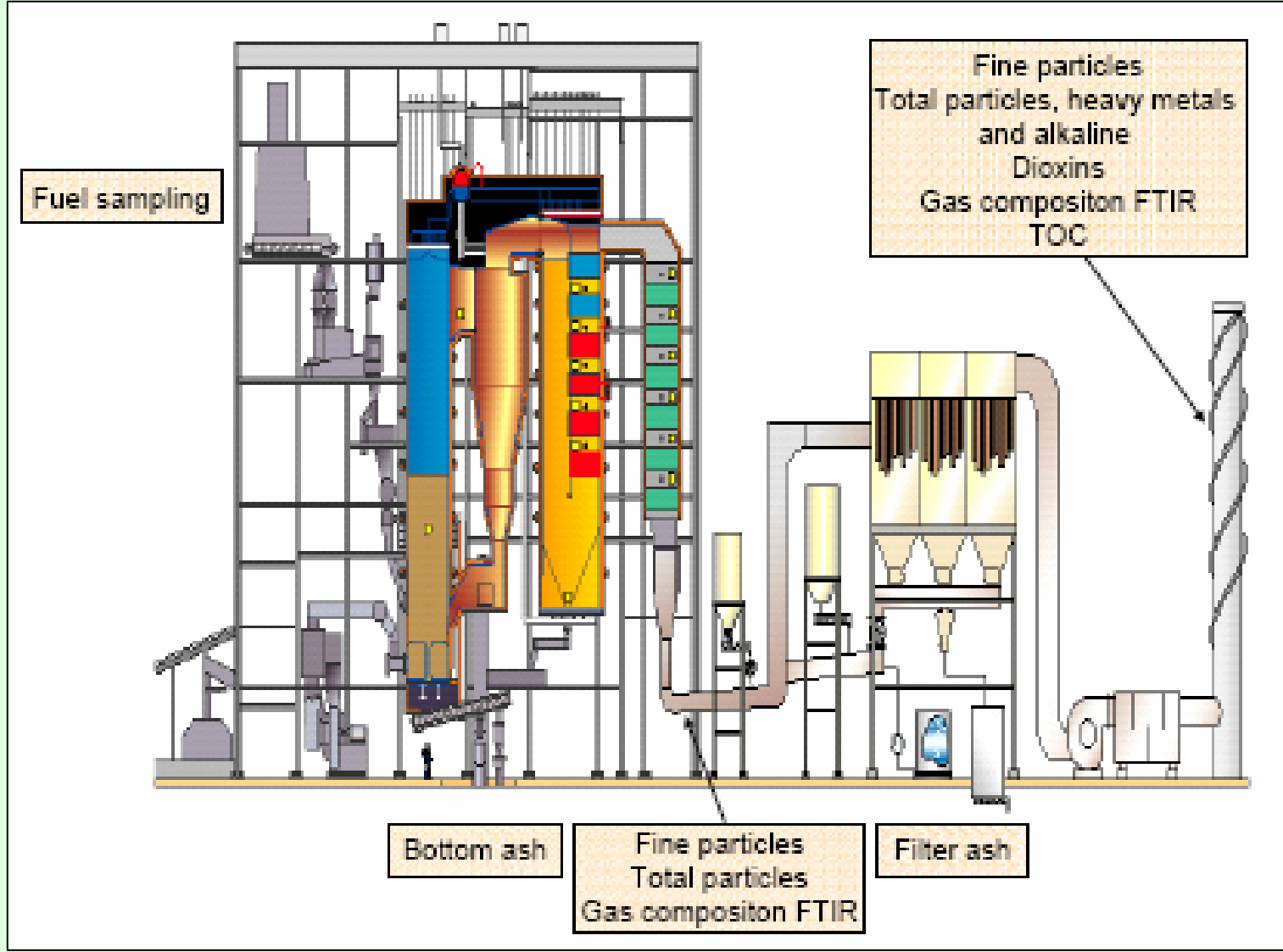


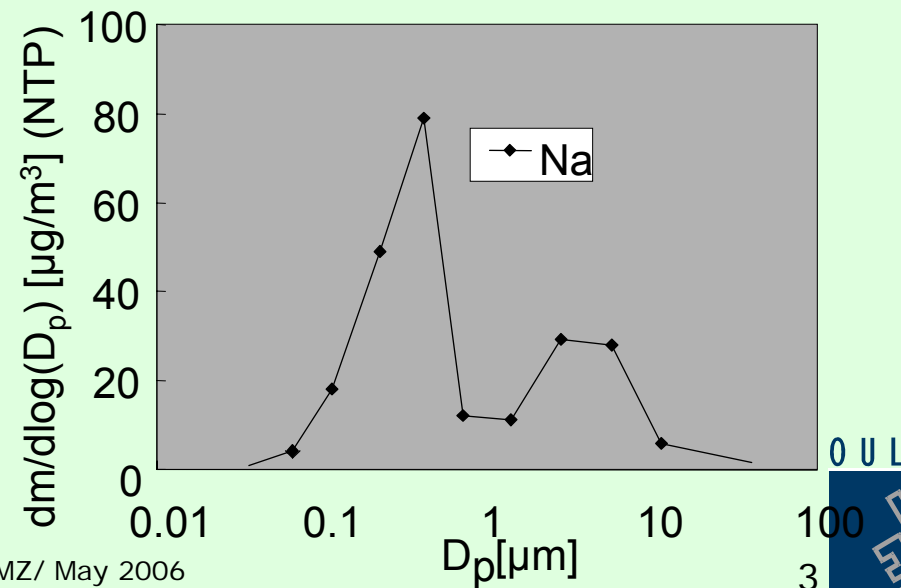
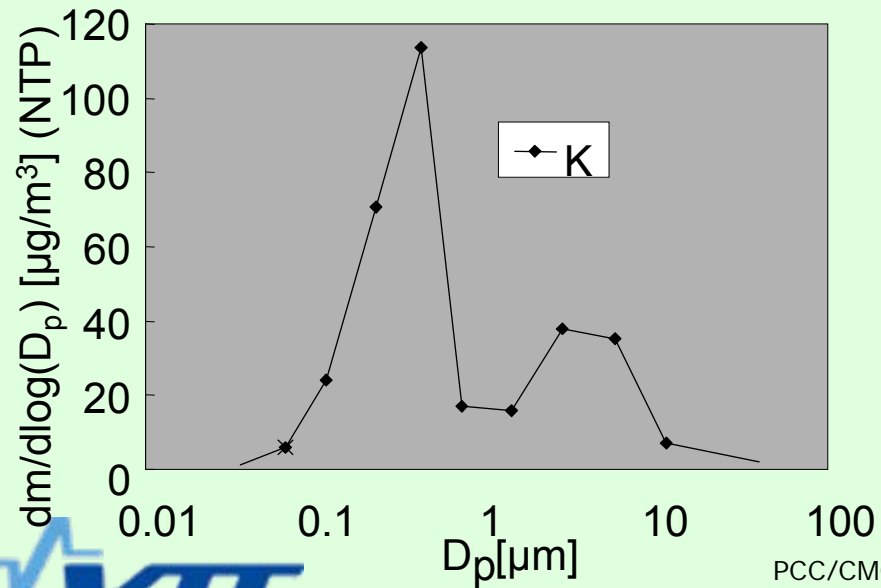
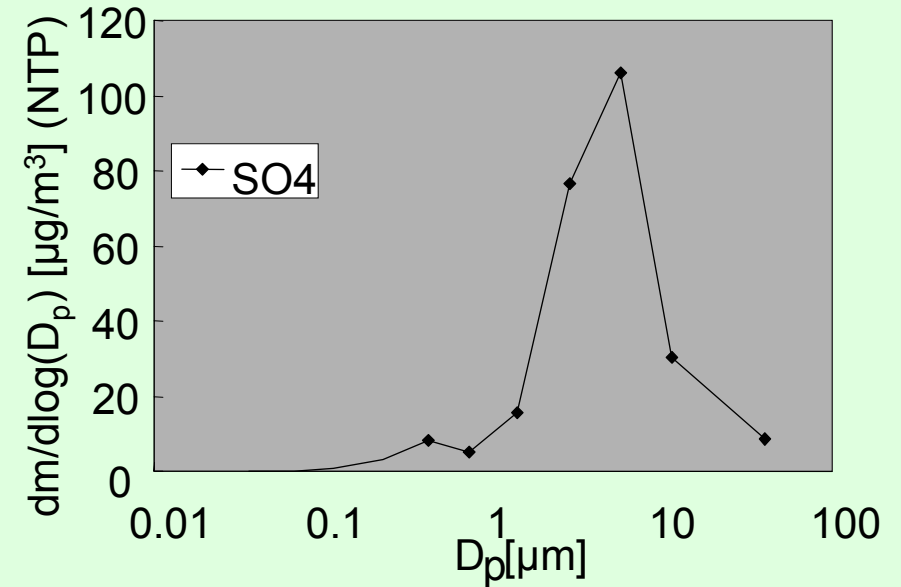
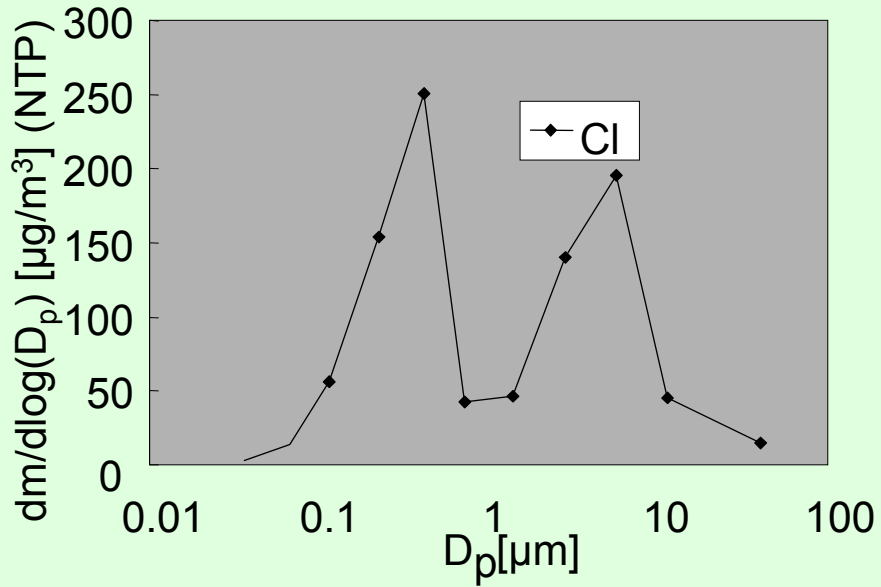
Heavy metals (EDD+Zn) in waste derived fuels for FBC

Maria Zevenhoven, Bengt-Johan Skrifvars, Mikko Hupa
Antero Moilanen, Carl Wilen
Terttaliisa Lind, Jouni Hokkinen, Jorma K. Jokiniemi
Heikki Ollila, Mia Tiainen, Risto Laitinen

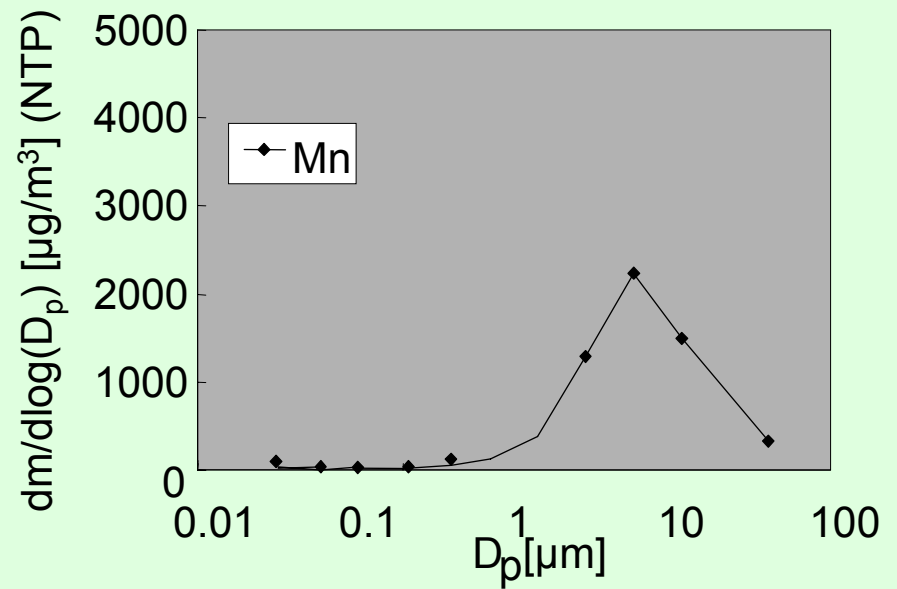
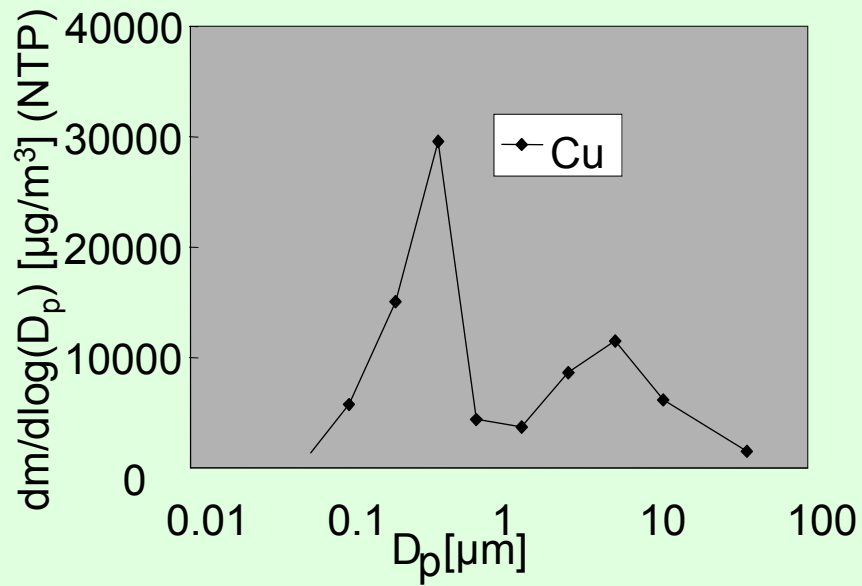
CFB plant



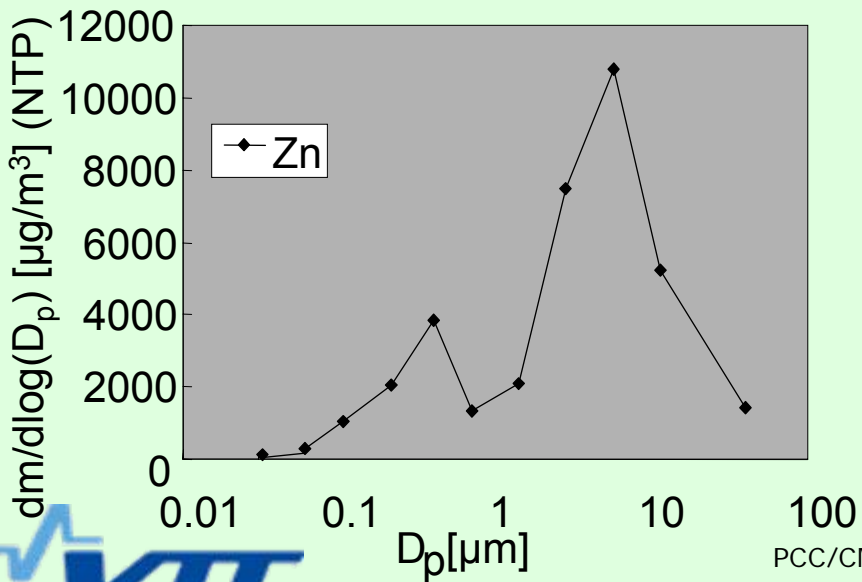
Combustion 1MW CFB



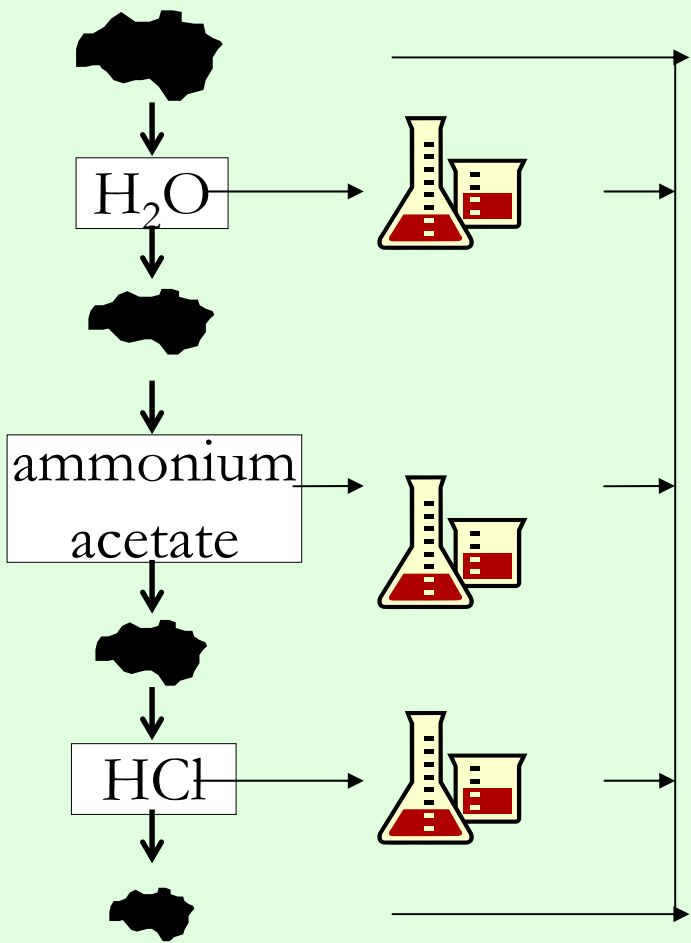
Combustion 1MW CFB



Cr not in fly ash



Chemical fractionation

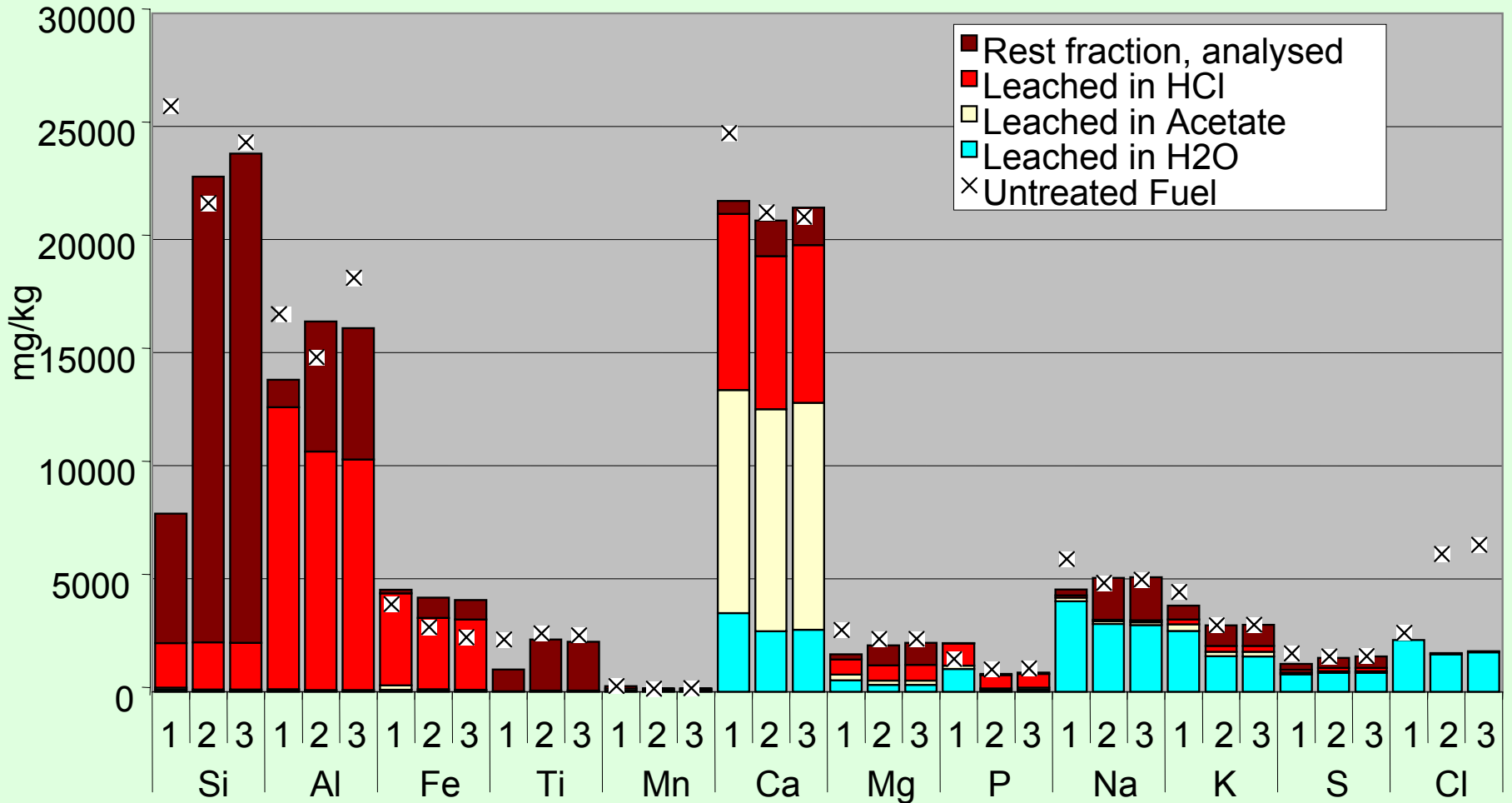


Analysis

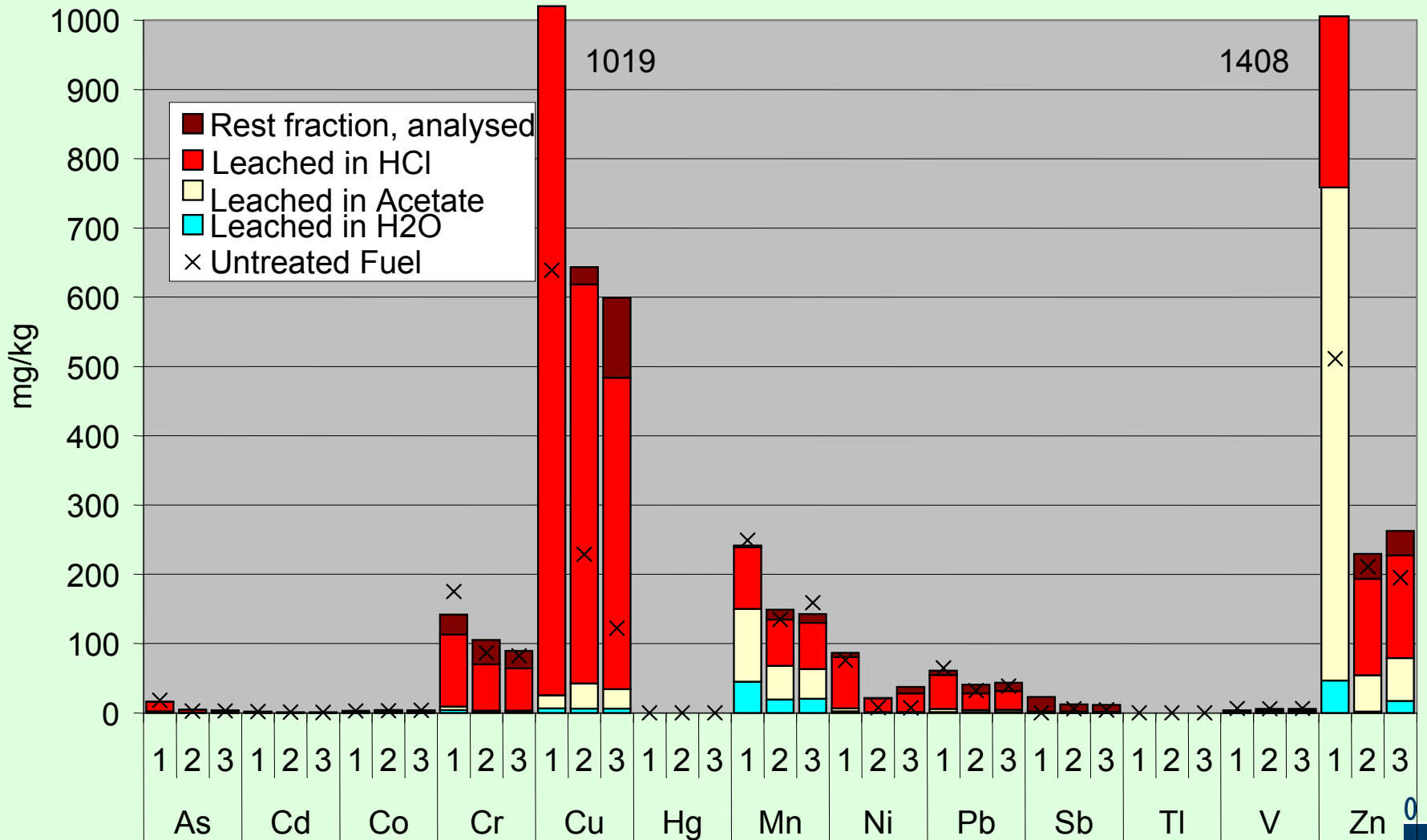
- all major ash elements
- alkali sulfates/
carbonates,
chlorides
- exchangeable
some CaCO₃
- carbonates,
sulfates
- silicates, insoluble
rest

heavy metals?

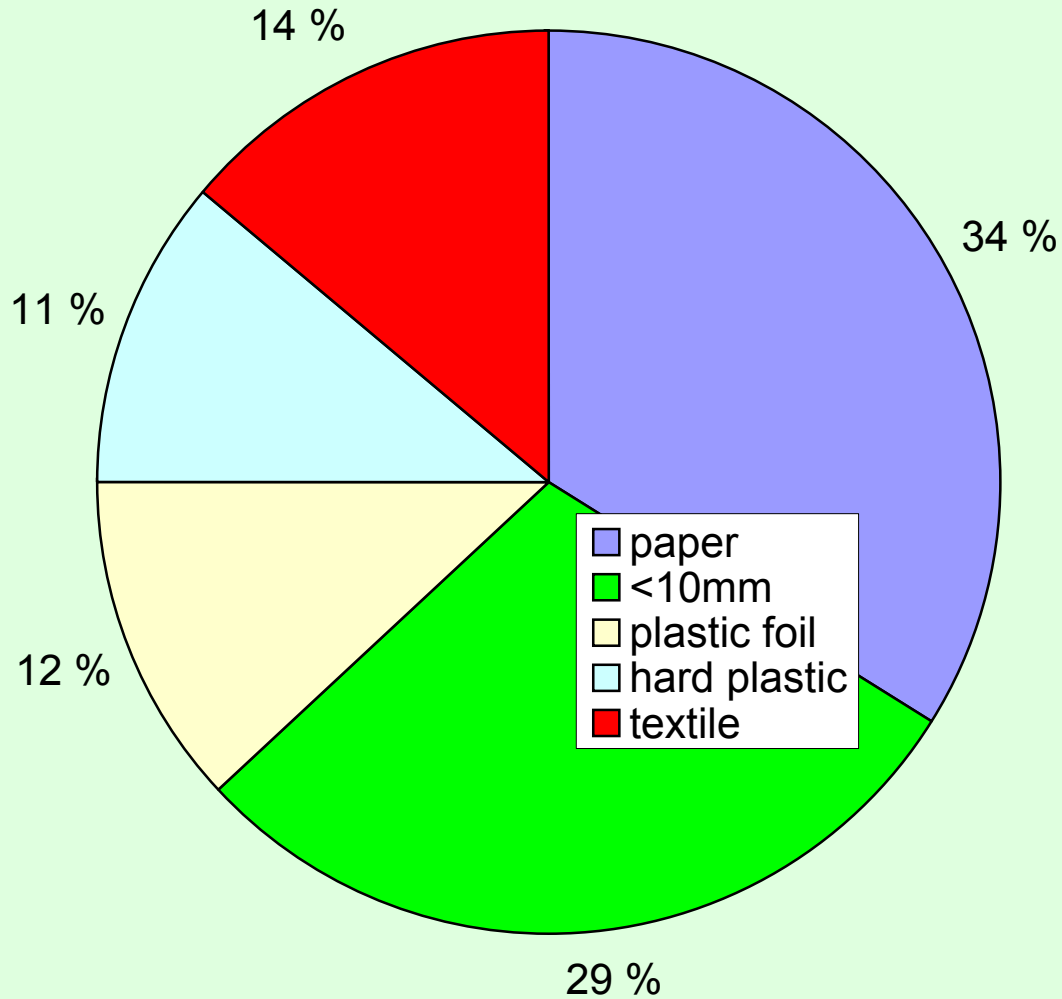
PCC/CMC/MZ/ May 2006



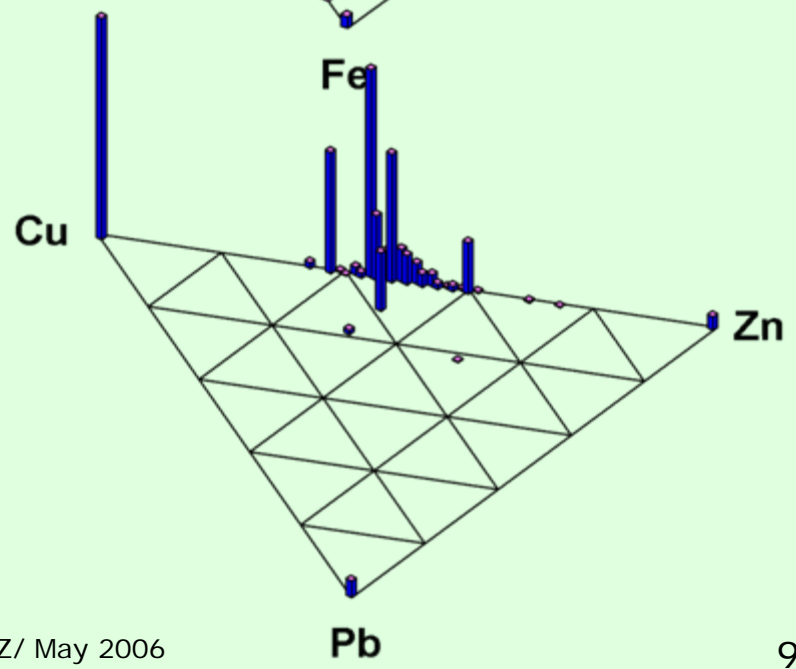
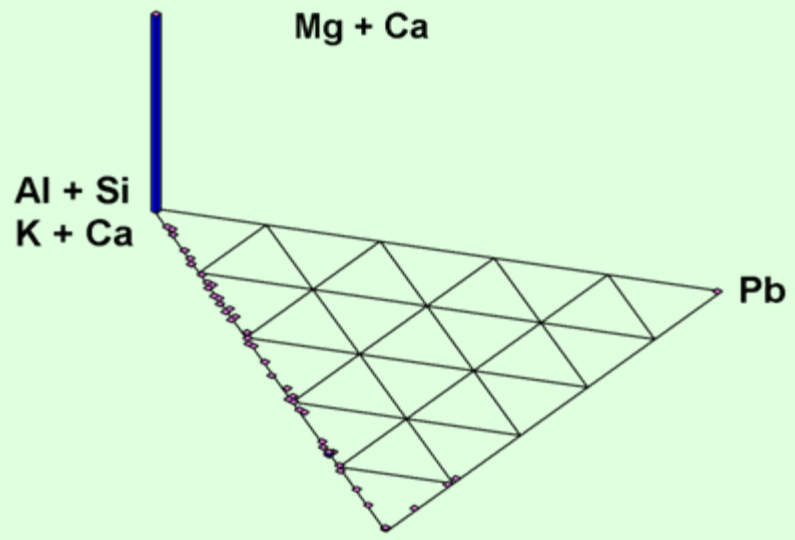
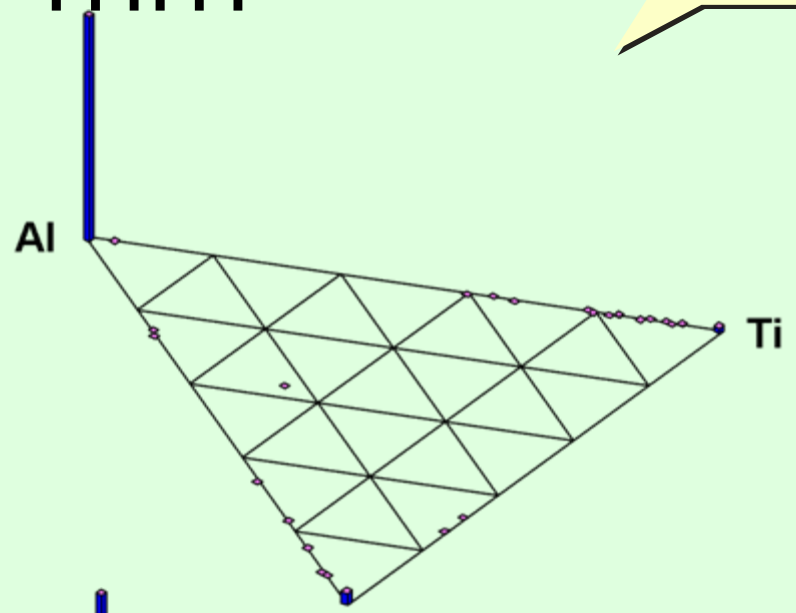
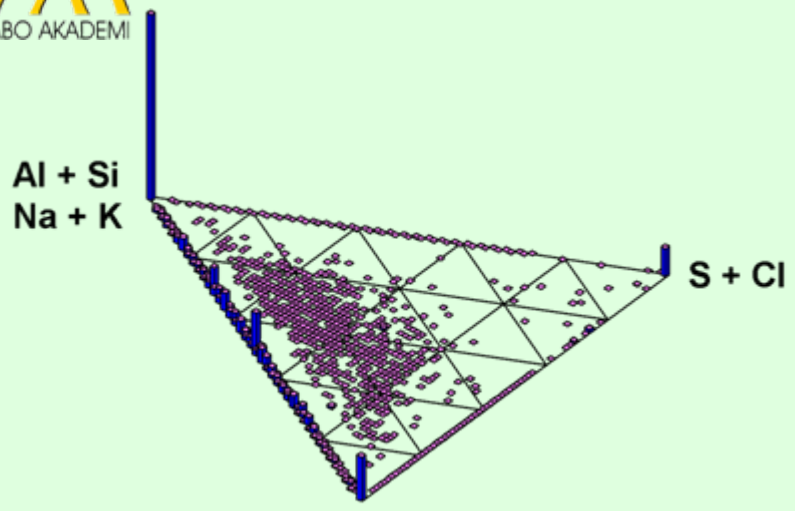
Heavy metals



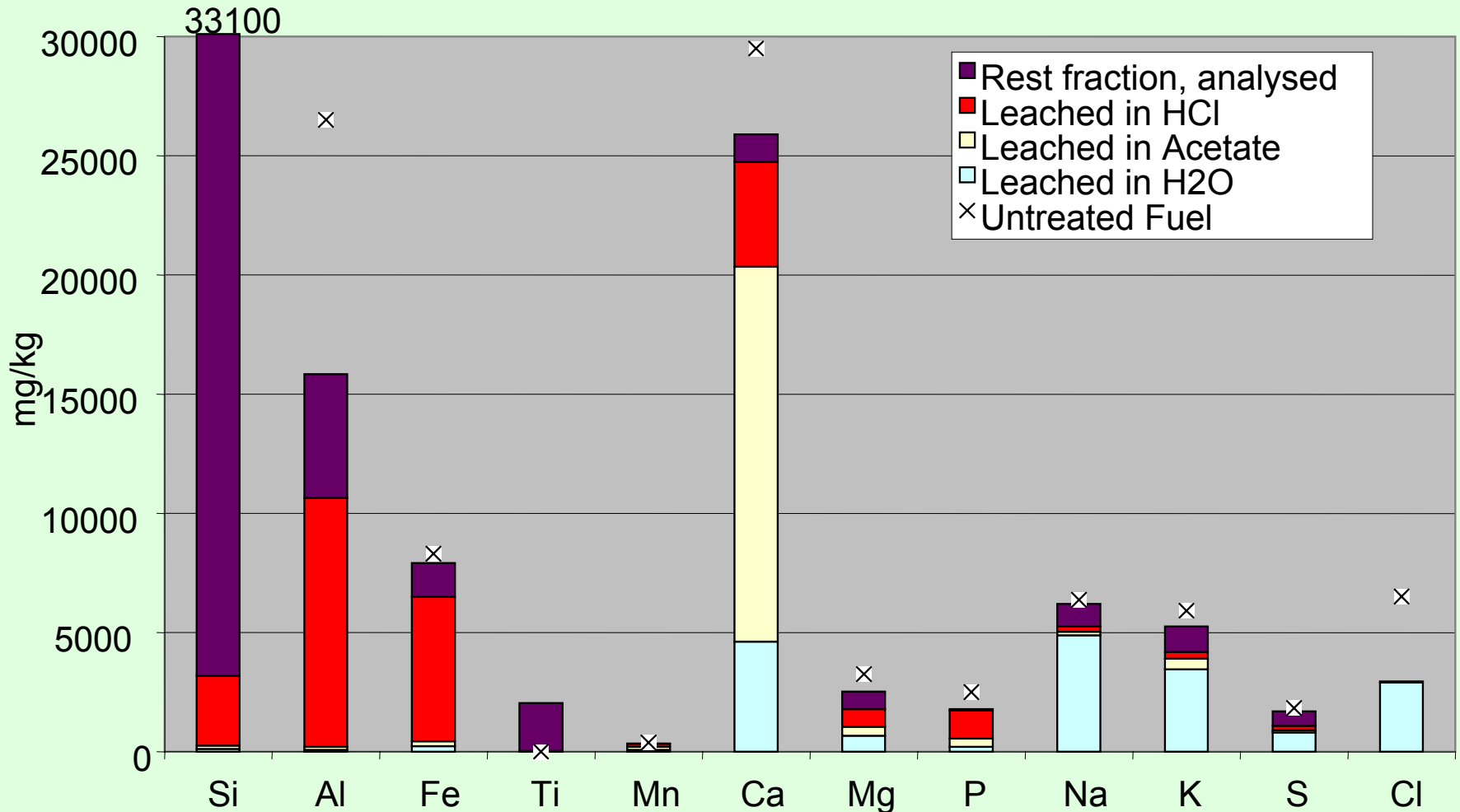
Picked fractions



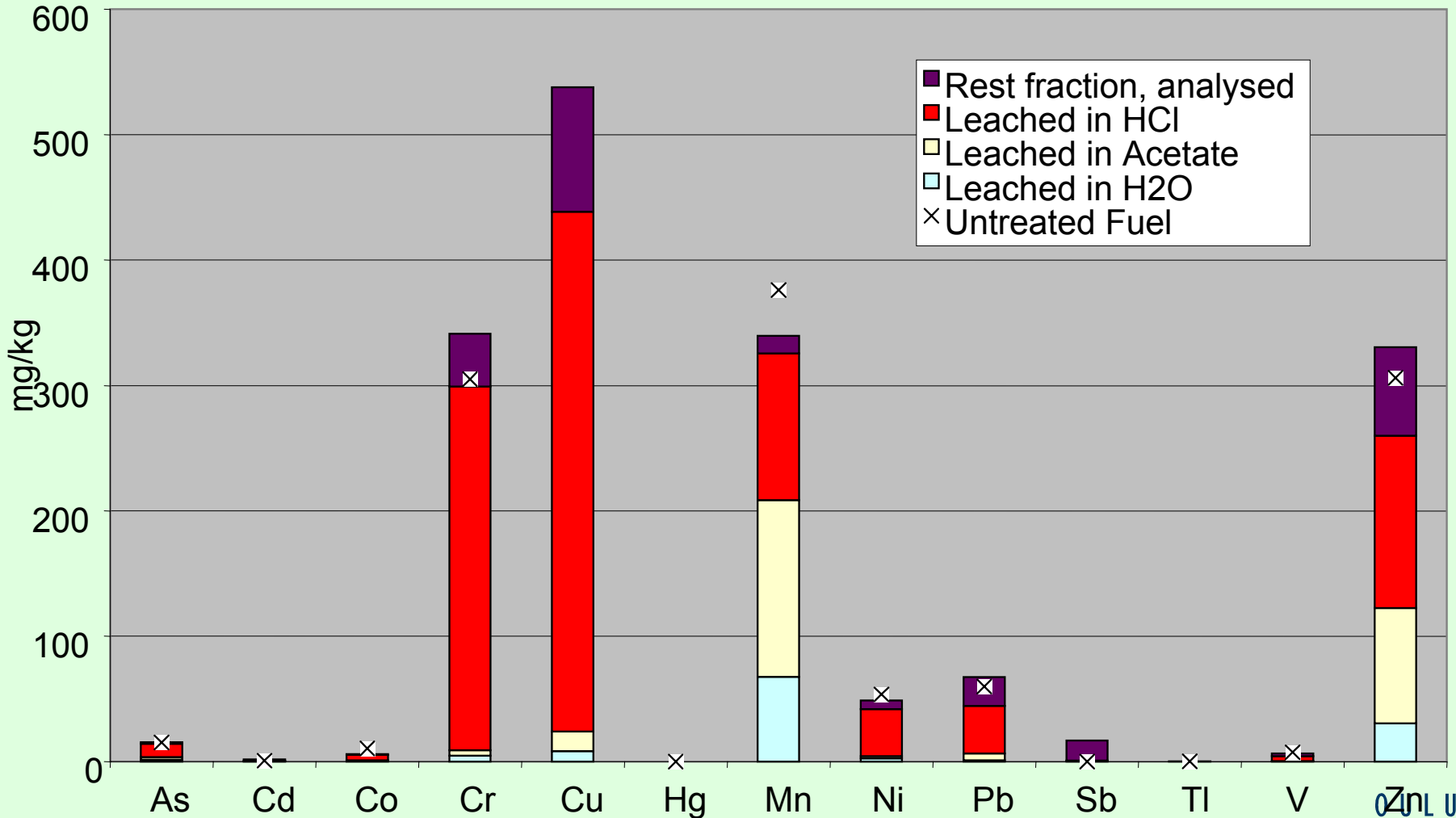
< 10 mm



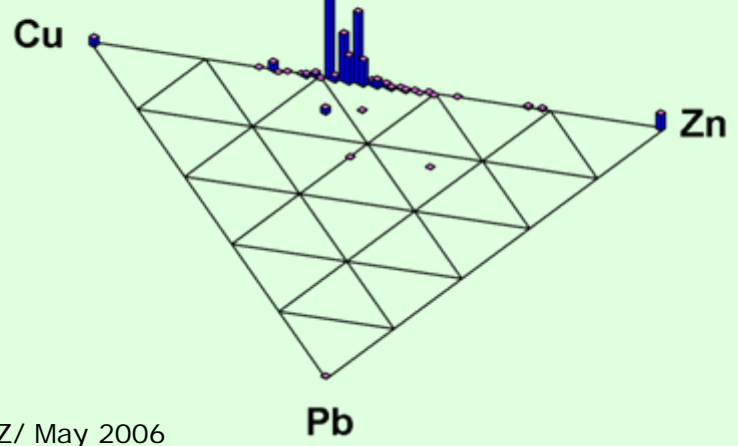
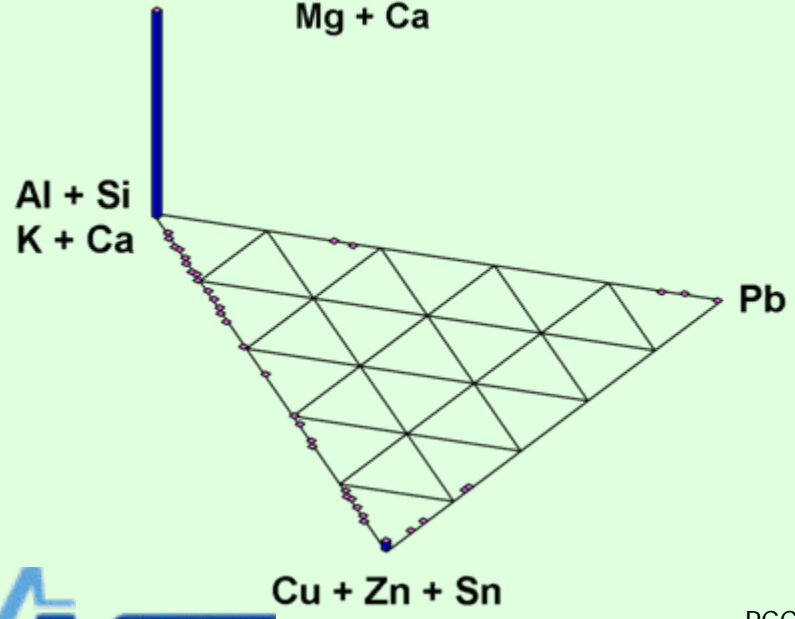
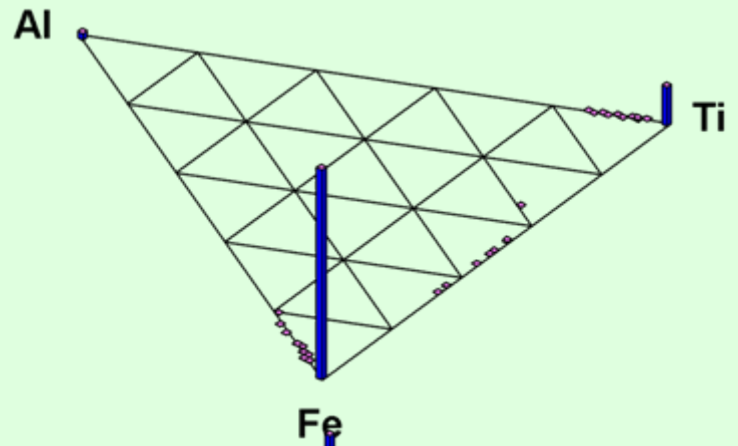
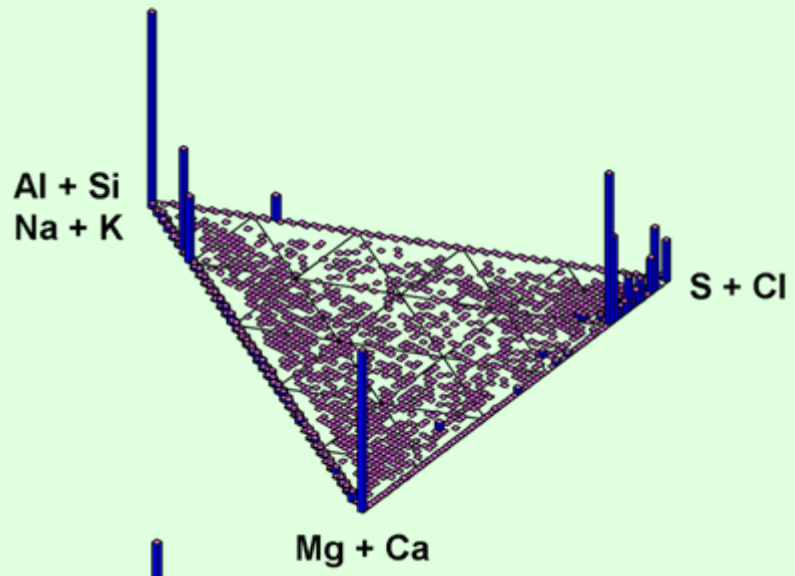
< 10 mm

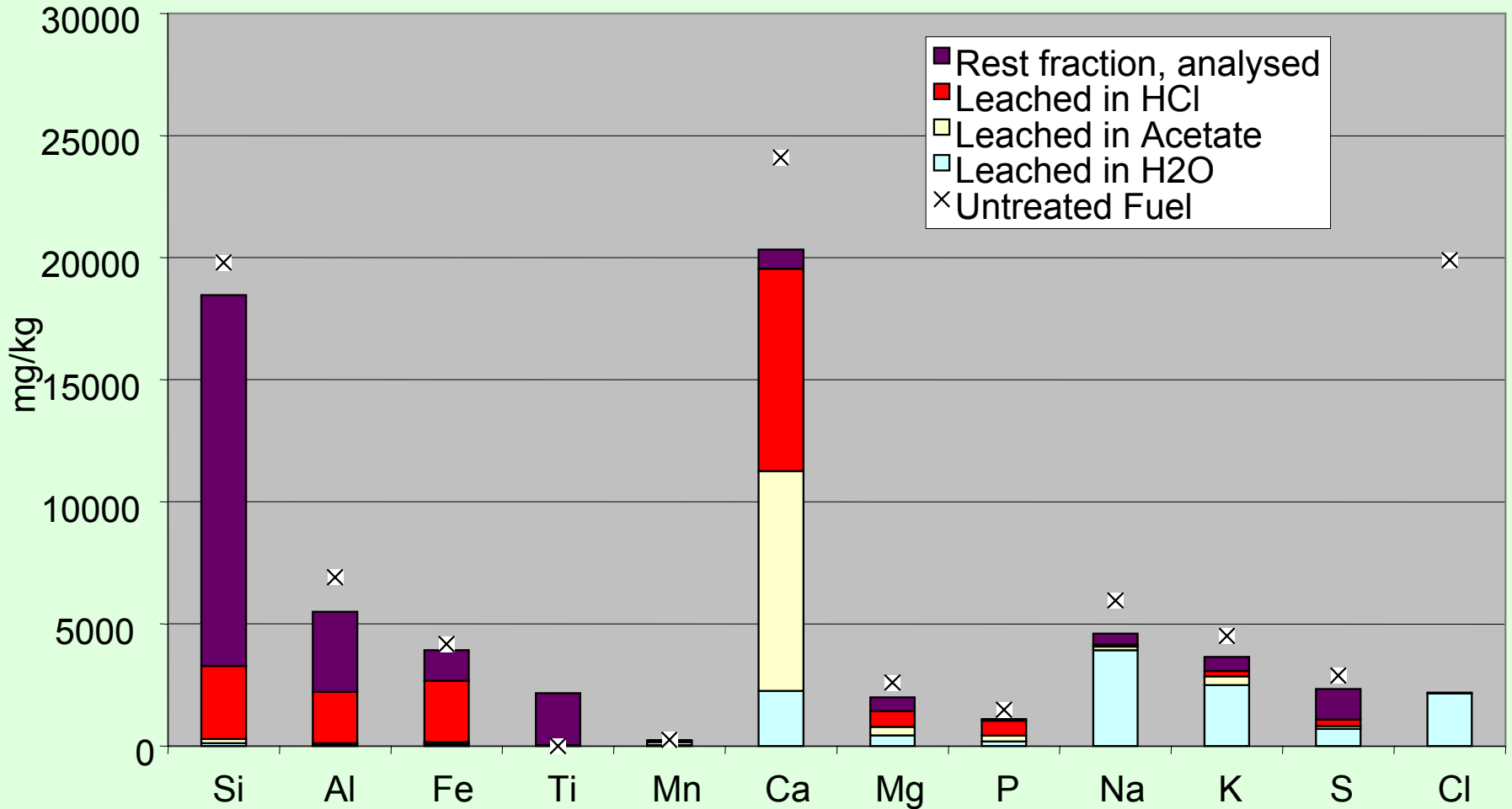


< 10 mm

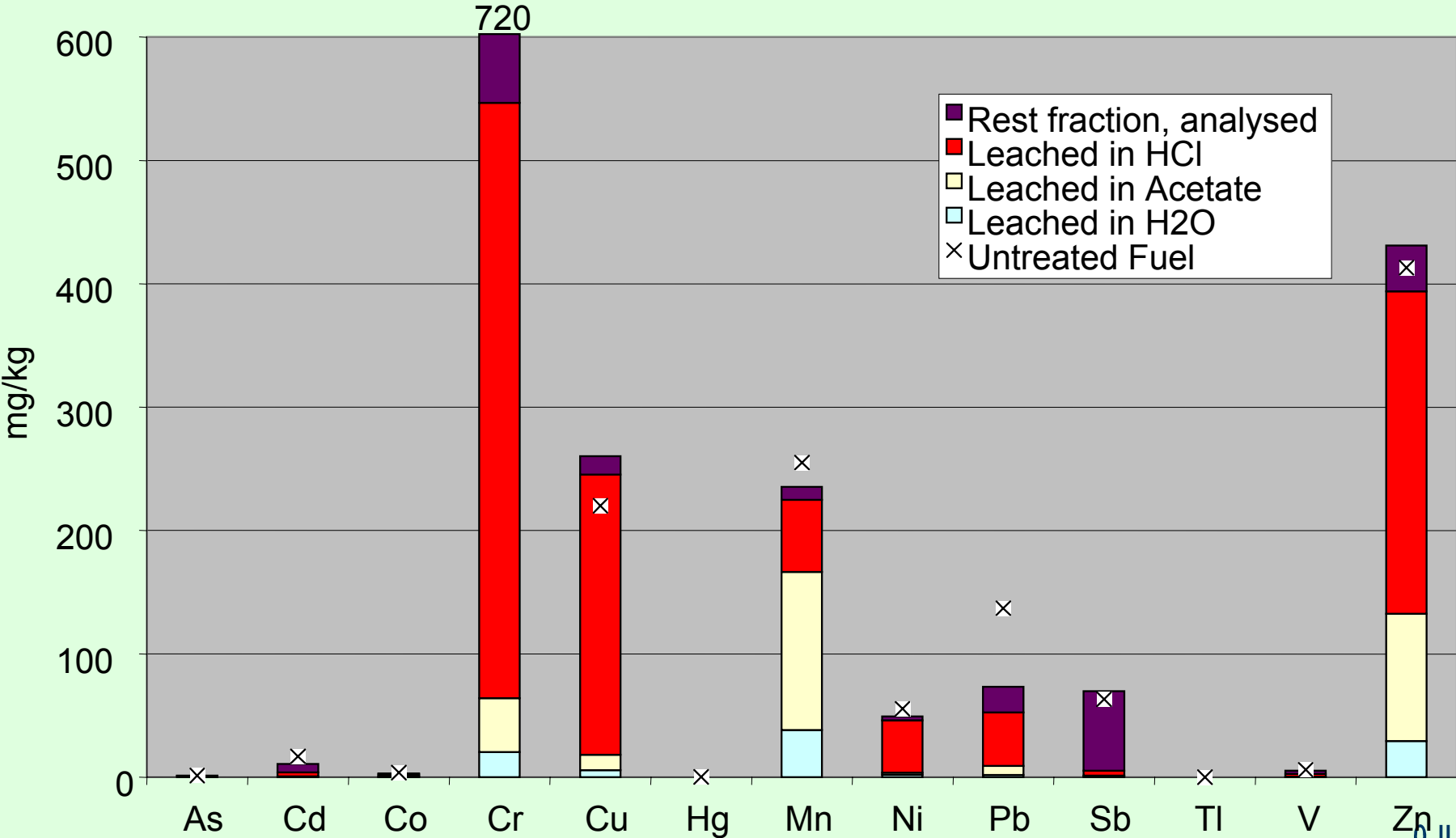


Textile

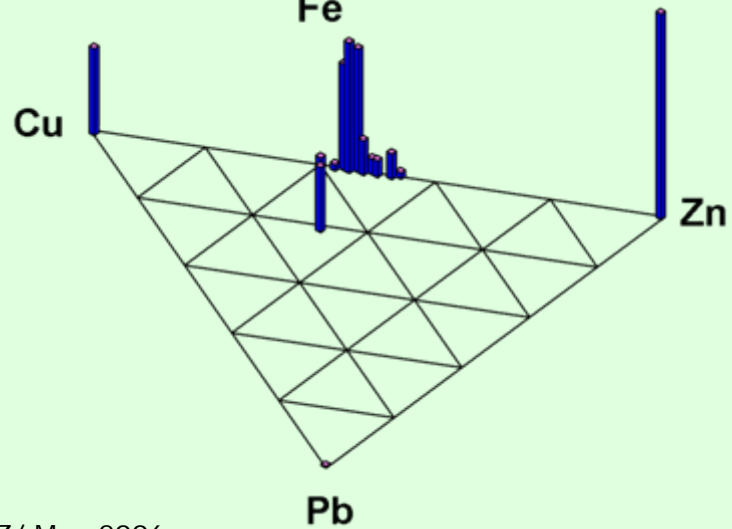
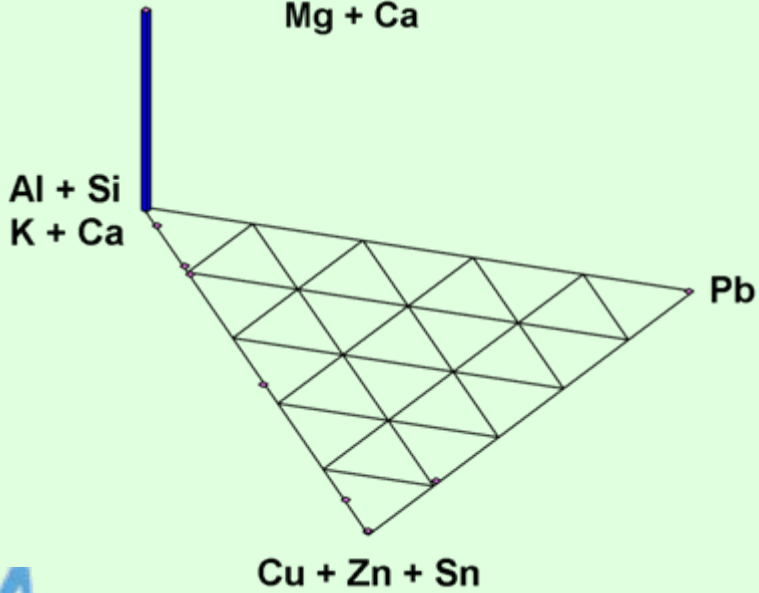
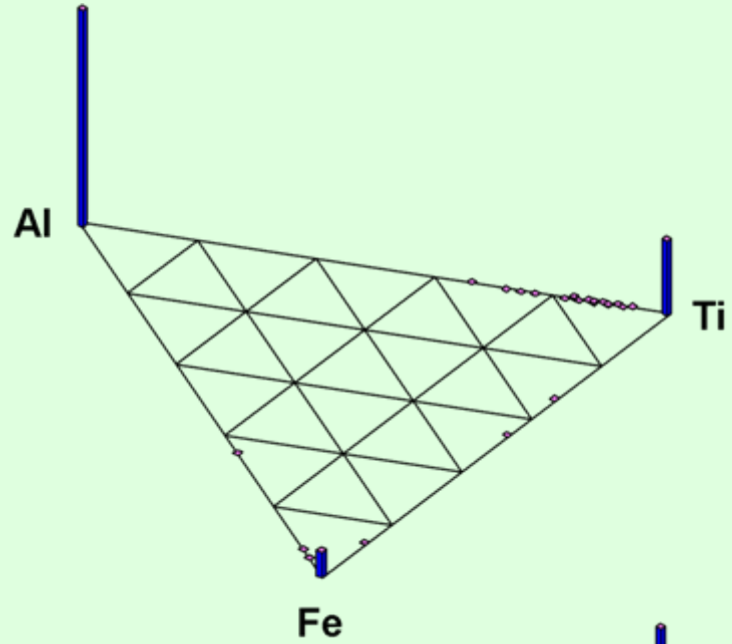
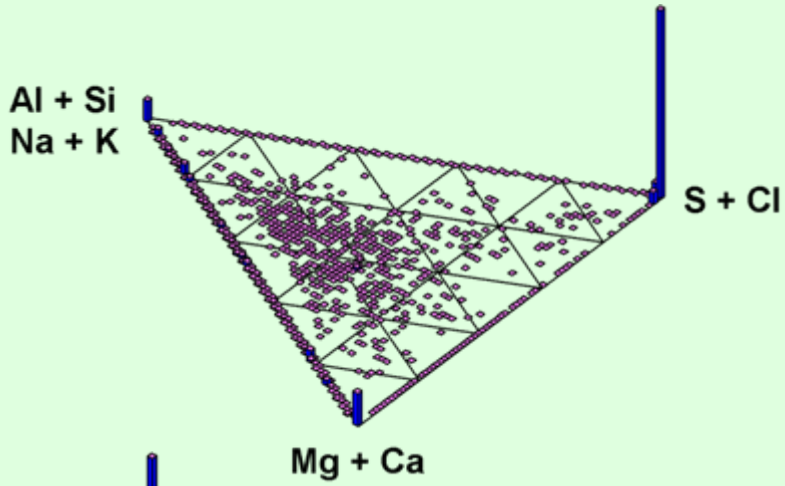




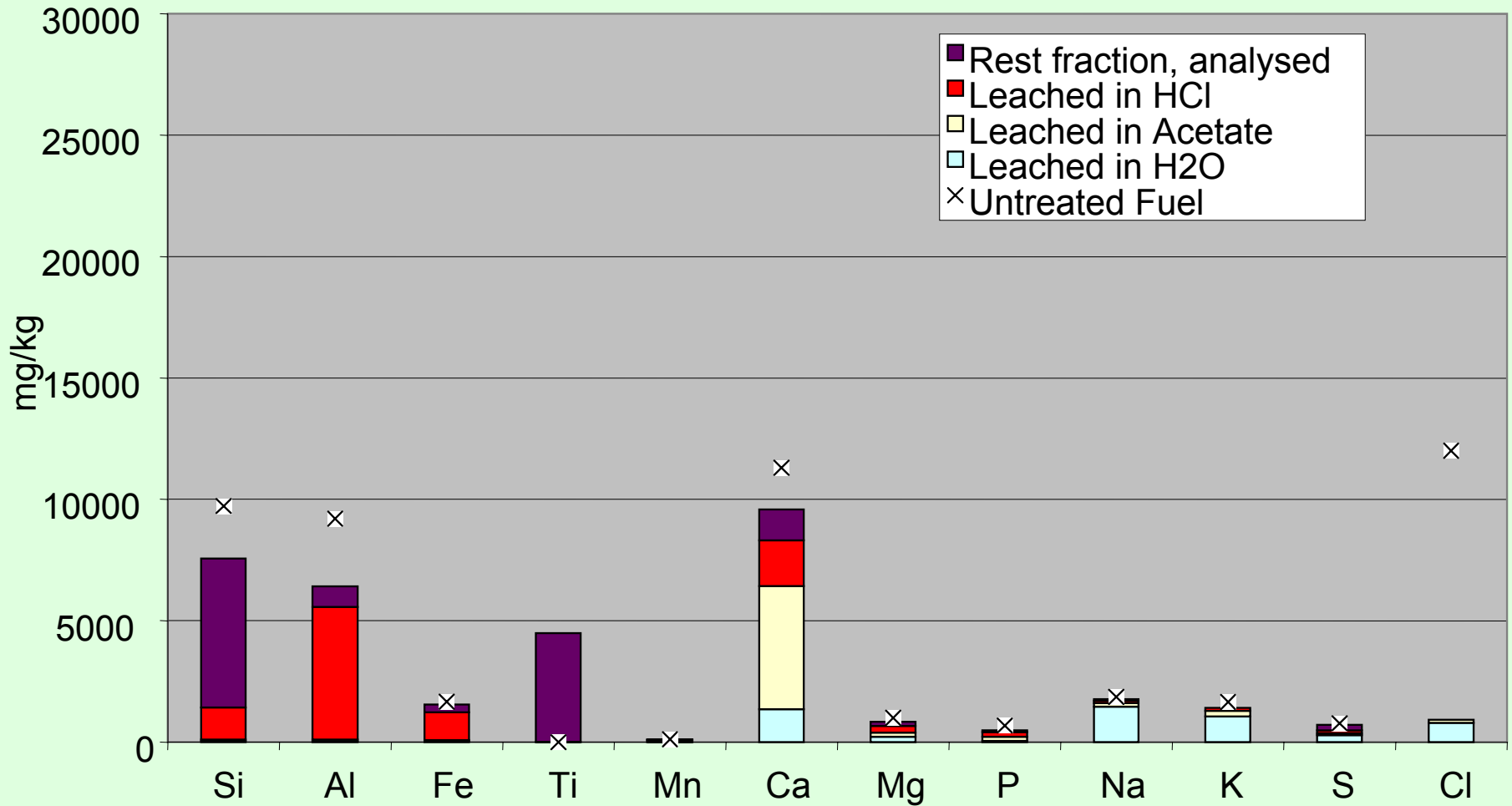
Textile



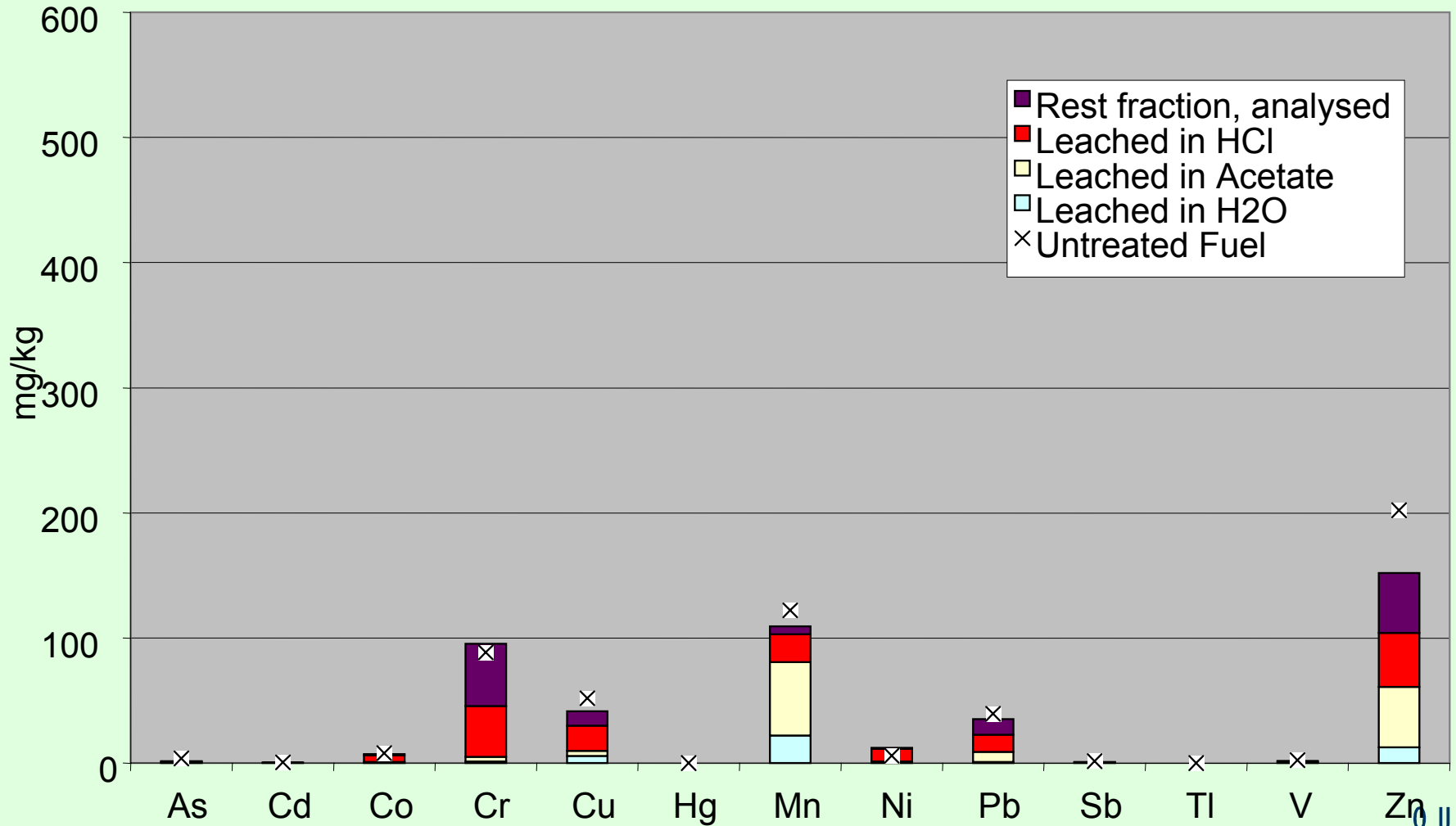
Plastic foil



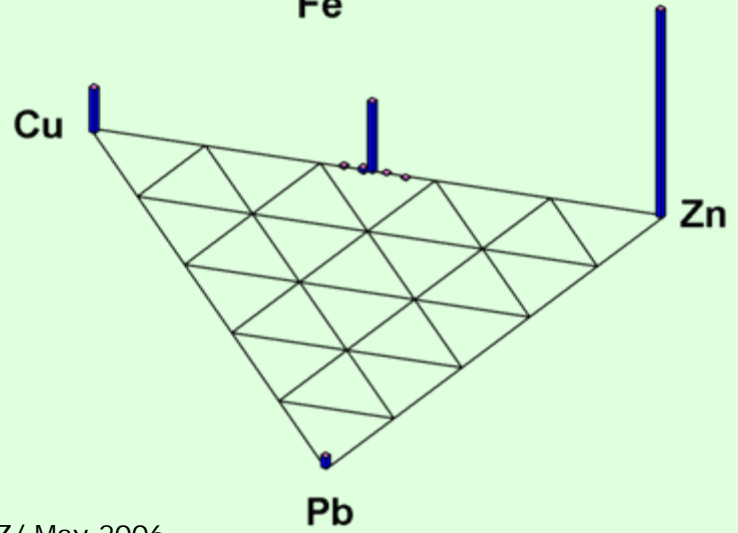
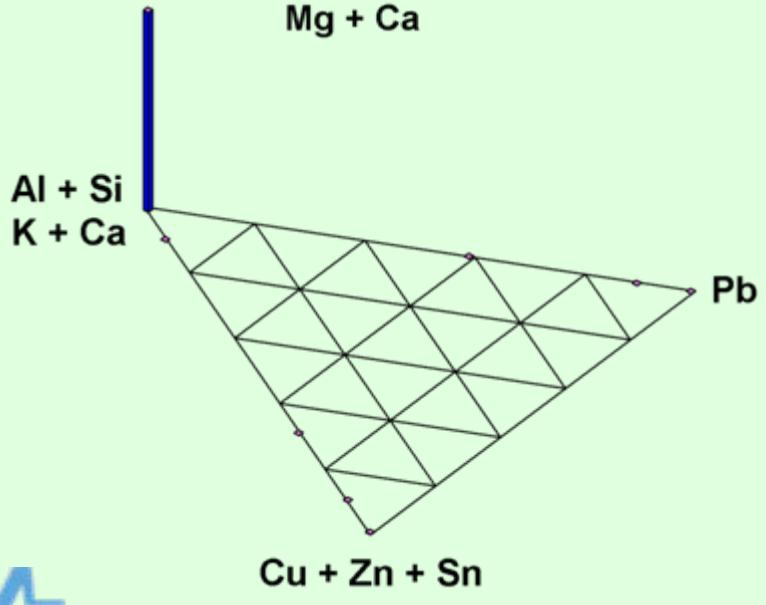
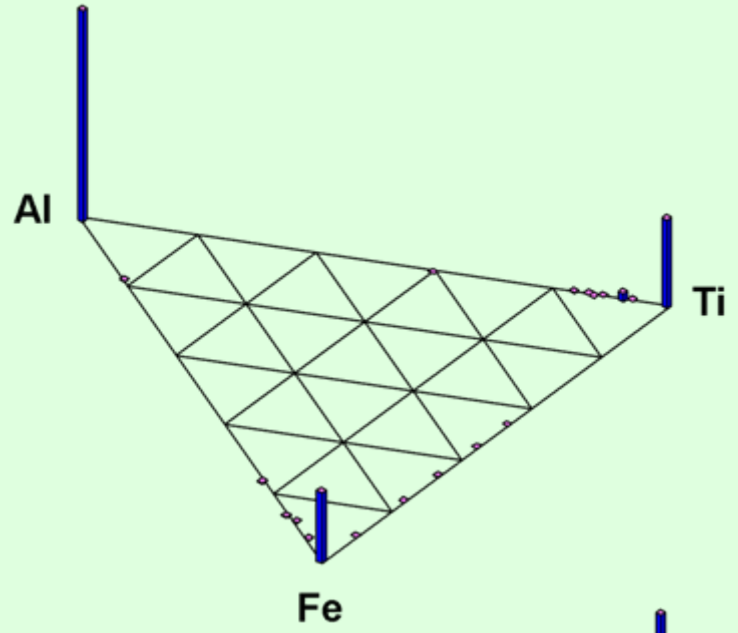
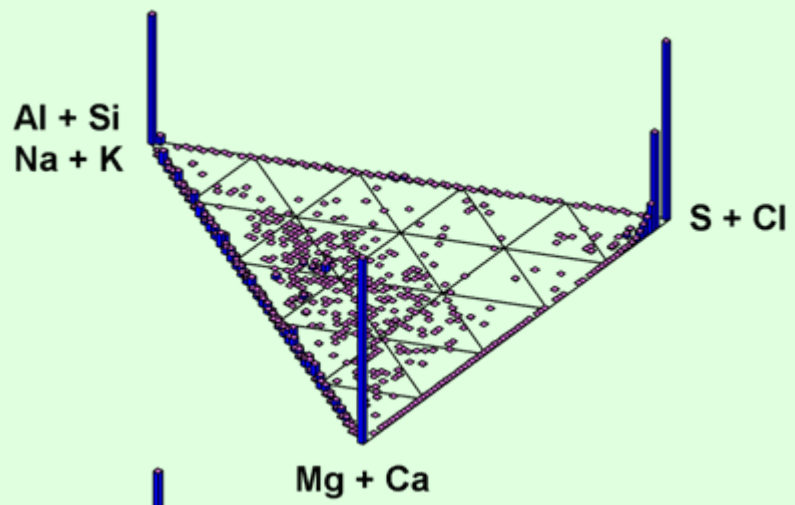
Plastic foil



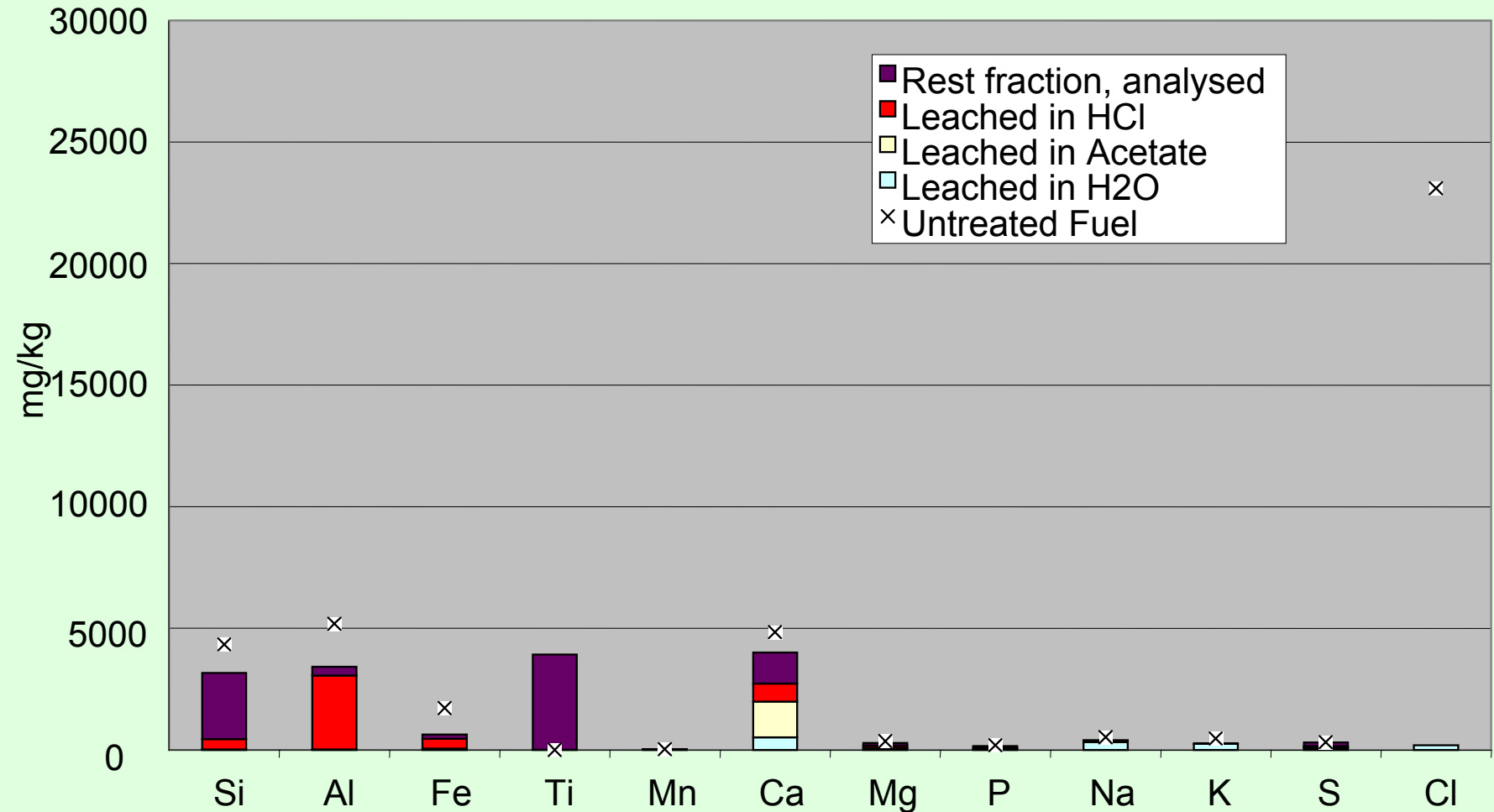
Plastic foil



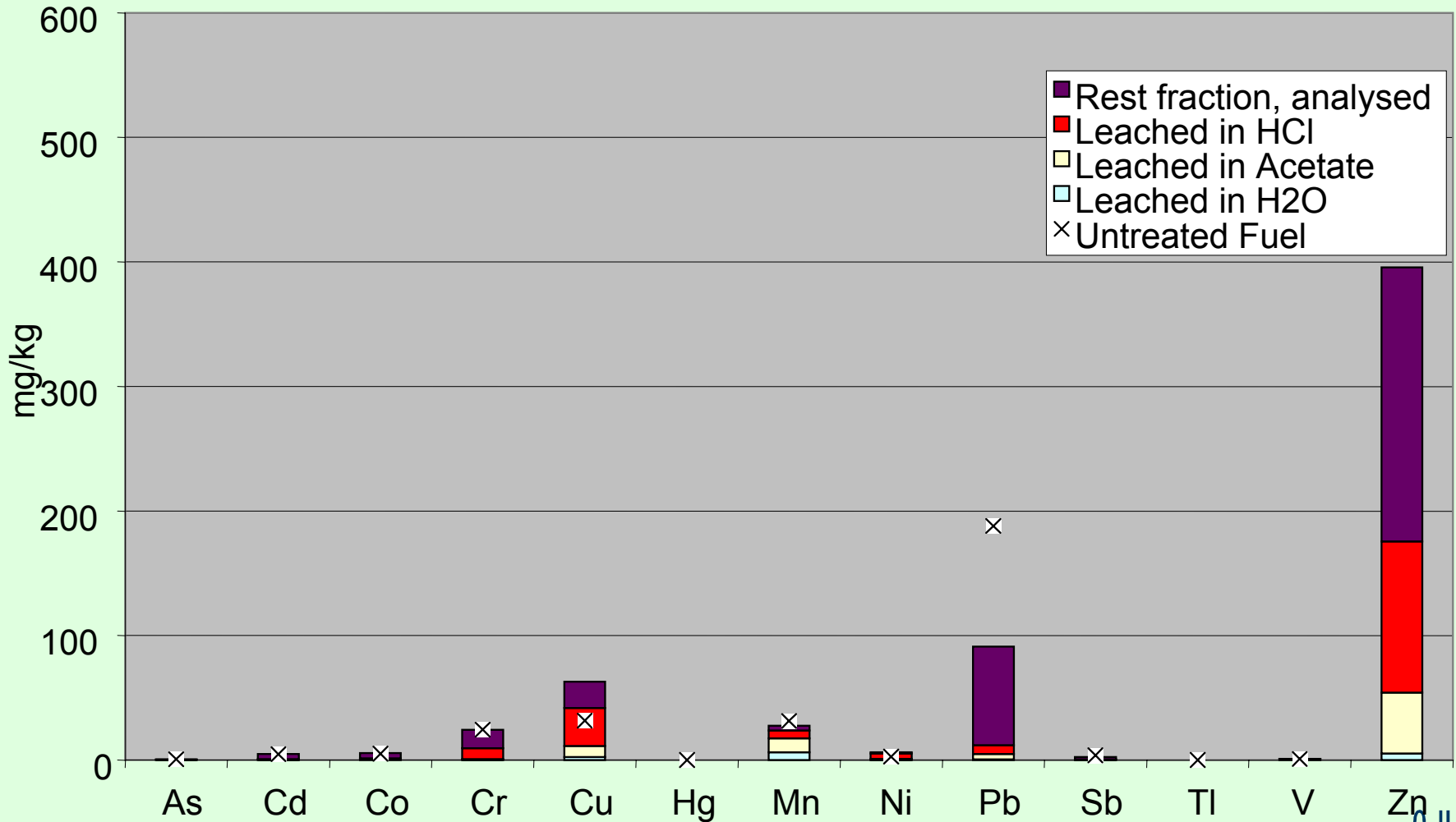
Hard plastic

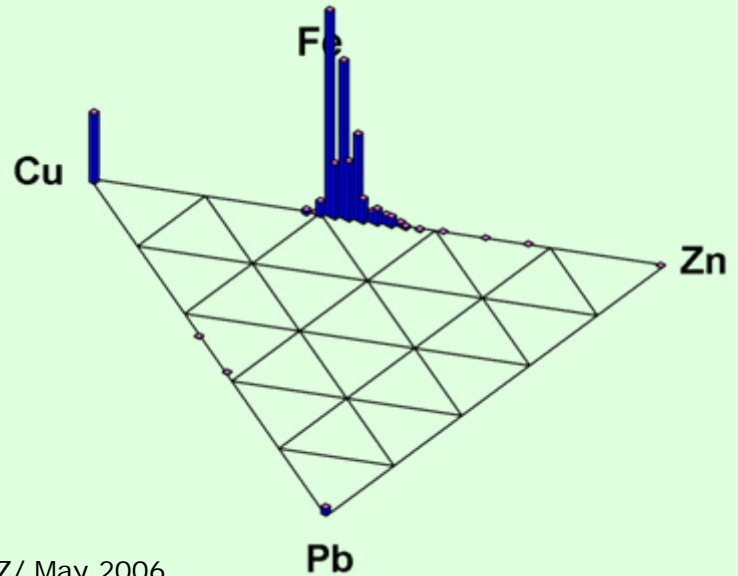
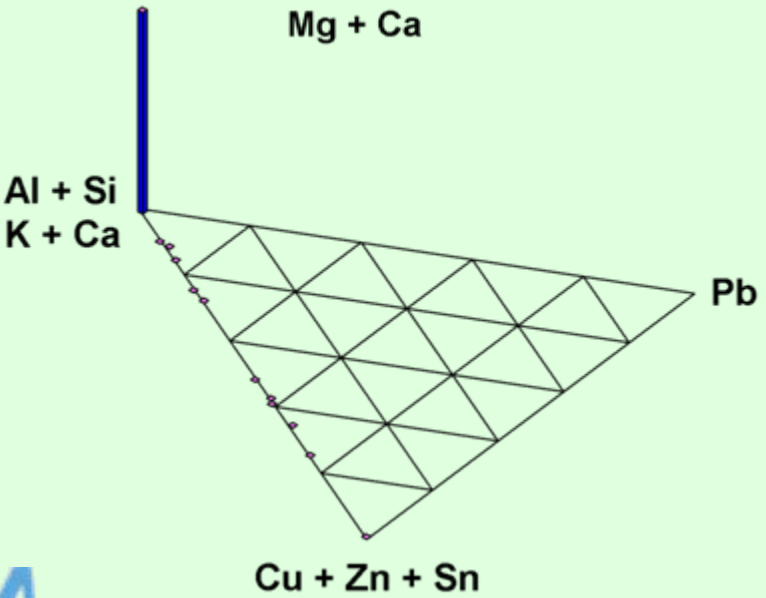
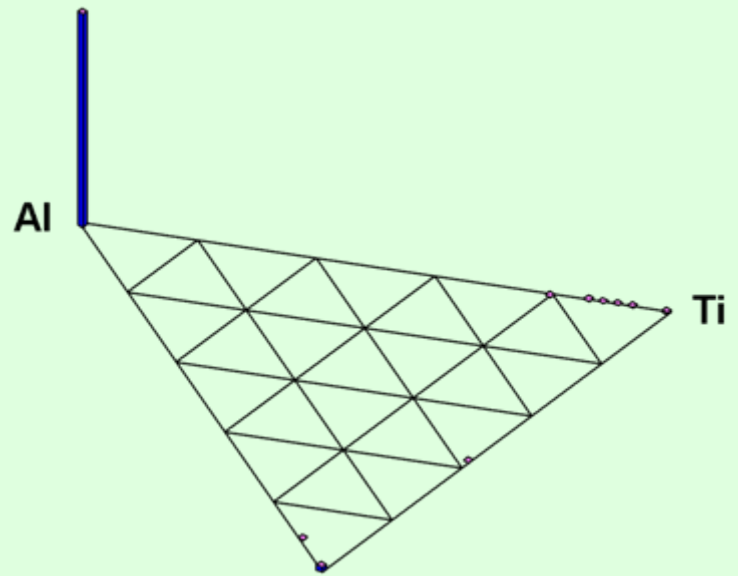
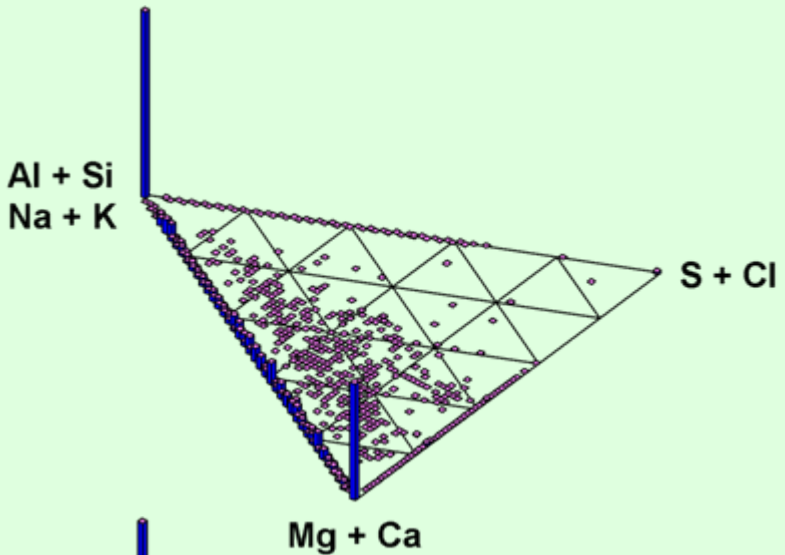


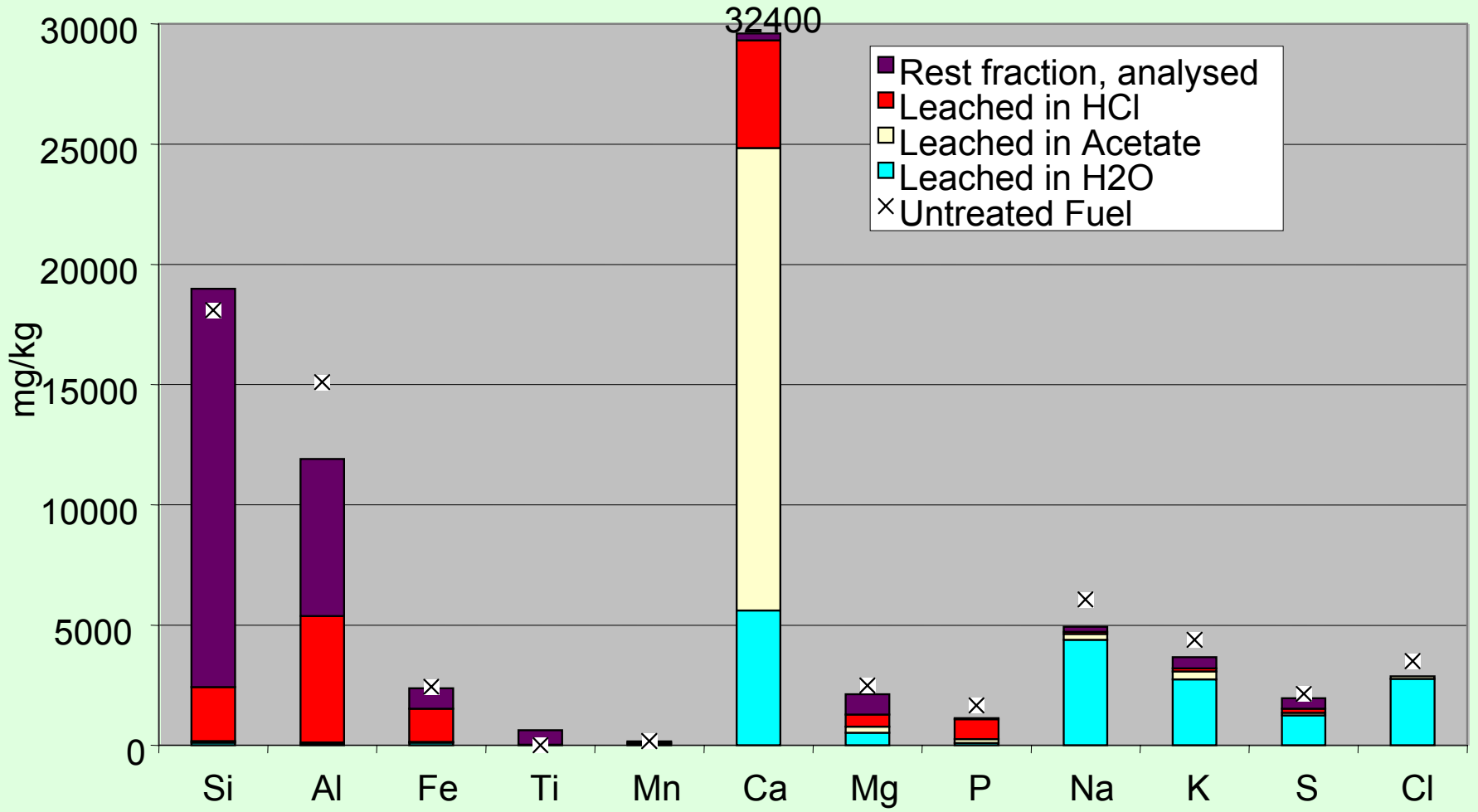
Hard plastic

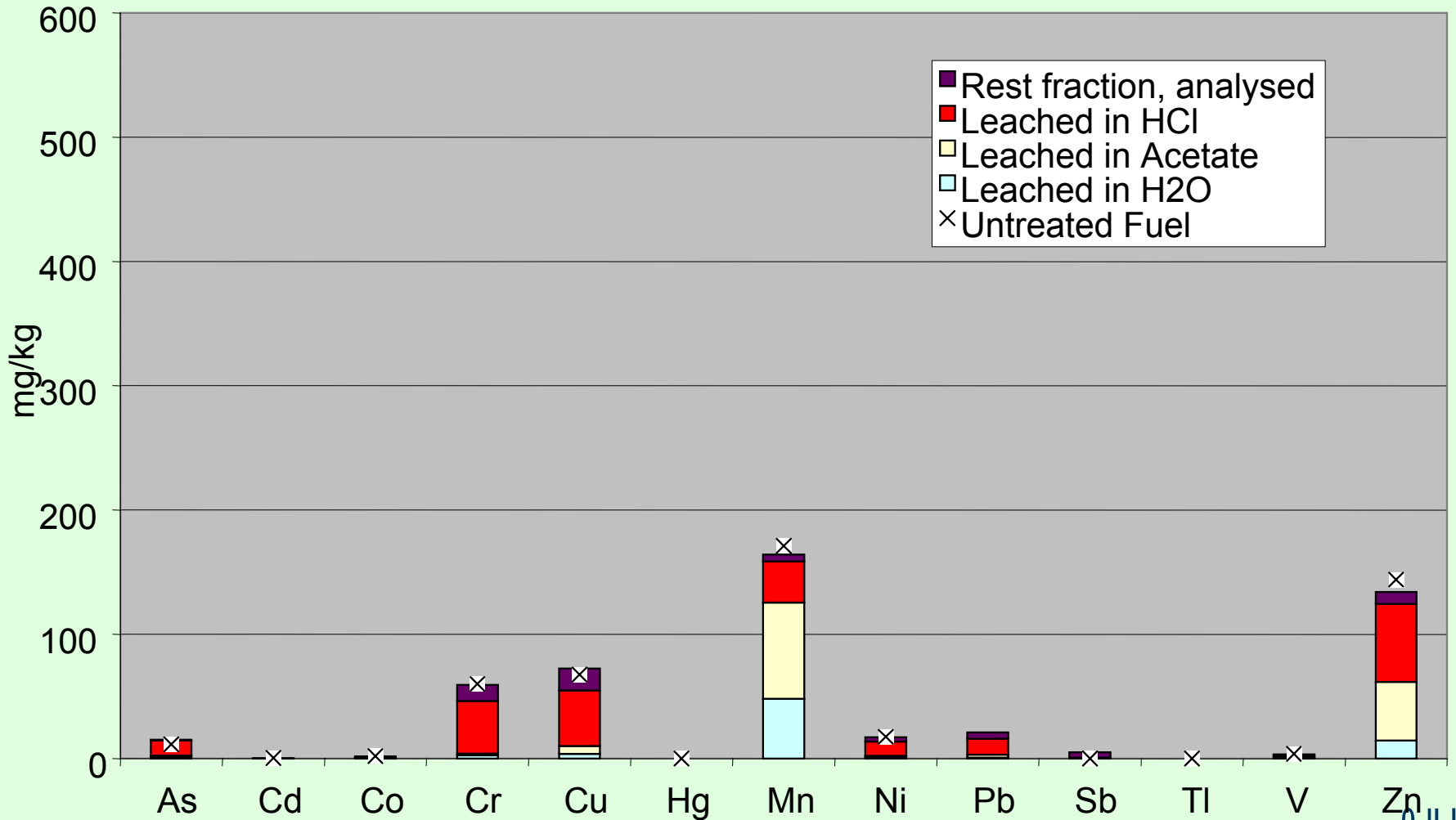


Hard plastic

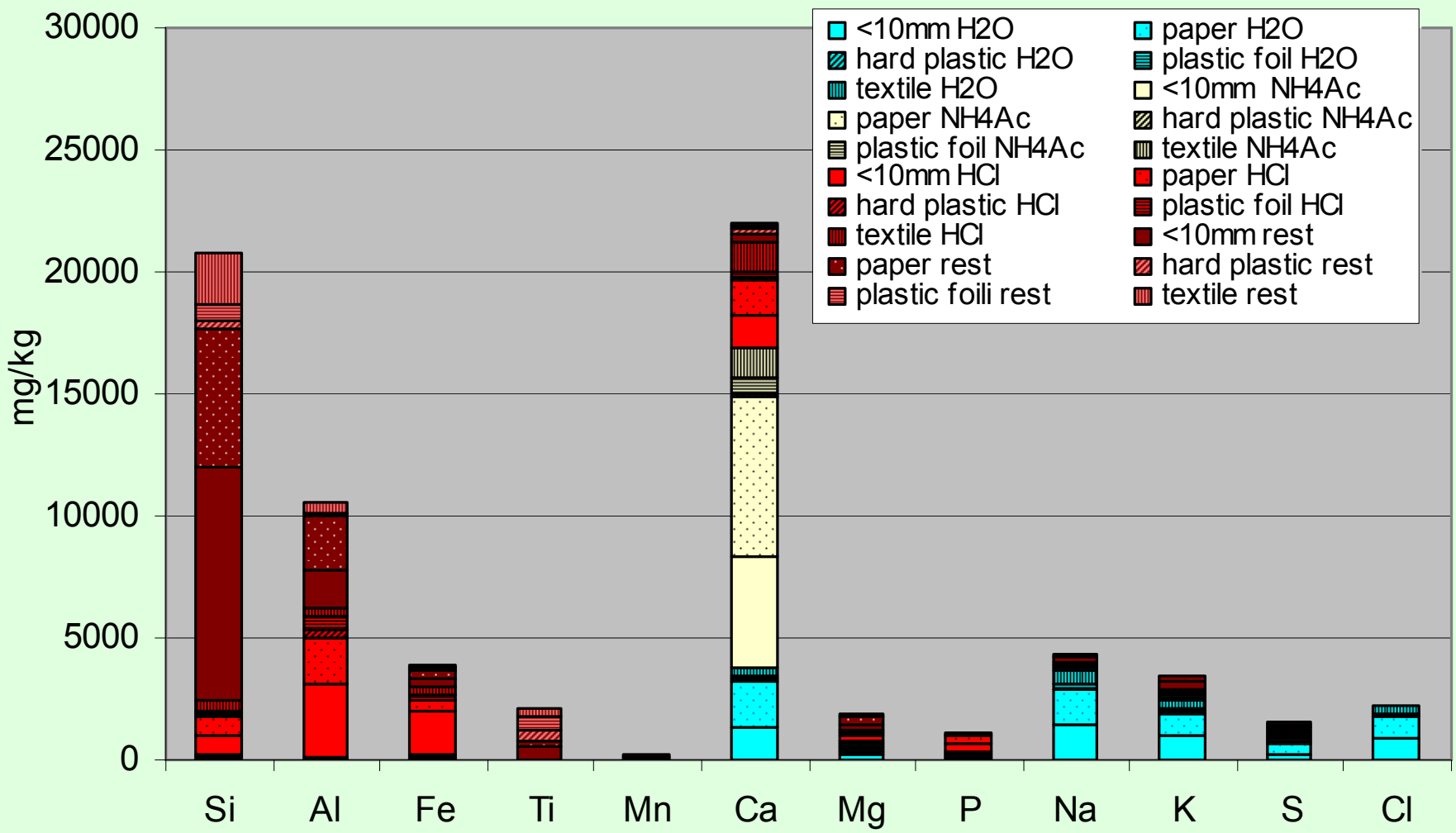




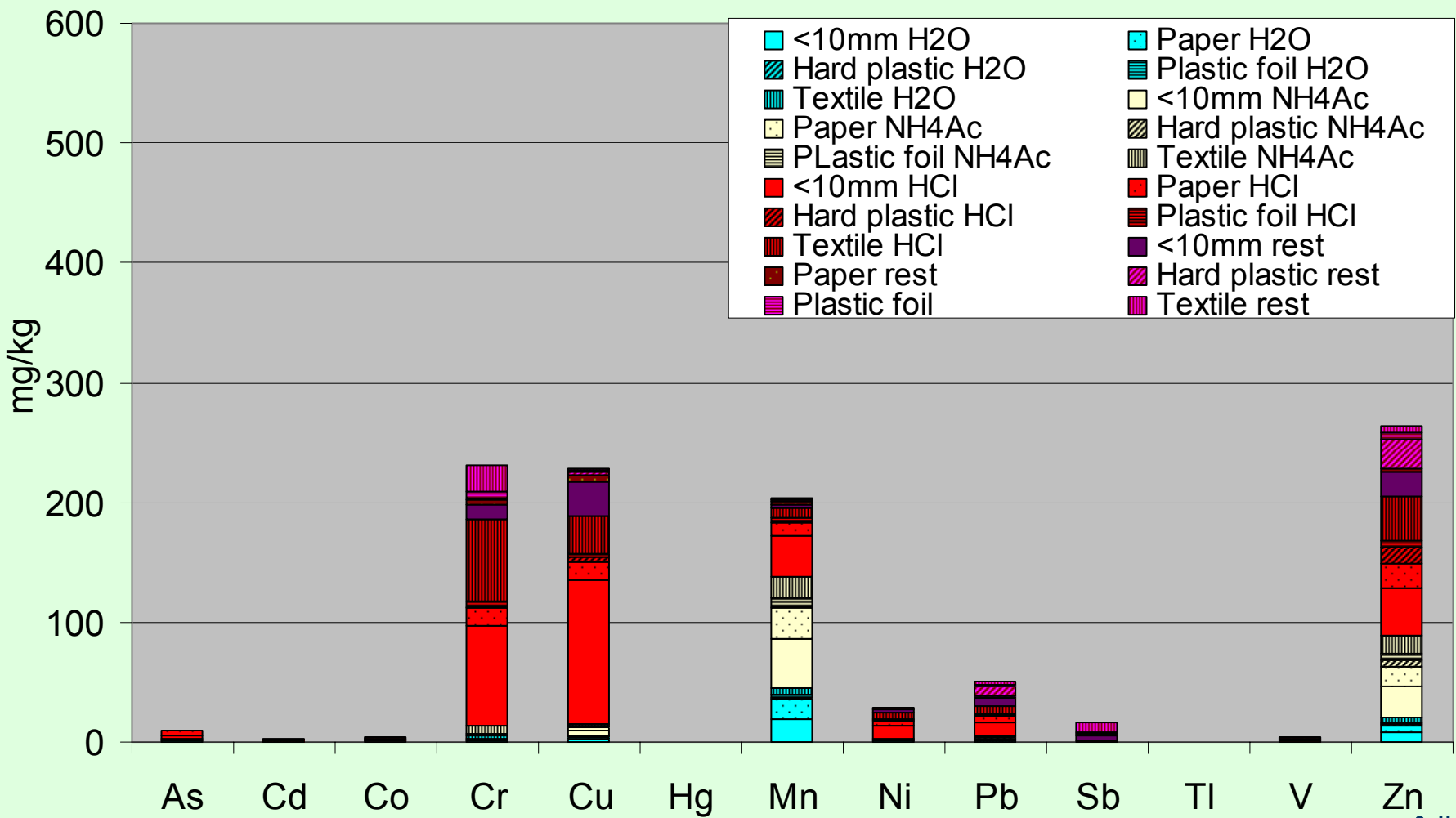




Summary



Summary



- Relationship between solubility of main ash forming matter and fine particle formation
- Similar relationship less unclear for heavy metals
 - Release from plastics could be solubility independent
 - Non-dissolved heavy metals may be connected to the silicate phase and thus be non-volatile
- Cr was found non volatile thus in bottom ash.
- Cu is mainly associated with chlorine in fine particle fly ash
- Zn is mainly associated with sulphur in fine particle fly ash

Acknowledgement

- TEKES Fine program
- VTT
- Finnish meteorological institute
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- Alstom
- Fortum
- Lassila and Tikanoja
- Vapo, YTV, BMH wood technology, Wärstilä, Pirkanmaan jätehuolto, Nordkalk, and Metso