



Influence of sample preparation on the microstructure of bentonite



Belbar WP2 and WP4 meeting, Prague
M. Matusiewicz, V.-M. Pulkkanen, M. Olin
VTT Technical Research Centre of Finland

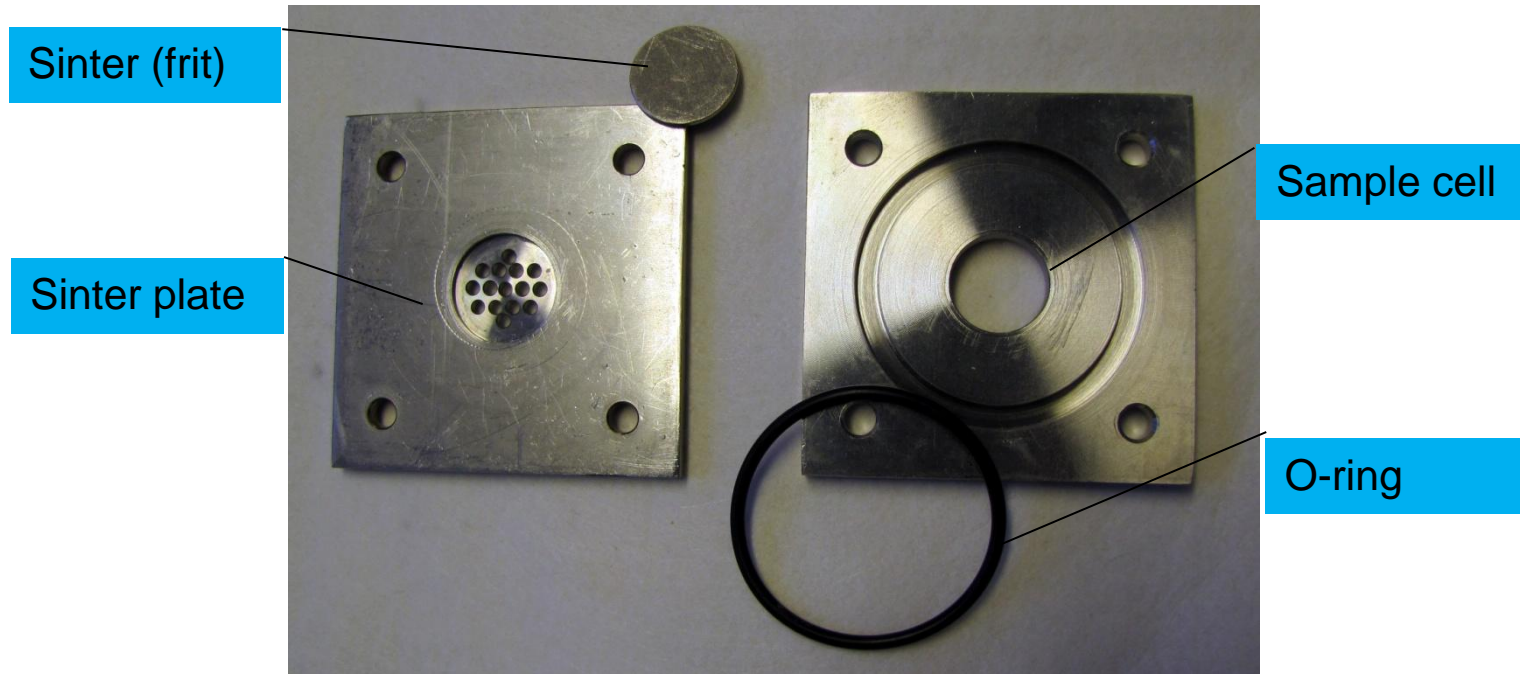
The idea

- Check the influence of the sample preparation on the microstructure
- Could that have an influence on the erosion experiments?
- To obtain information useful for the model development

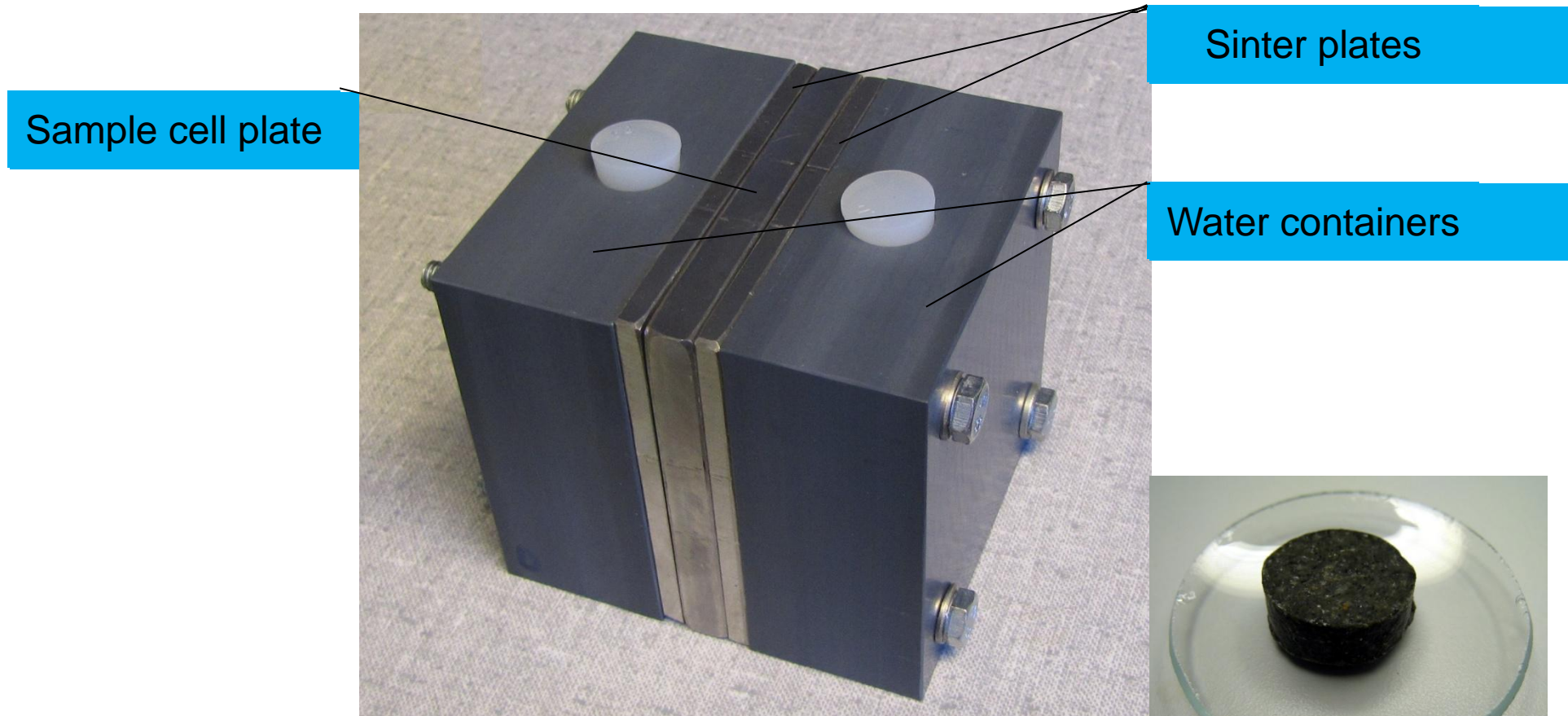
Samples

- 4 target dry densities: 0.7, 1.0, 1.3 and 1.6 g/cm³
- 4 ways of preparation:
 - Compact air-dry clay to 1.8 g/cm³ and saturate with water, letting it swell to the target density
 - Compact air-dry clay to 1.8 g/cm³ and saturate with 0.1M NaCl, letting it swell to the target density
 - Compact air-dry clay to the target density, saturate with water
 - Swelling to target density from water saturated sample compacted to 1.6 g/cm³

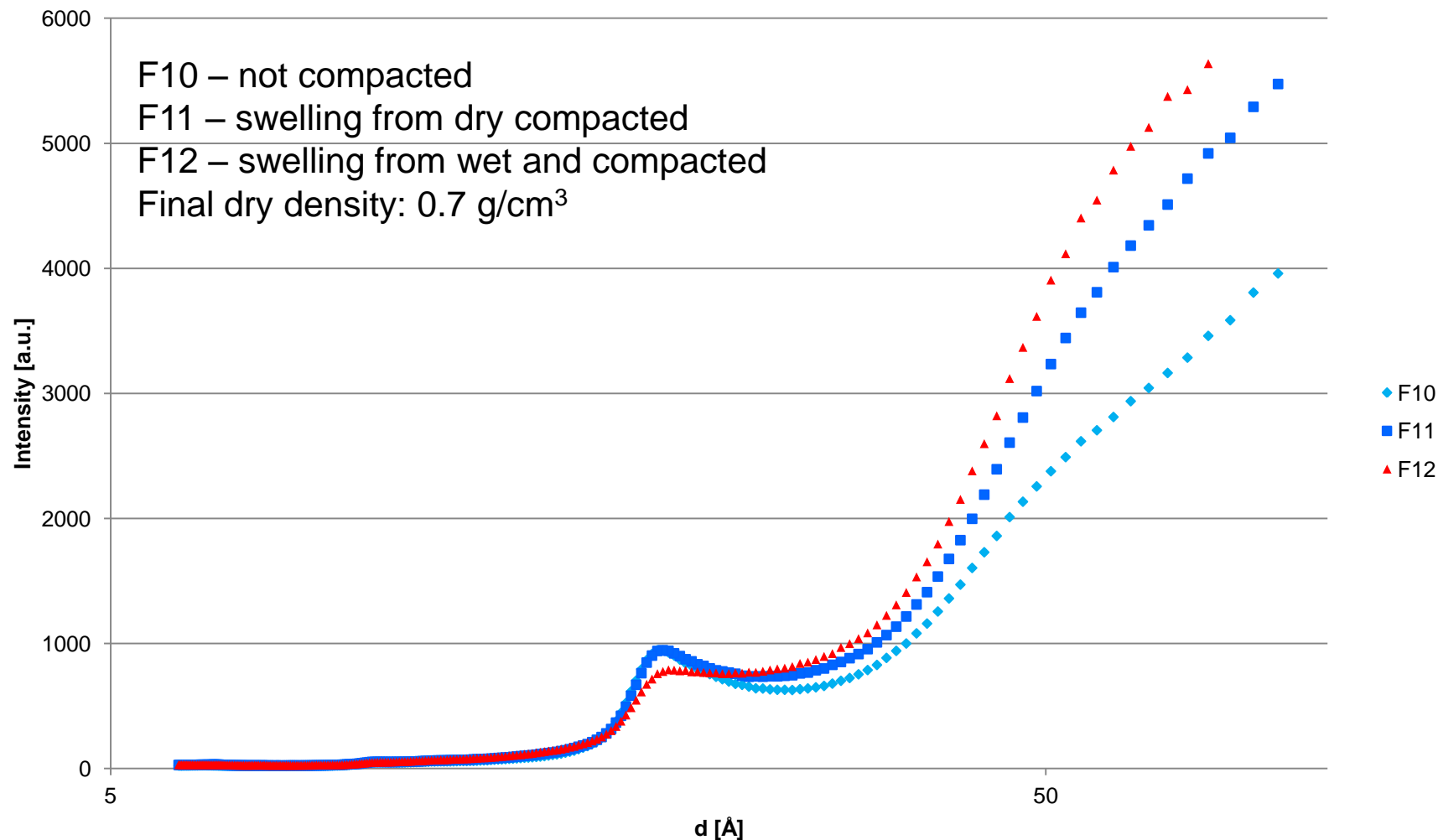
Sample preparation



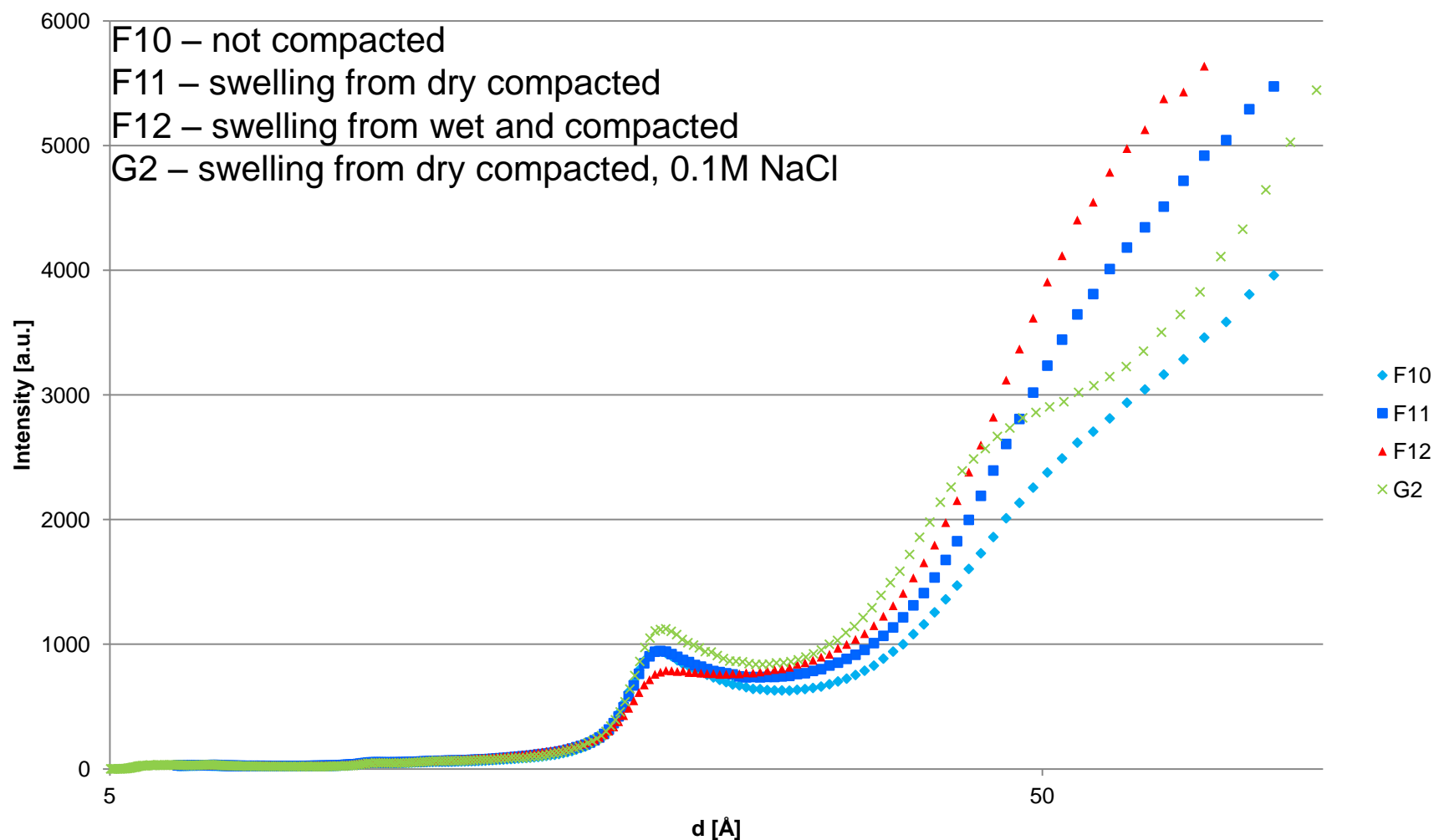
Sample preparation



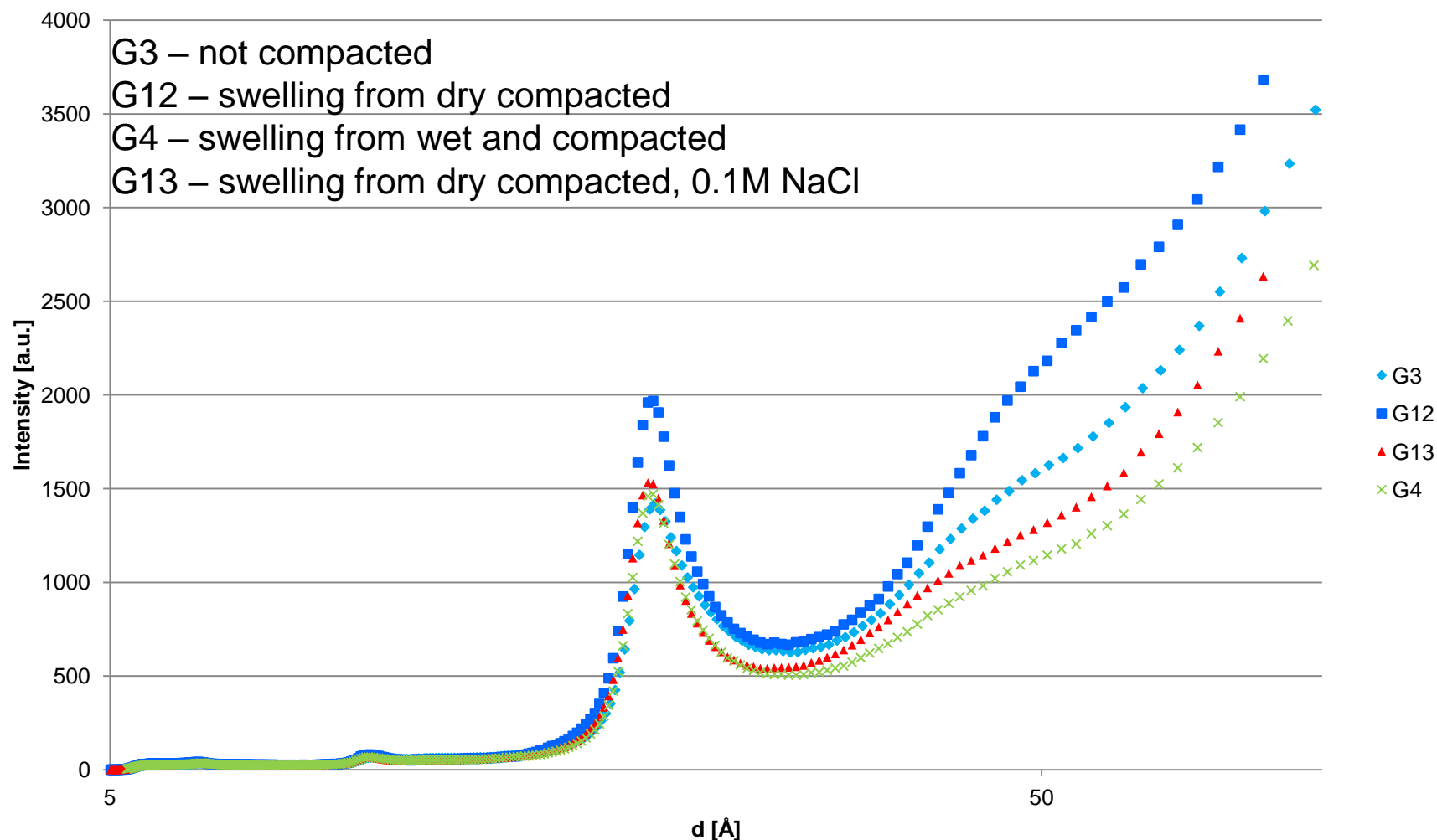
First try – interesting!



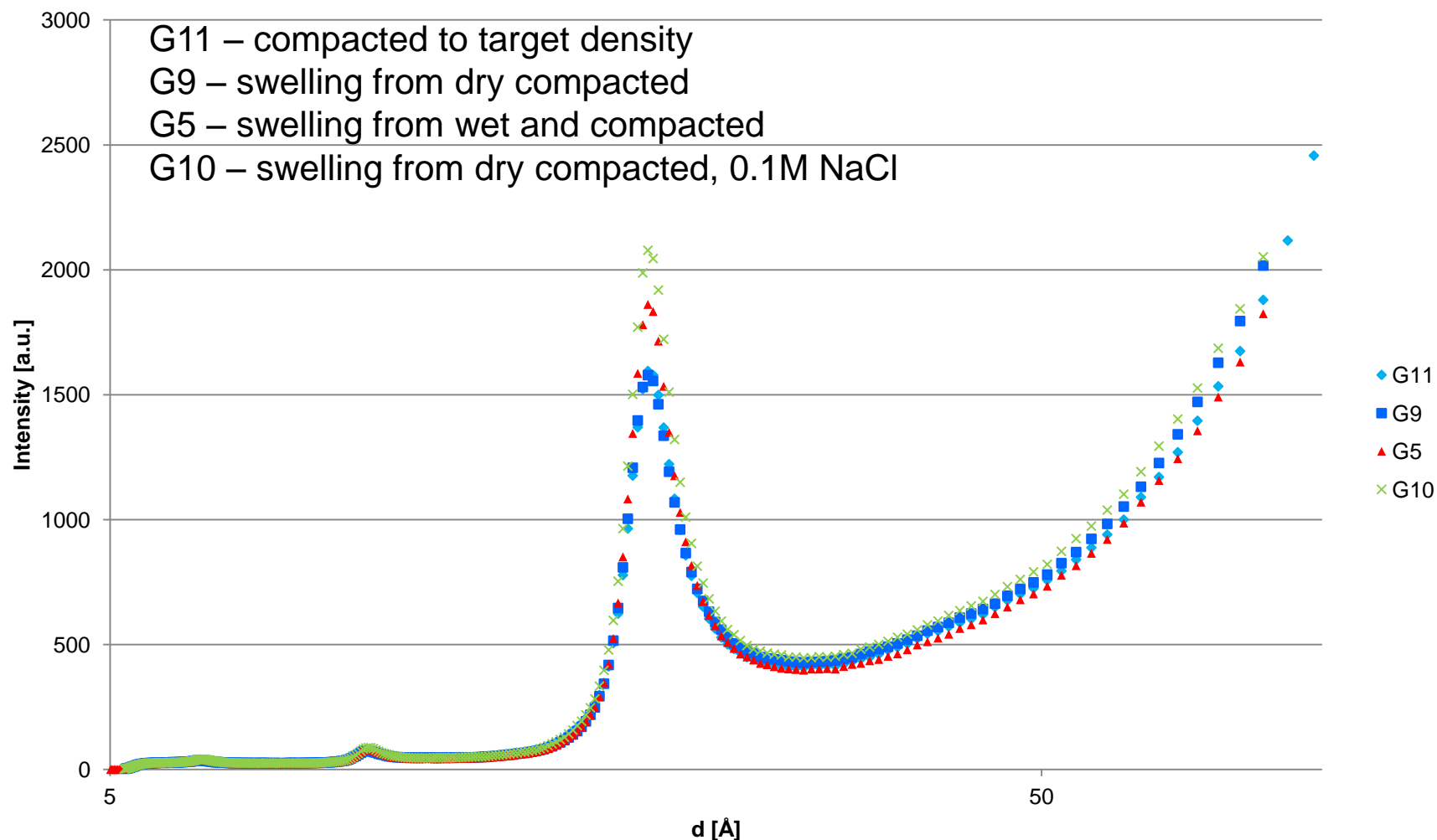
Continuation – 0.7 g/cm³



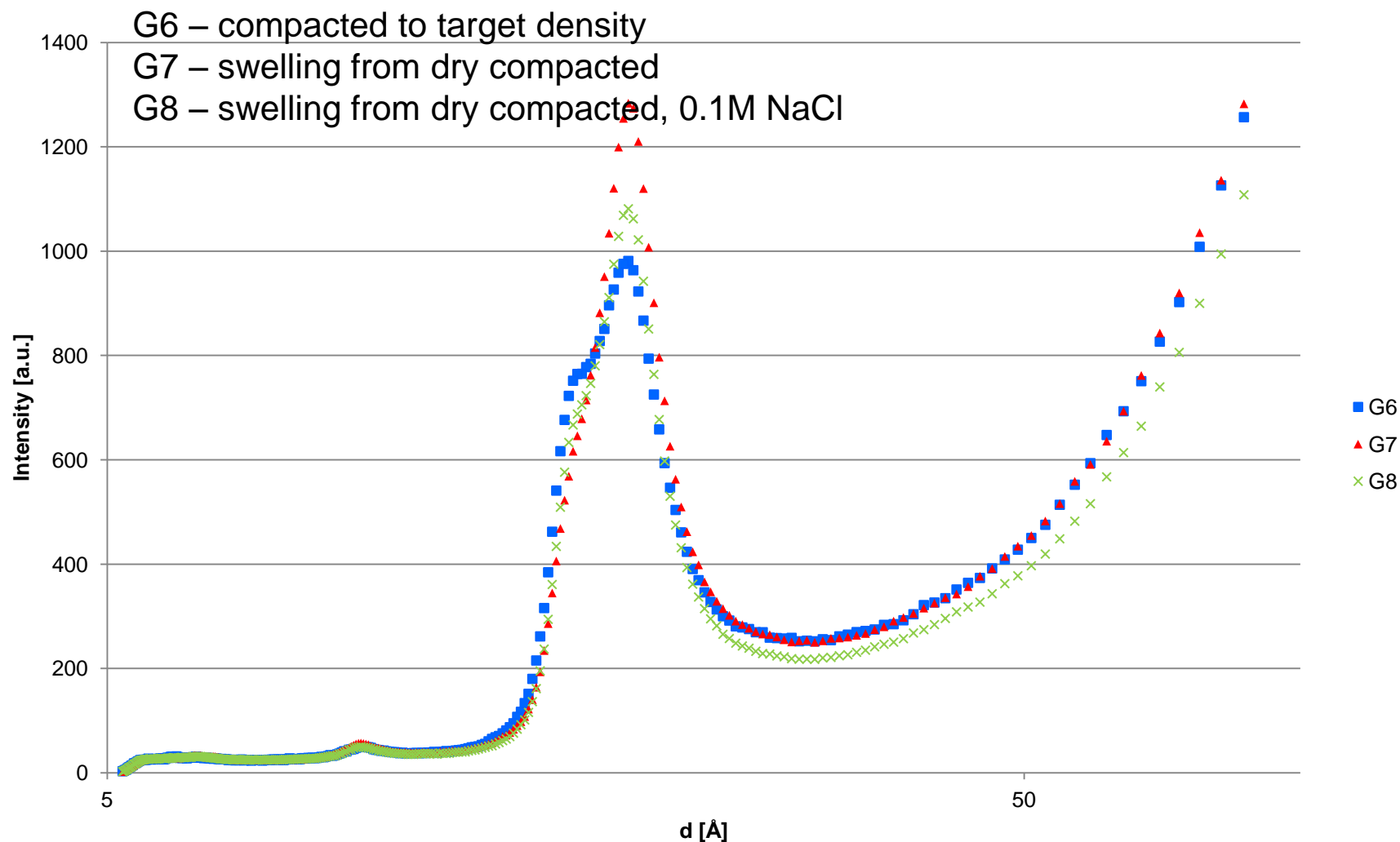
Continuation – 1.0 g/cm³ dry density



Continuation – 1.3 g/cm³ dry density



Continuation – 1.6 g/cm³ dry density



Sample details

		density	eq.time
F10	not compacted	0,75	44
F11	swelling from dry compacted	0,72	44
F12	swelling from wet compacted	0,71	26+18
G2	swelling from dry compacted, NaCl	0,67	57

		density	eq.time
G3	not compacted	0,93	56
G12	swelling from dry compacted	0,94	52
G4	swelling from wet compacted	0,99	46+21
G13	swelling from dry compacted, NaCl	0,96	52

		density	eq.time
G11	compacted to target density	1,22	52
G9	swelling from dry compacted	1,24	52
G5	swelling from wet compacted	1,28	45+21
G10	swelling from dry compacted, NaCl	1,26	52

		density	eq.time
G6	compacted to target density	1,56	54
G7	swelling from dry compacted	1,51	53
G8	swelling from dry compacted, NaCl	1,5	53

Conclusions

- Clear differences are visible at low densities
- No, or minor, differences at high densities
- Some of the differences visible can be caused by slight variations in density
- After around 40-50 days we don't see clear influence of tested sample preparation methods on the clay's microstructure at high densities
- Longer equilibration time here than in the most of Belbar experiments!



Thank you for attention

