

Co-Firing in FBC

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A Challenge for Fuel Characterization and Modelling

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Fuels Behaviour in FBC – Predictor Development at Åbo Akademi

*This presentation: **Fouling/Slagging/Corrosion/Trace Metals:***

**Rainer Backman, Bengt-Johan Skrifvars
Patrik Yrjas, Maria Zevenhoven, Christian Mueller**

*(Additional development: **Nitrogen Oxides Emissions:***

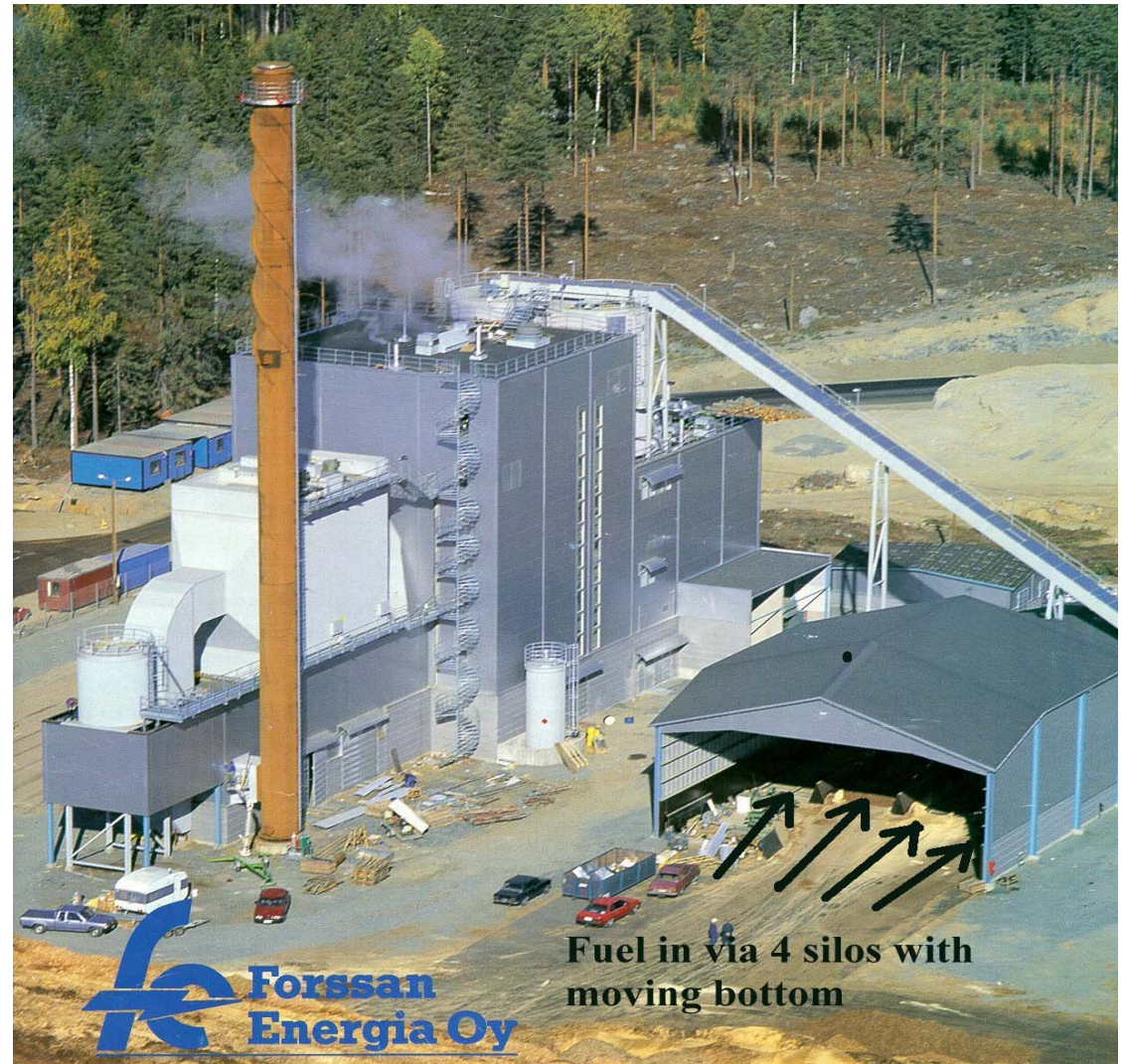
Pia Kilpinen, Sirpa Kallio, Jukka Konttinen)

Multi-fuel BFB:
Wood chips, saw dust,
forest residue, bark,
peat (back-up fuel)

Capacity : 66 MW_{th}

Steam: 2.8 kg/s,
61 bar, 510°C

Energy production:
17.2 MW_{el} + 48 MW_{heat}

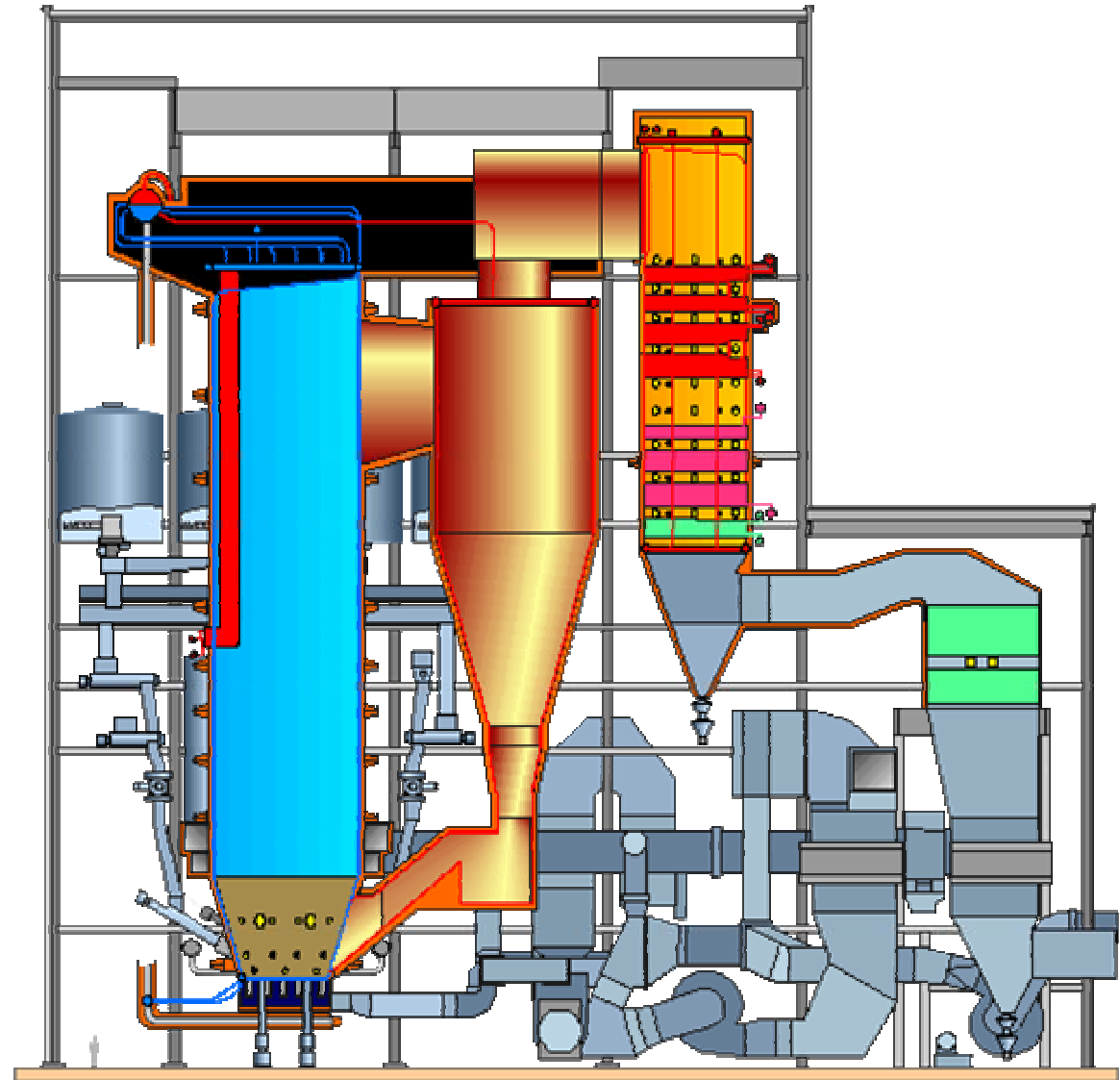


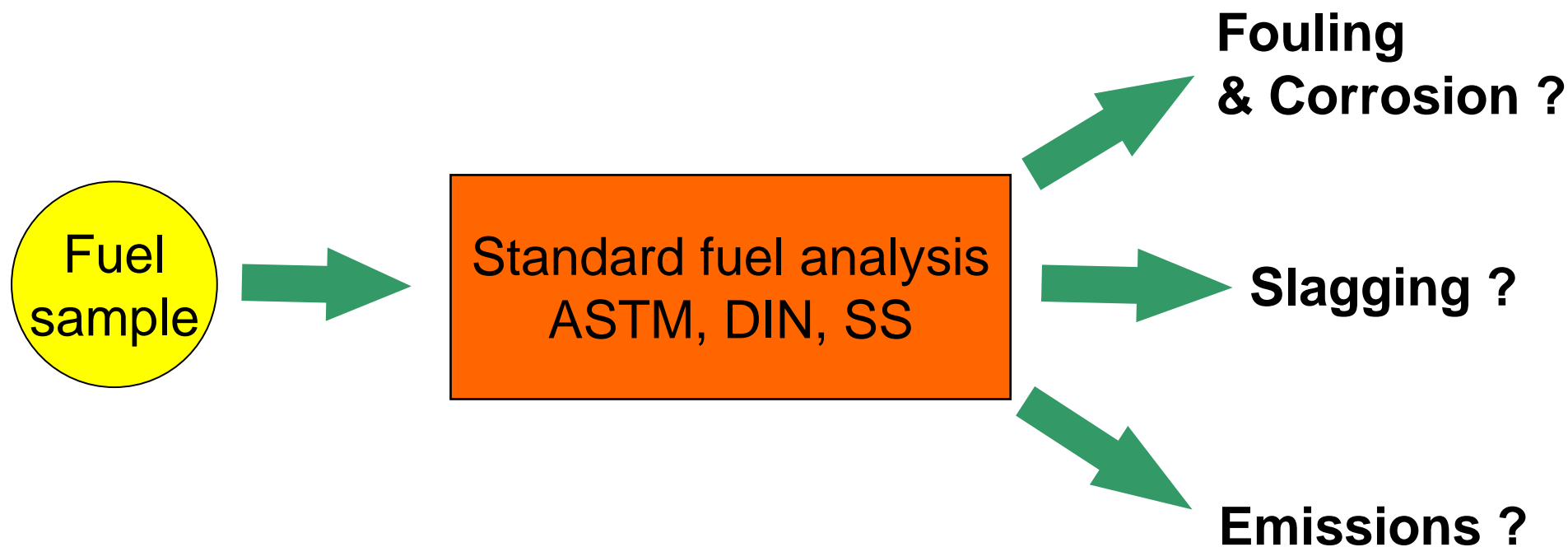
Multi-fuel CFB:
Peat, bark,
wood residue,
coal (back-up fuel)

Capacity : 550 MW_{th}

Steam: 194 kg/s,
165 bar, 545°C

Energy production:
240 MW_{el} (alt. heat)

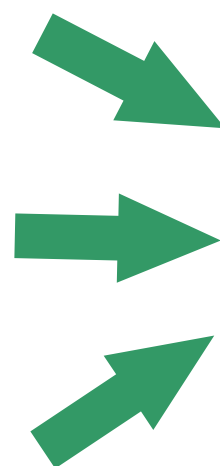




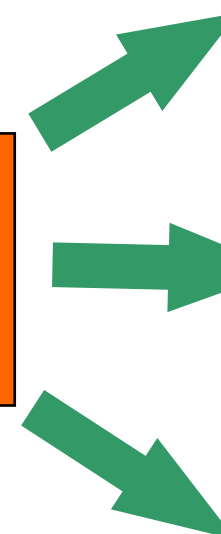
Fuel
sample
1

Fuel
sample
2

Fuel
sample
3



Standard fuel analysis
???



**Fouling
& Corrosion ?**

Slagging ?

Emissions ?

ÅA biofuel database

Conventional fuel analyses
(proximate, ultimate, ash)

Stepwise leaching analyses
(water, acetate, acid soluble)

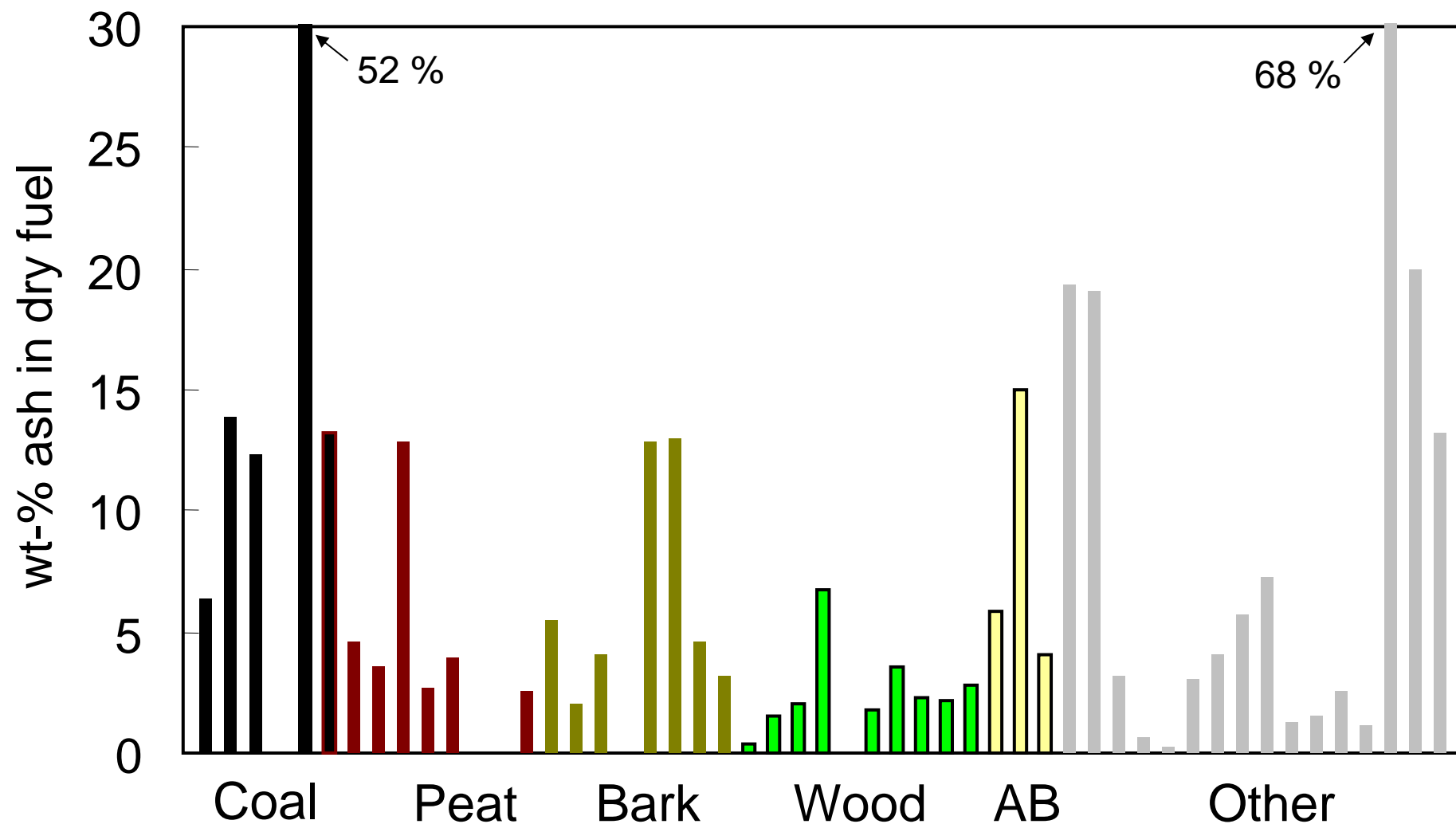
SEM + EDS analyses
(original & partly burned-out fuels)

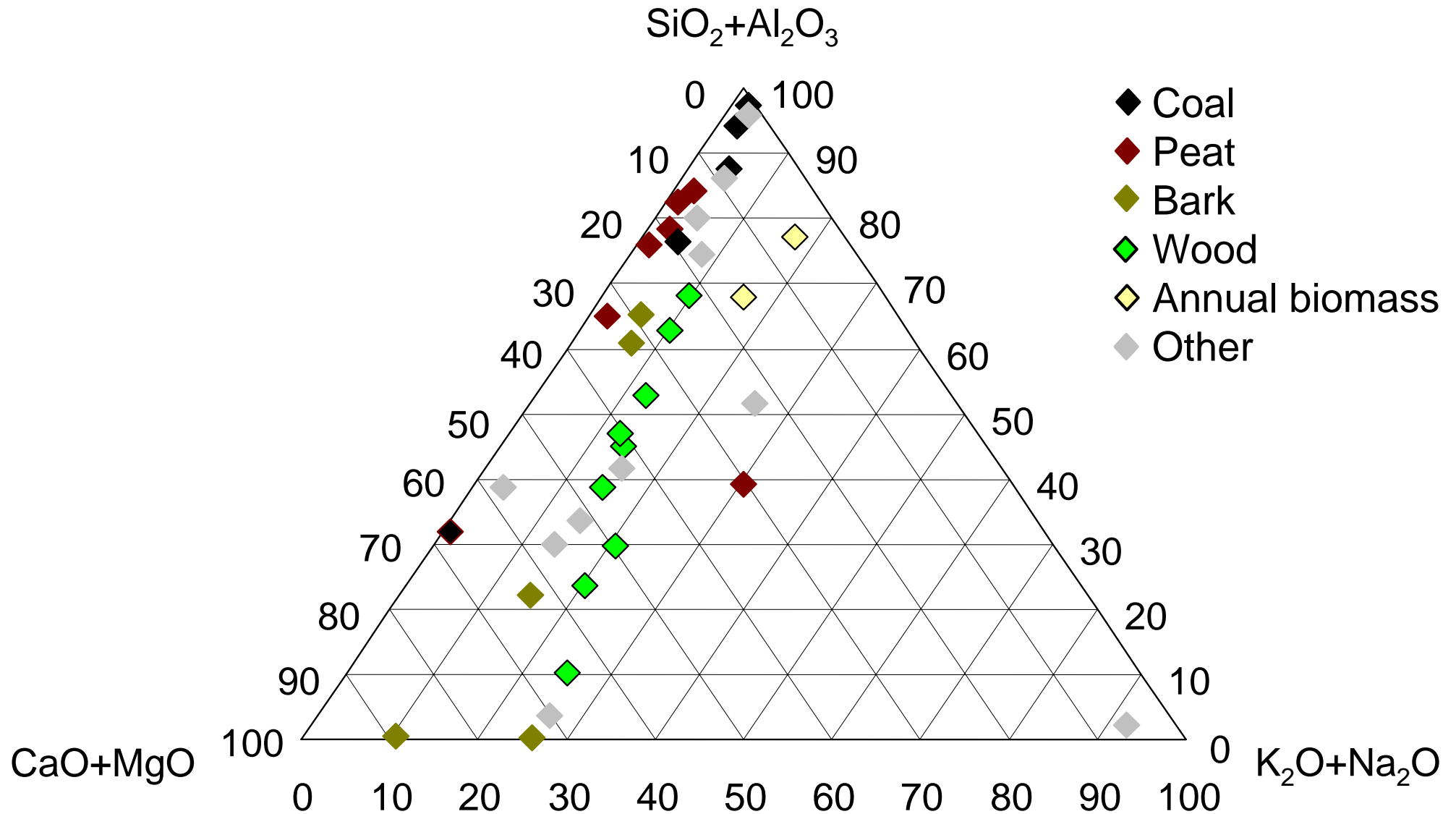
Melting behavior calculations
(reactive fraction)

Total: 51 fuels per May 2002

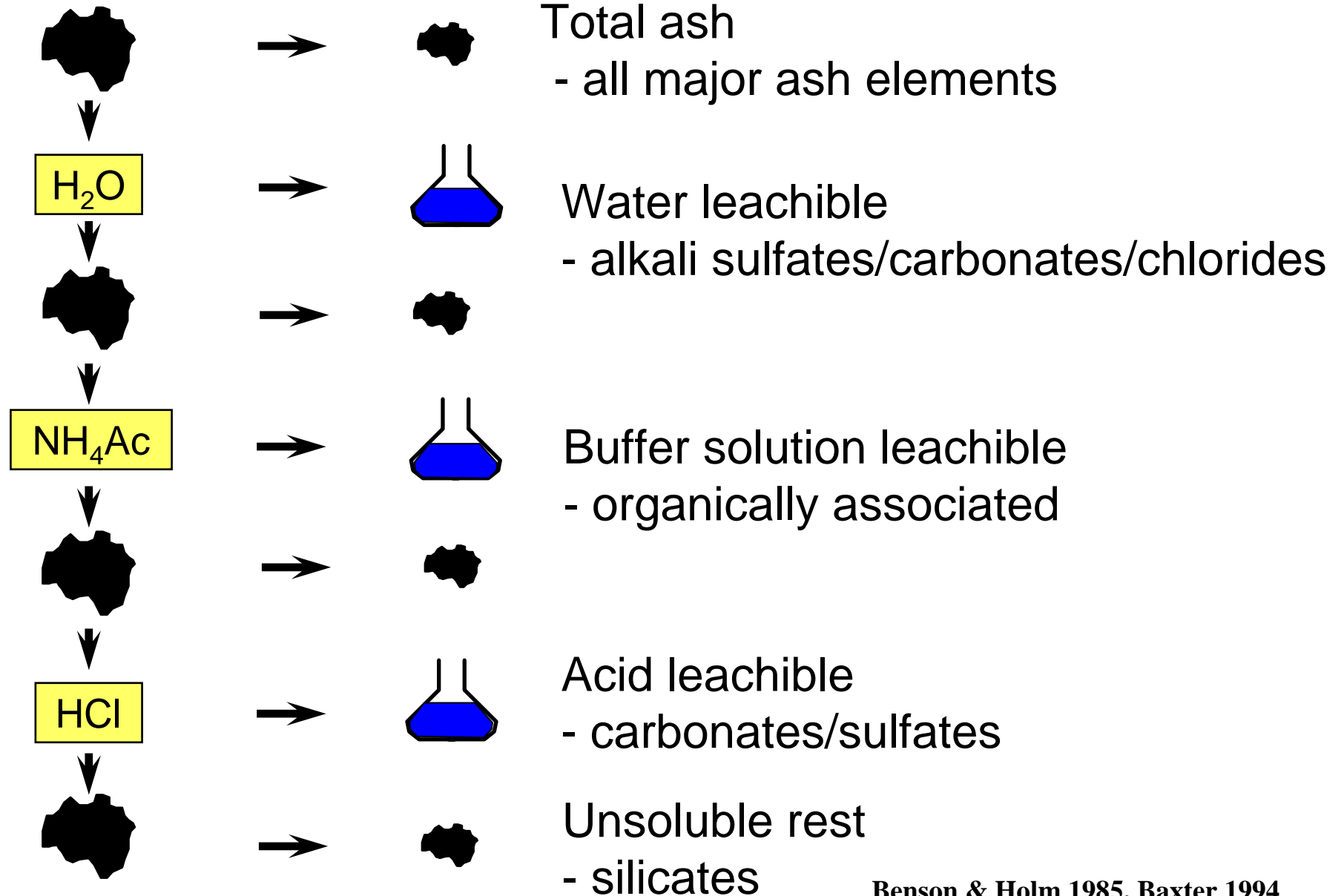
- 8 bark fuels
- 10 wood fuels (steam wood, forest residue)
- 3 annual biomasses
- 8 peats
- 6 coals
- 16 others (RDF, sludge, hulls & husks, bagasse, other residues)

ÅA biofuel database, % of ash

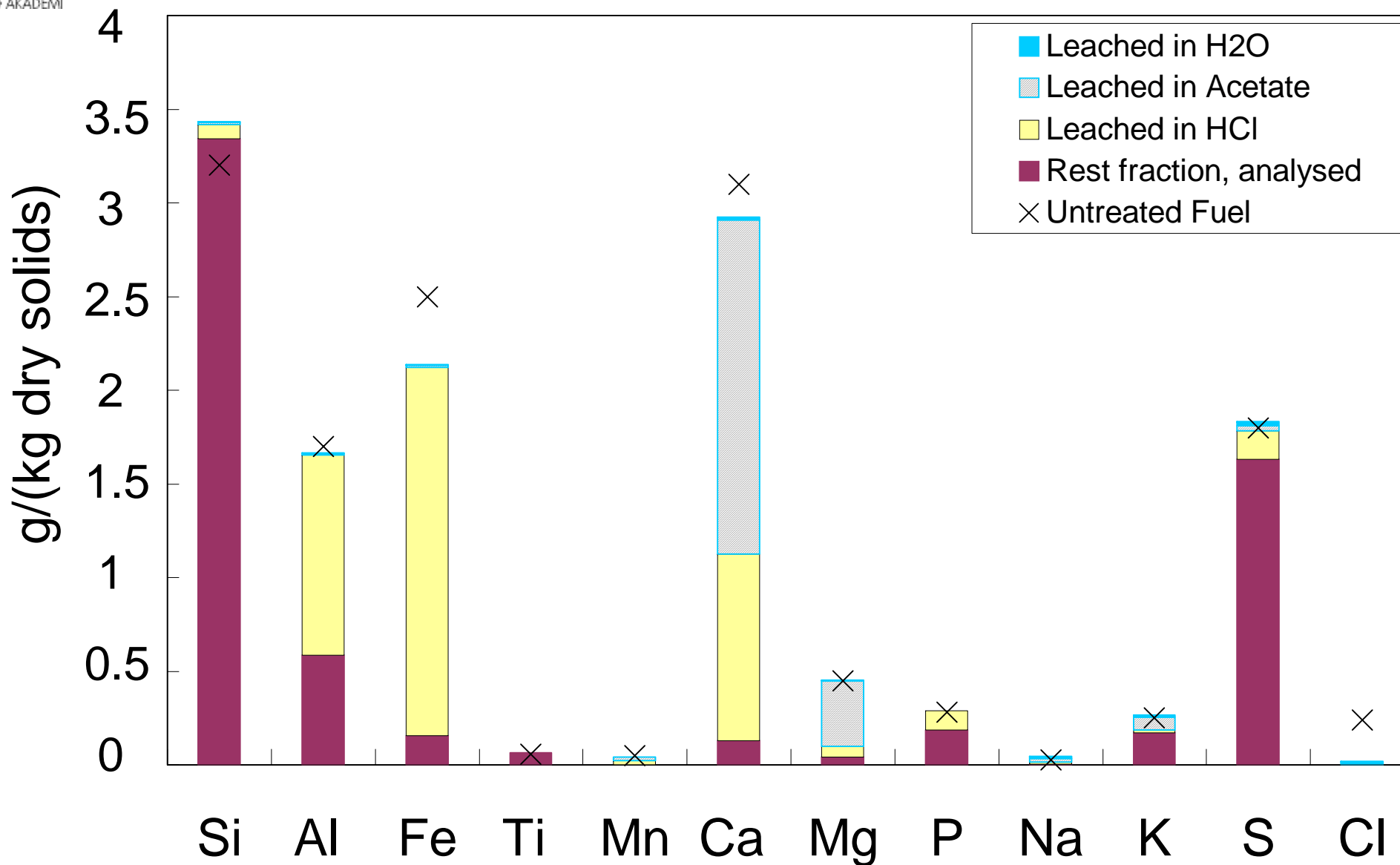




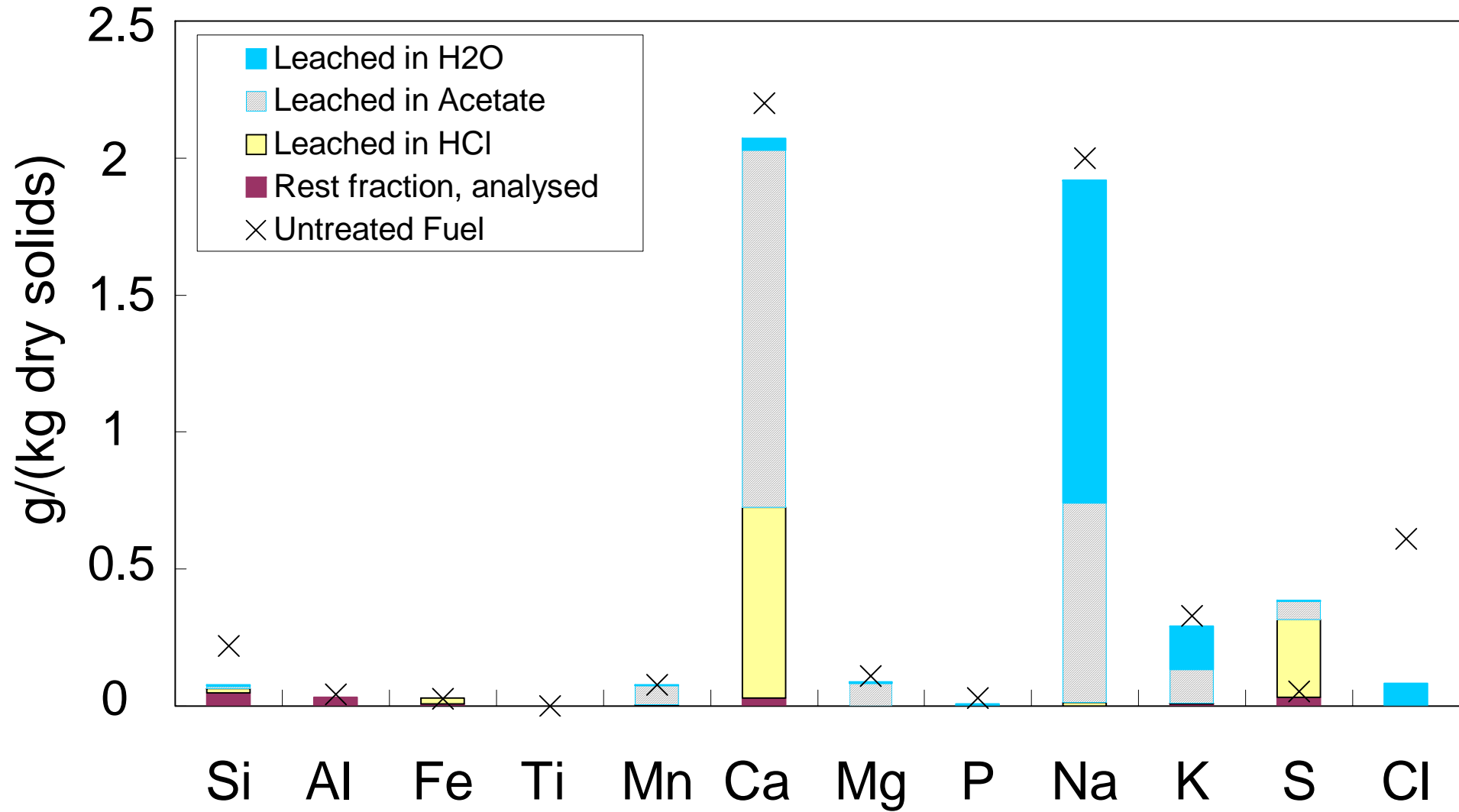
Stepwise leaching



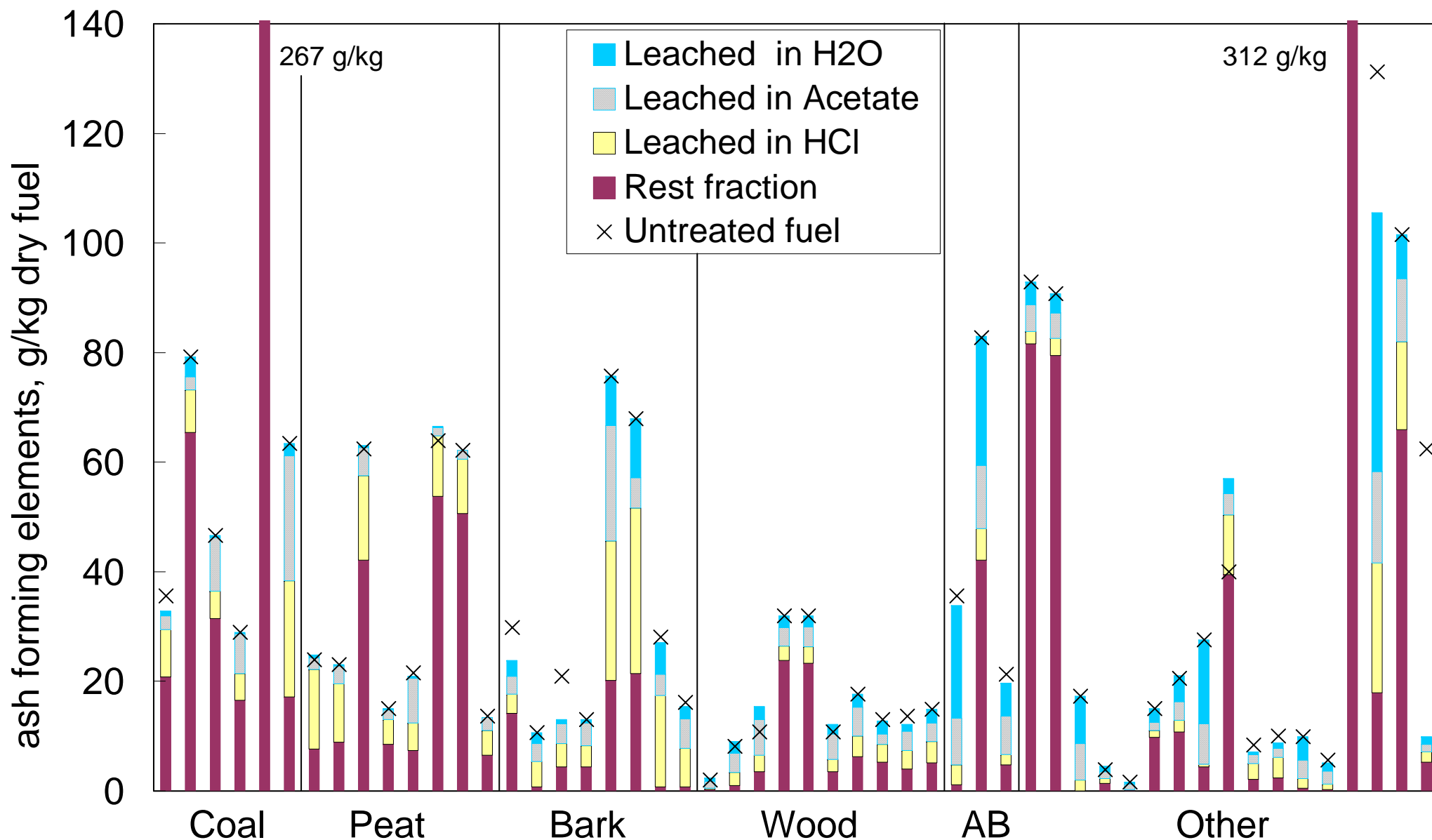
Stepwise leaching of peat



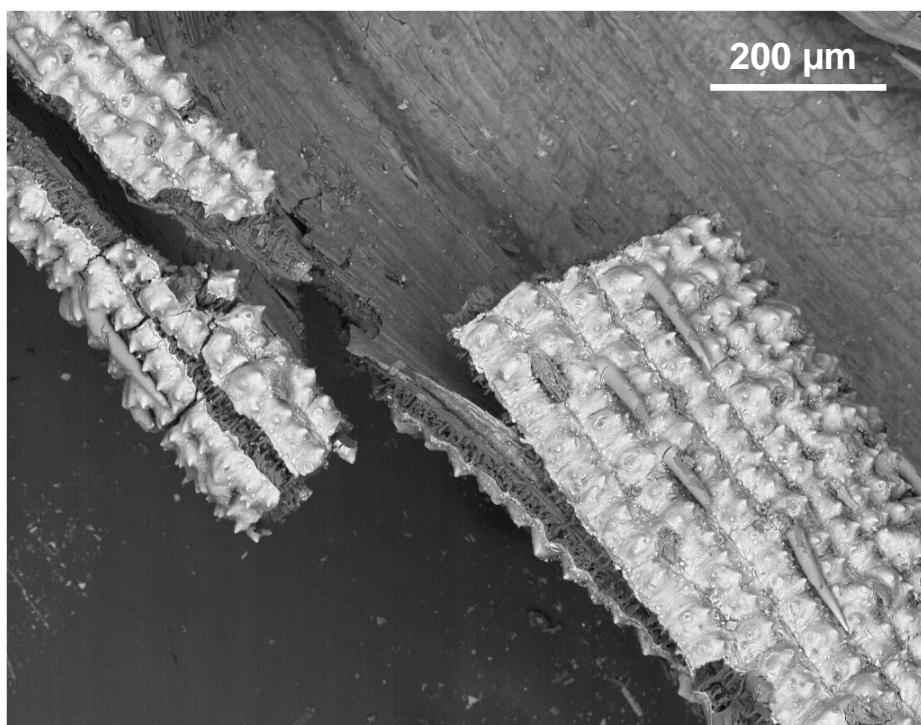
Stepwise leaching of plywood



Stepwise leaching, ÅA biofuel database



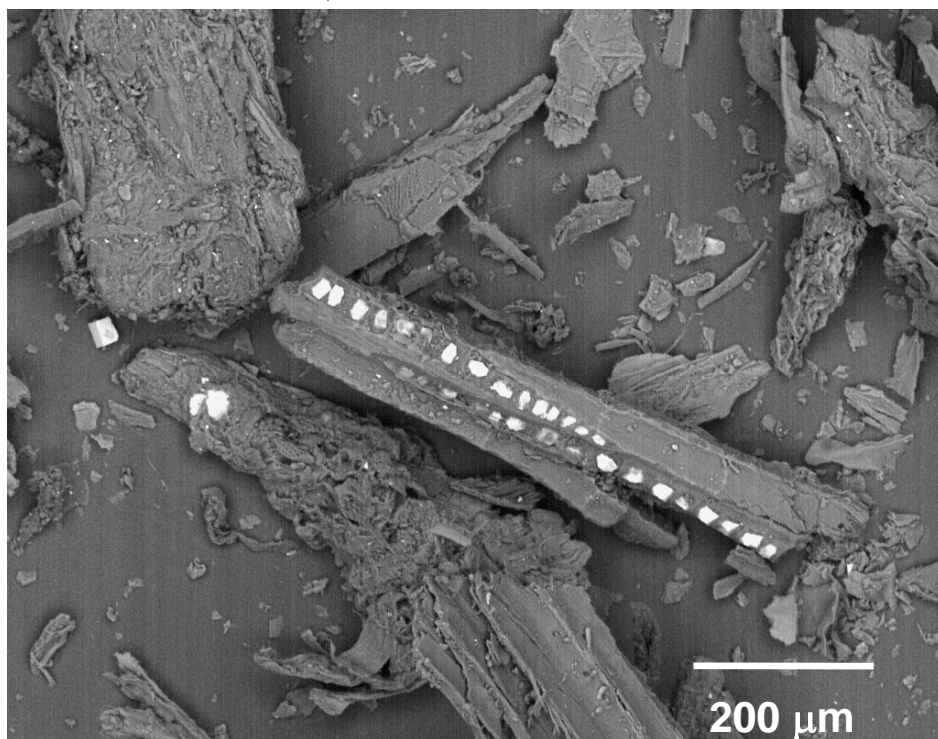
Rice husk, untreated fuel



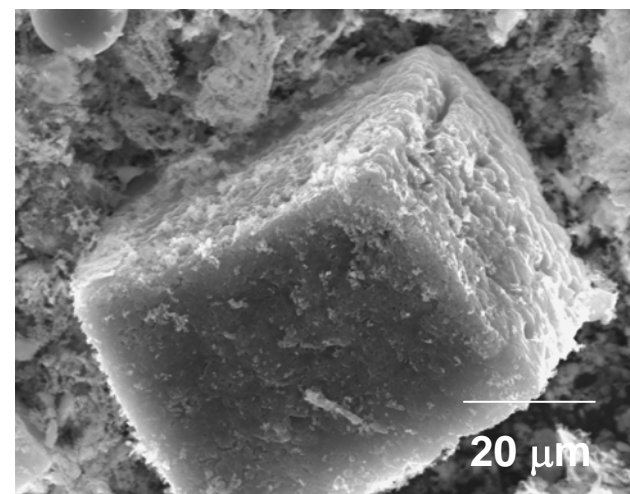
Rice husk laboratory ash, 700°C



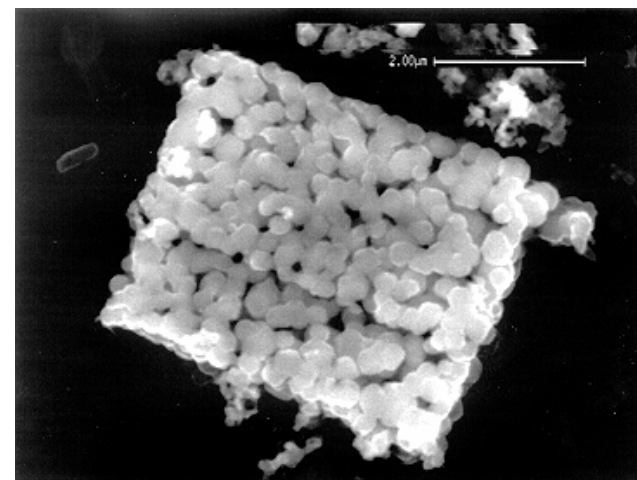
Bark, untreated fuel



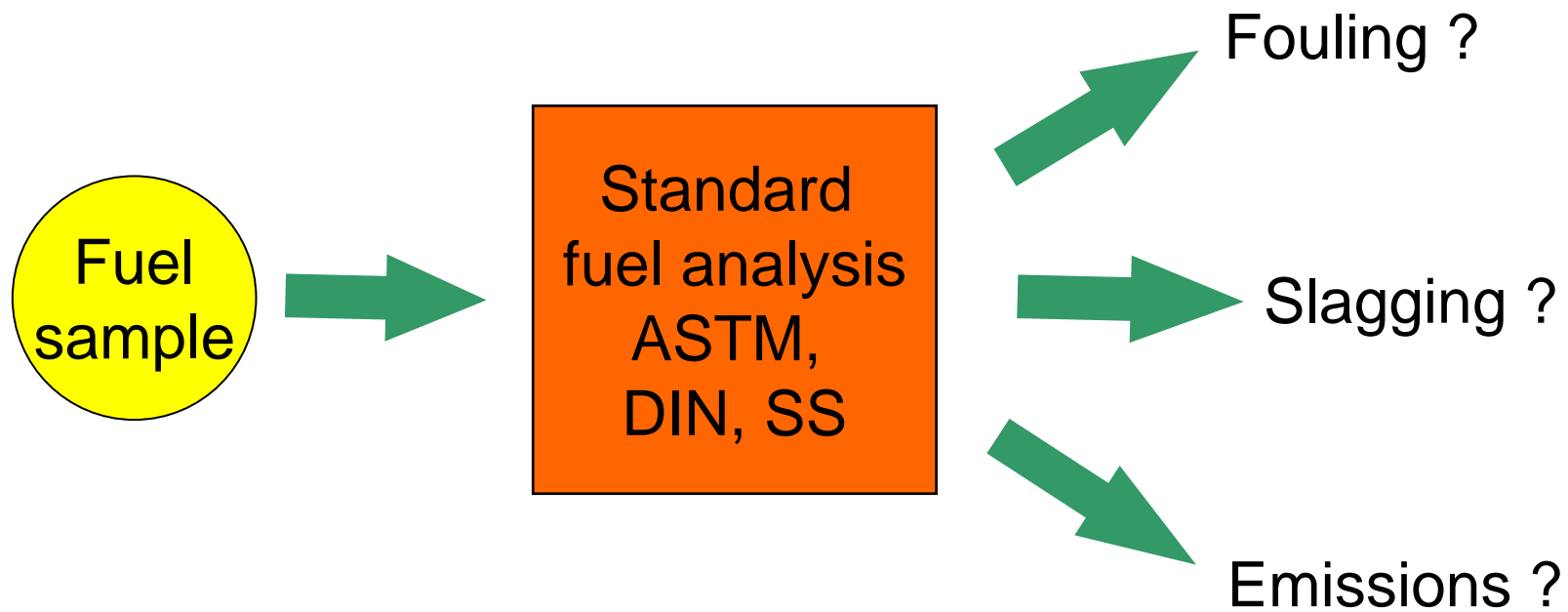
Bark, laboratory ash

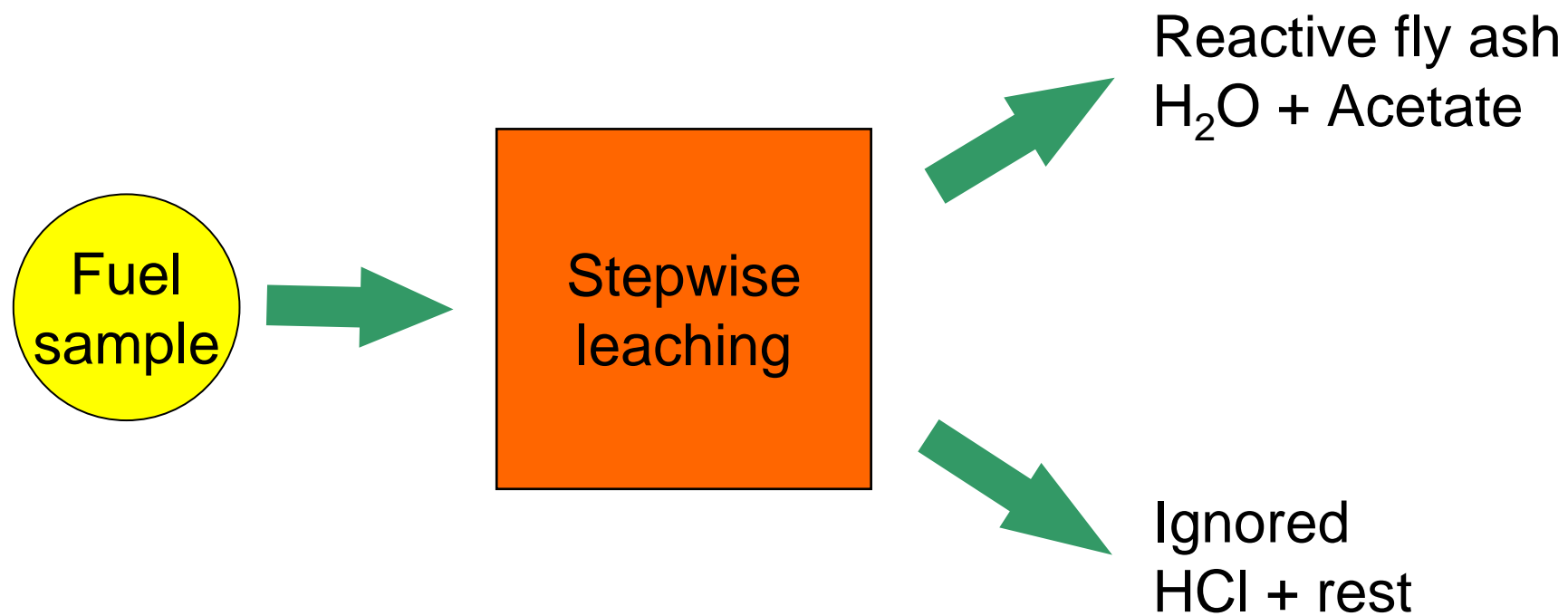


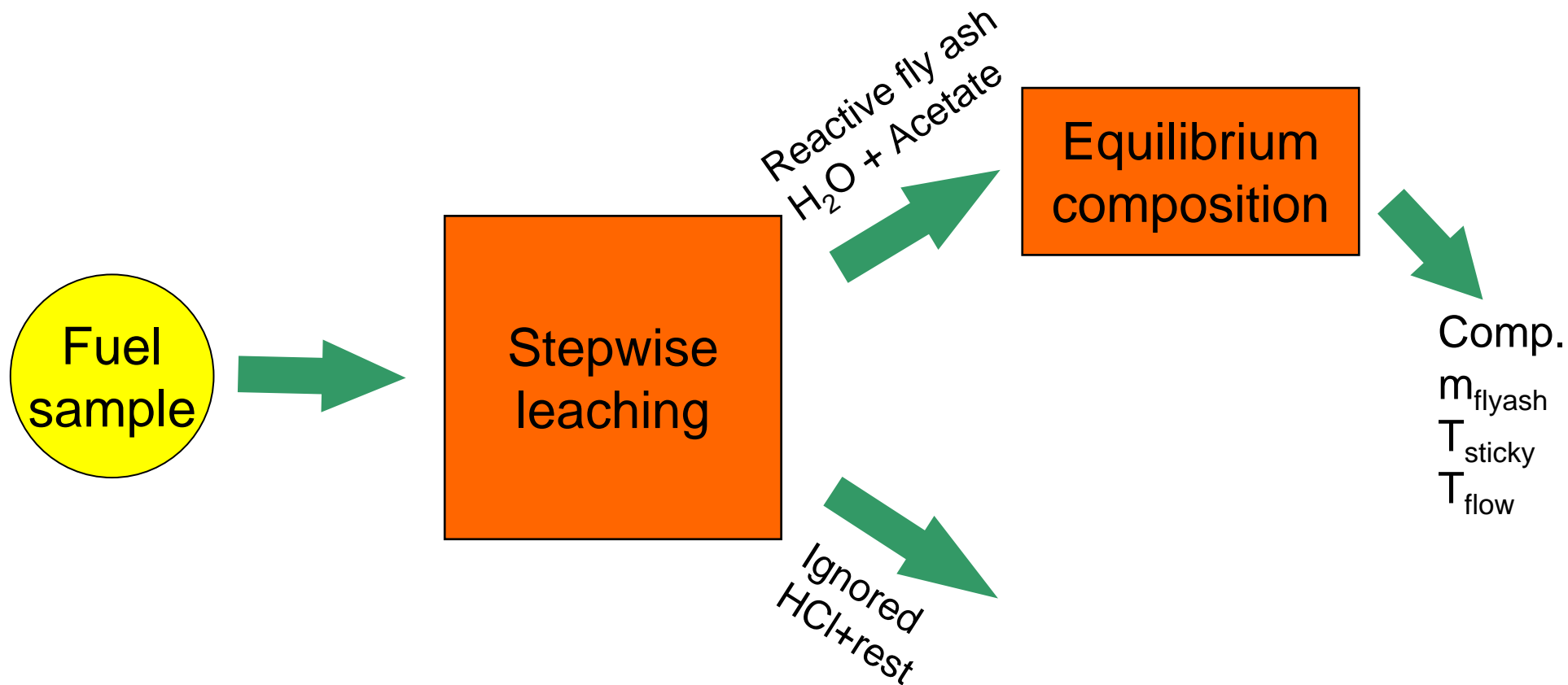
500°C



900°C

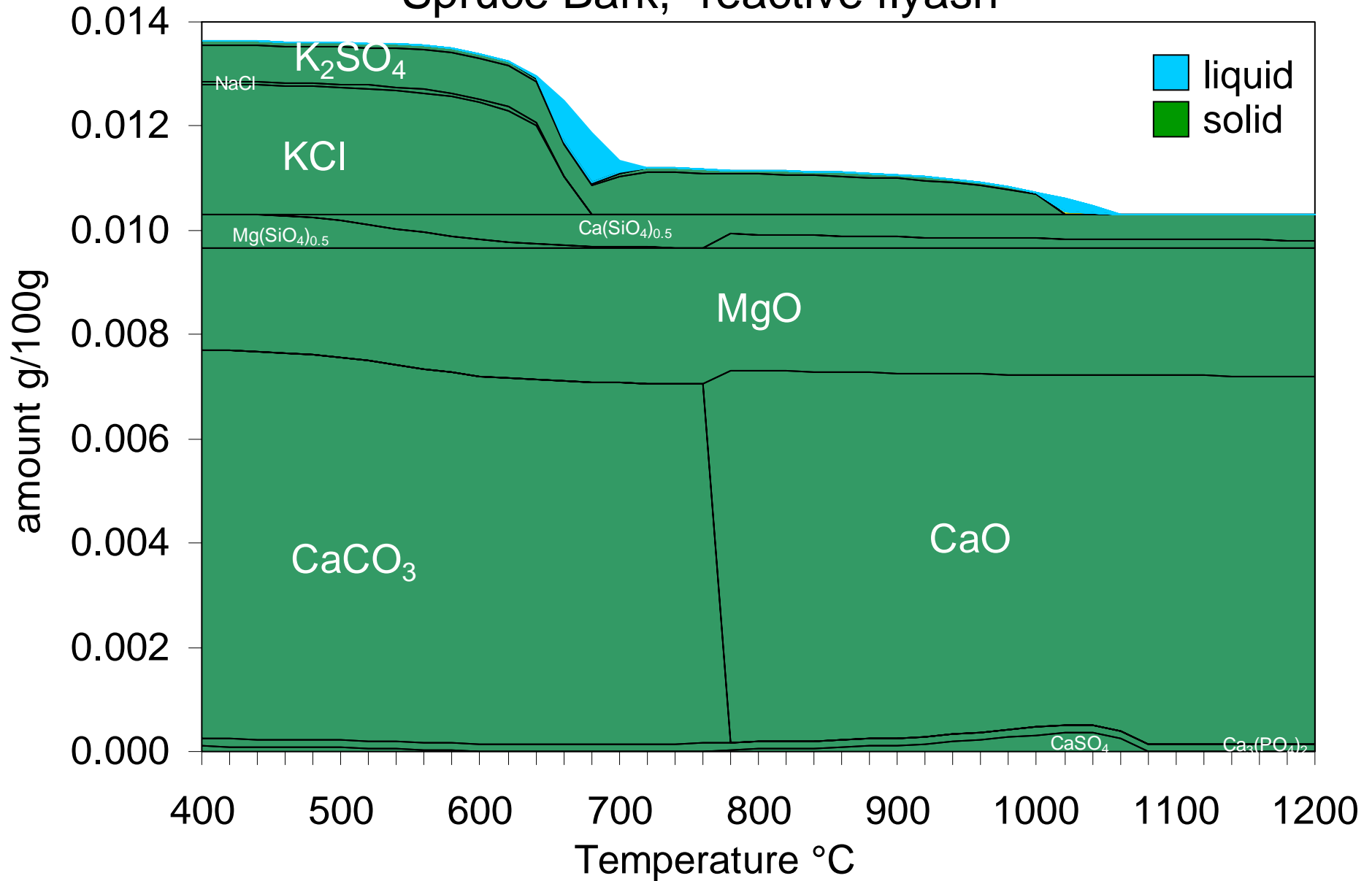


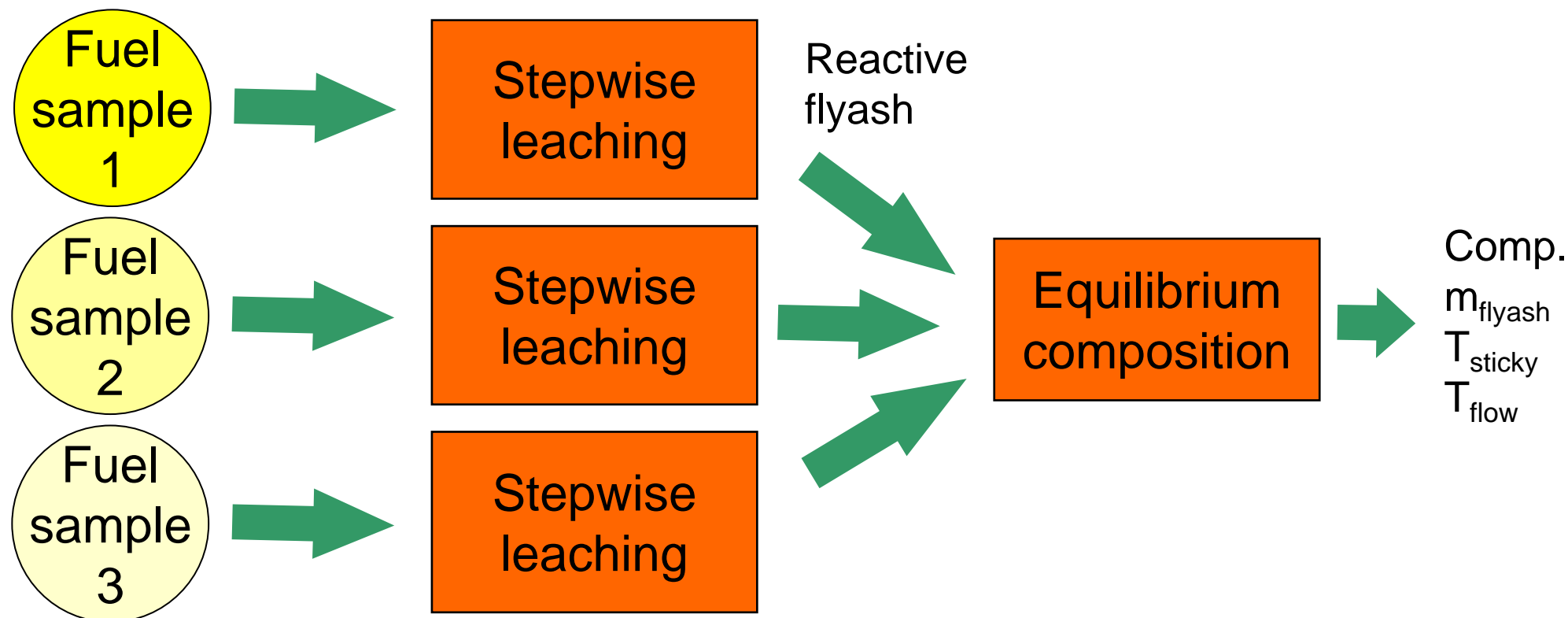




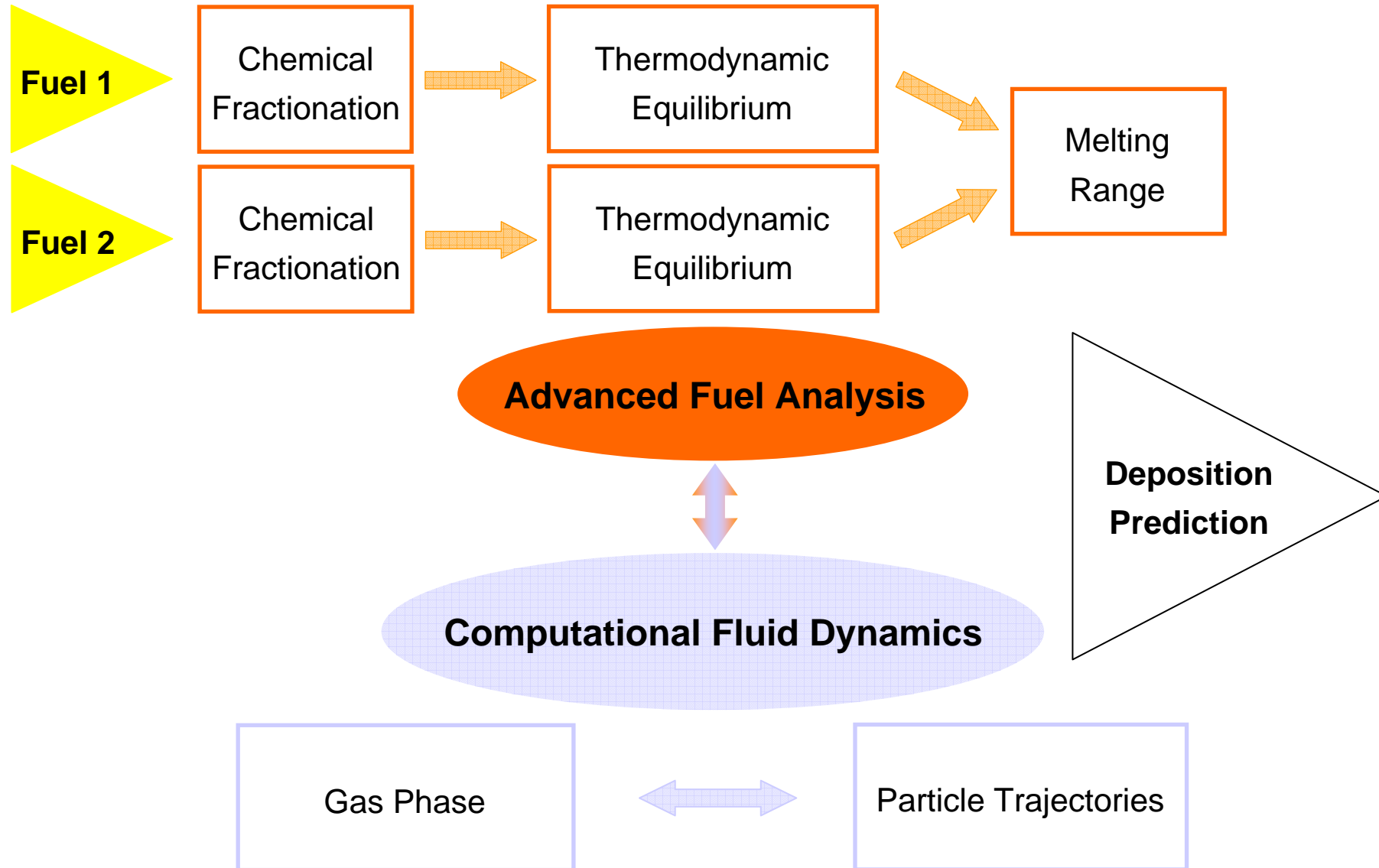
Chemical equilibrium calculation

Spruce Bark, "reactive flyash"





Stepwise leaching + chem.eq. + CFD



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