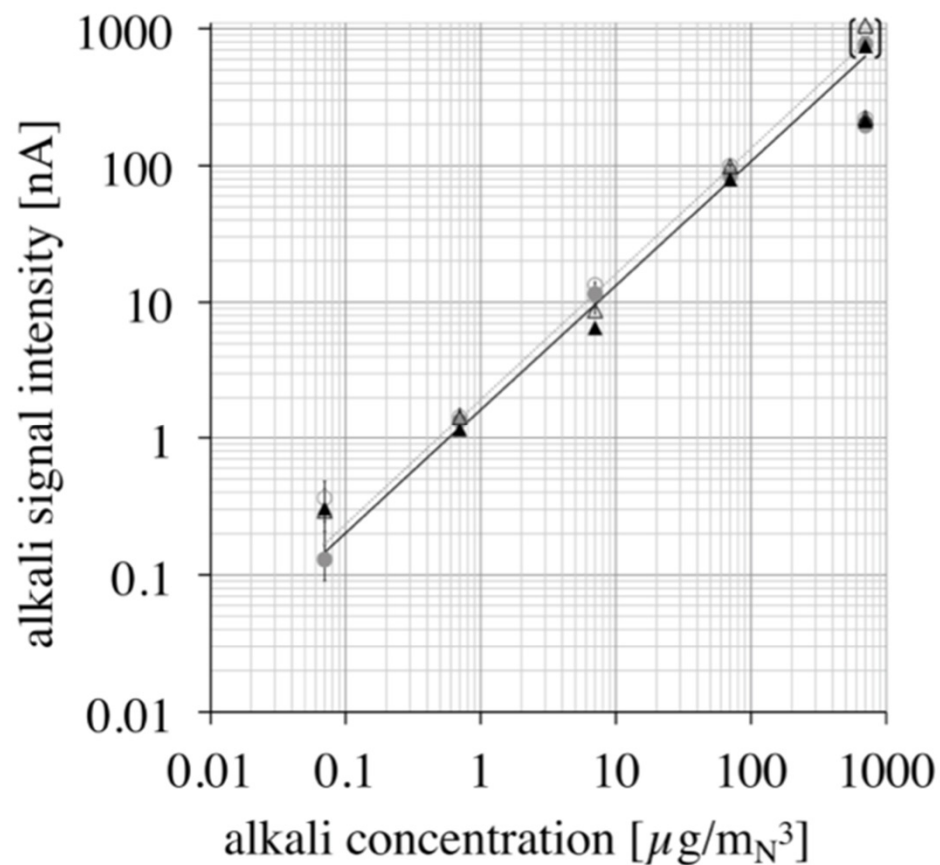
ICP-MS

Gas Quench System



Calibration

Calibration curves conducted by dispersing aqueous solutions with an ultrasonic nebulizer



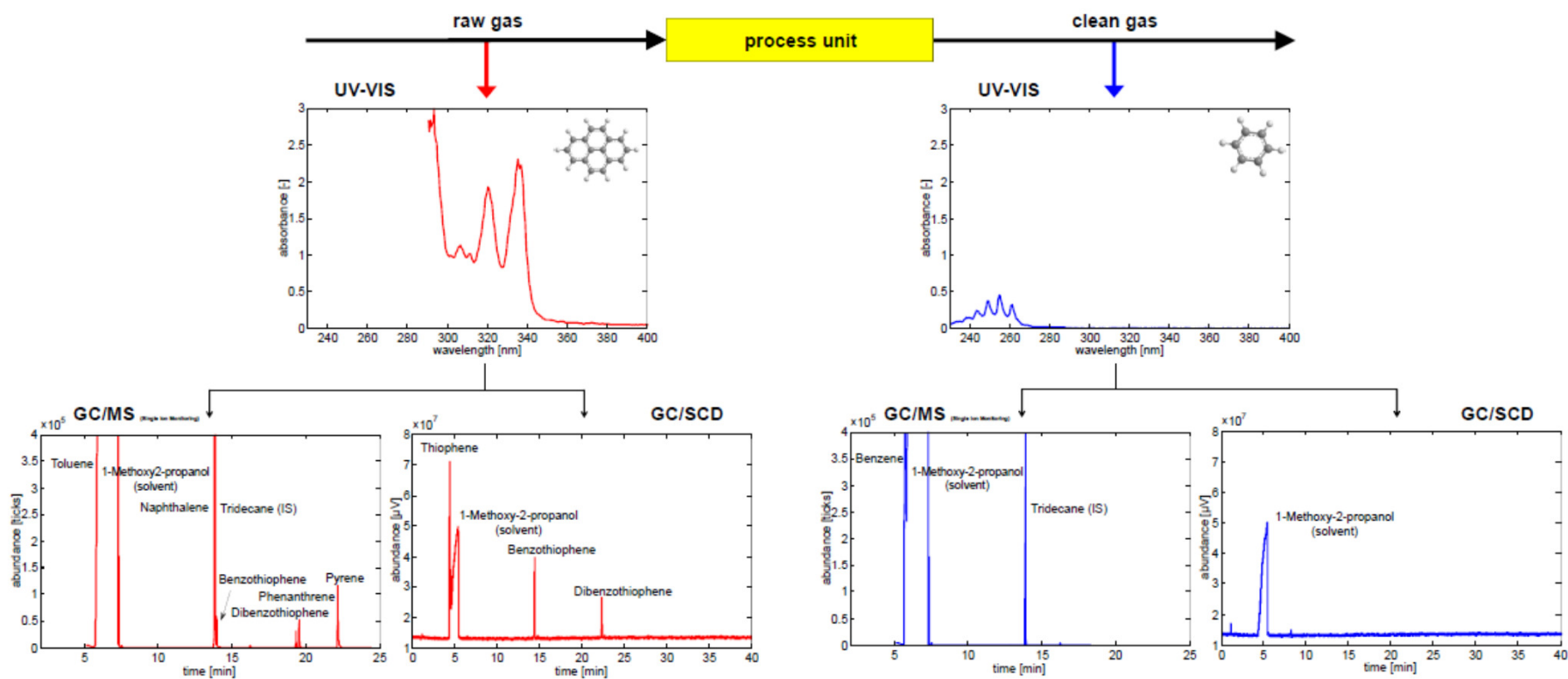
Δ Sodium in air, \blacktriangle sodium in nitrogen,
 ● Potassium in nitrogen ○ Potassium in air,

Expected results/data of a round-robin test

Example tar and sulphur measurements

	UV-VIS (Pyrene)	UV-VIS (Benzene)	GC/MS	GC/SCD
LoD (gas) [ppmM]	0.04	11.5	0.05	0.3
LoQ (gas) [ppmM]	0.07	23.0	0.5	0.6
LoD (liquid) [ppmM]	0.06	19.3	0.1	0.5
LoQ (liquid) [ppmM]	0.12	38.5	1.0	1.0

Limit of Detection (LoD); Limit of Quantification (LoQ)

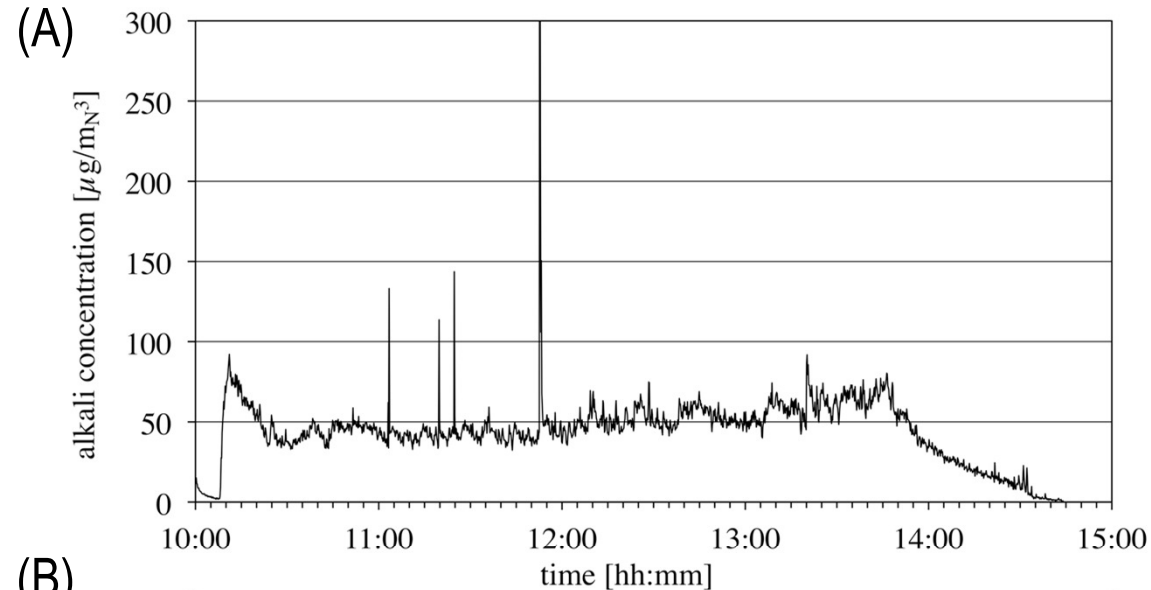


	Benzene	Toluene	Naphthalene	Phenanthrene	Pyrene	Thiophene	Benzothiophene	Dibenzothiophene
raw gas [ppmV]	< 0.5	279.2	79.2	6.6	3.1	5.0	1.5	0.7
clean gas [ppmV]	221.6	< 0.5	< 0.5	< 0.5	< 0.07	< 0.6	< 0.6	< 0.6

Example alkali measurements with SID

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

Signal from SID



Gas analysis with μGC

