

CONTRIBUTION FOR THE STRUCTURAL CHARACTERIZATION OF THE PARTICLES OF LIGHT EXPANDED CLAY AGGREGATES



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2. Study of single particles
3. Study of aggregates of particles
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1. Introducion

An experimental study was performed in LNEC where the structure of a particle of light expanded clay aggregate (LECA®) was investigated .



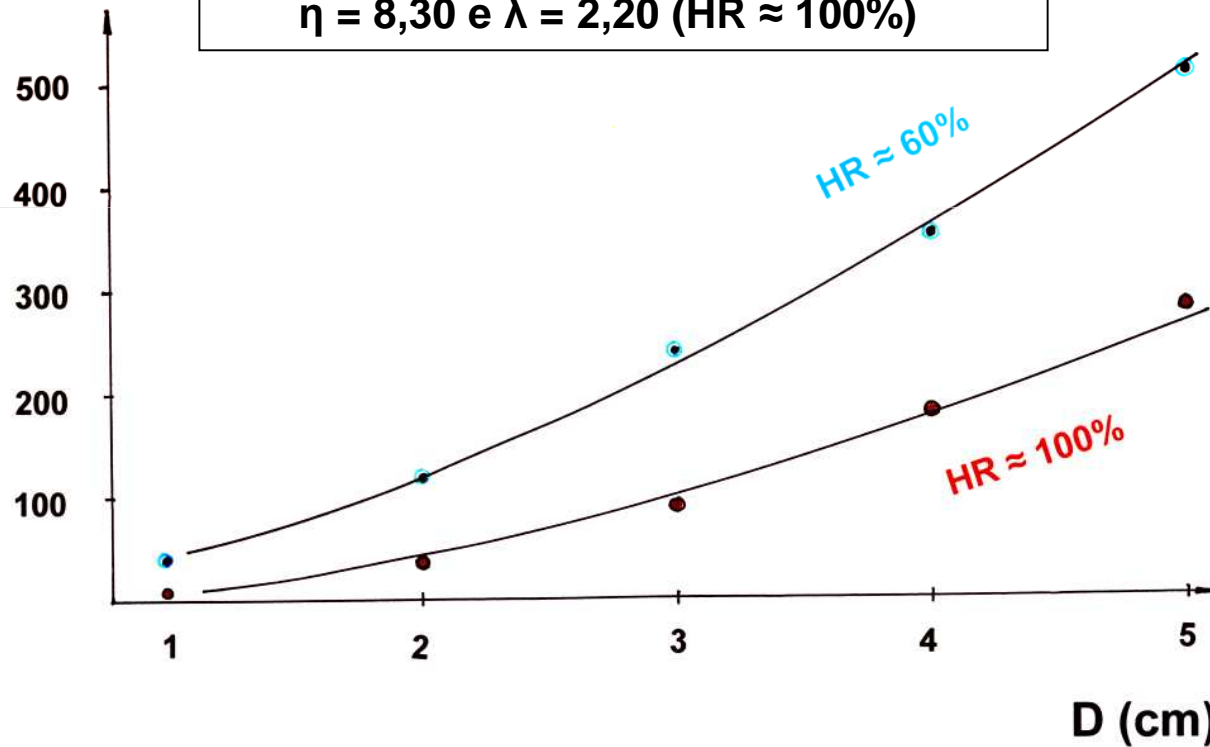
1. Introdução

$$P = \eta D^\lambda$$

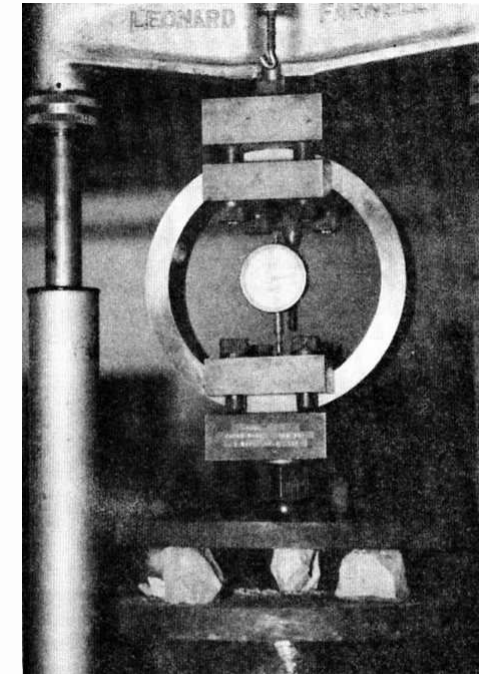
$$\eta = 38,9 \text{ e } \lambda = 1,68 \text{ (HR } \approx 60\%)$$

$$\eta = 8,30 \text{ e } \lambda = 2,20 \text{ (HR } \approx 100\%)$$

P (kgf)

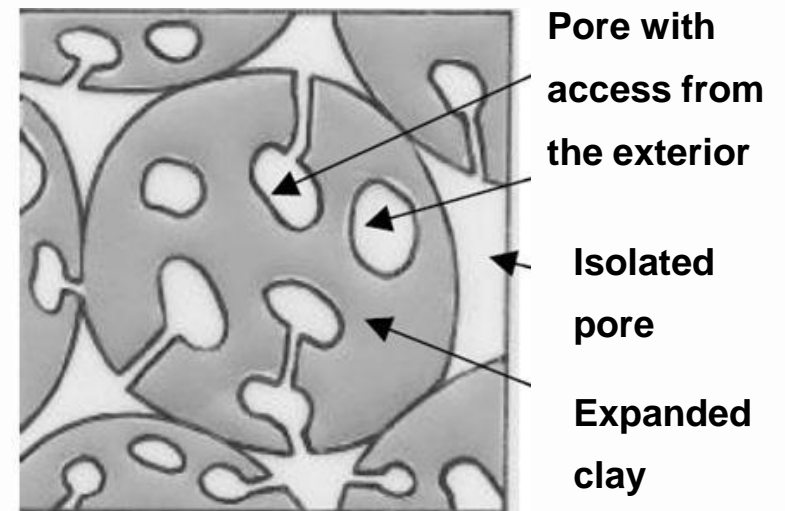
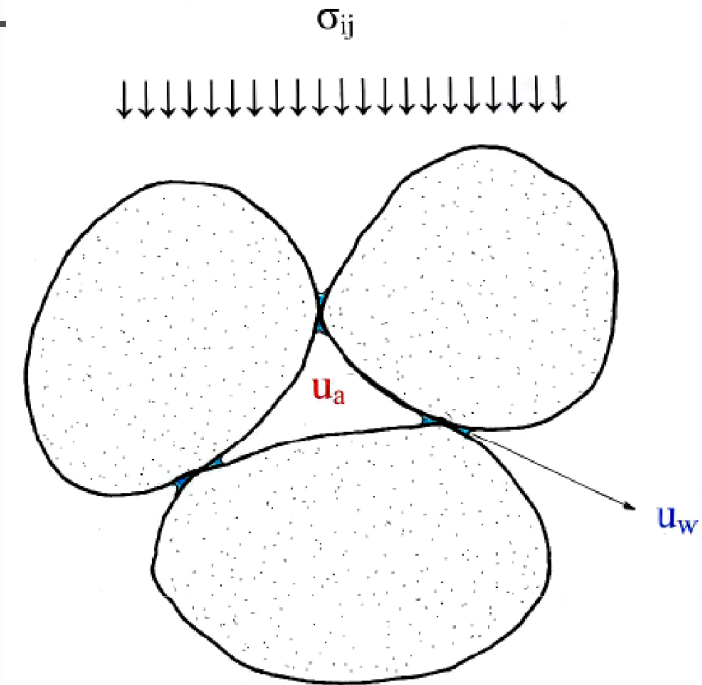
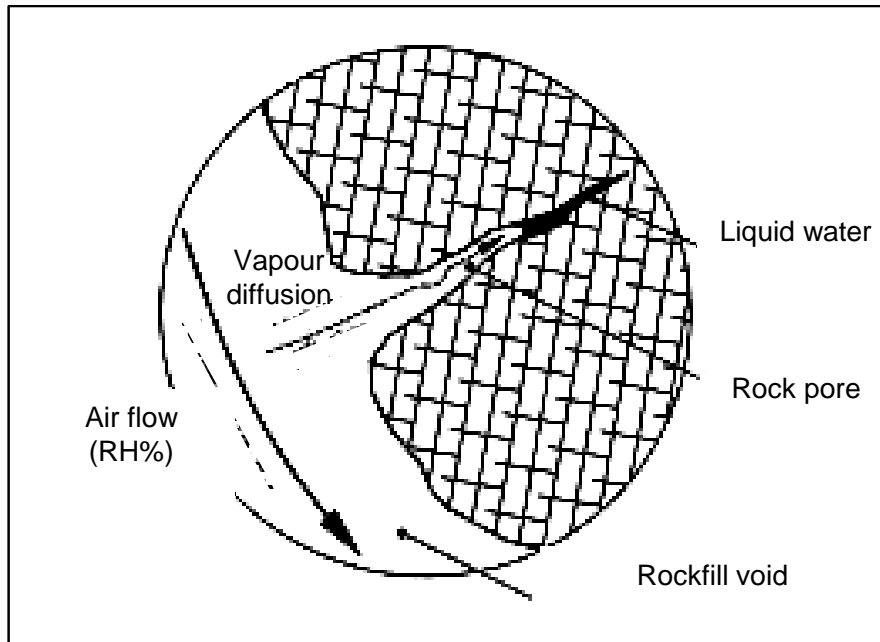


Weathered Greywacke
(Veiga Pinto, 1983)



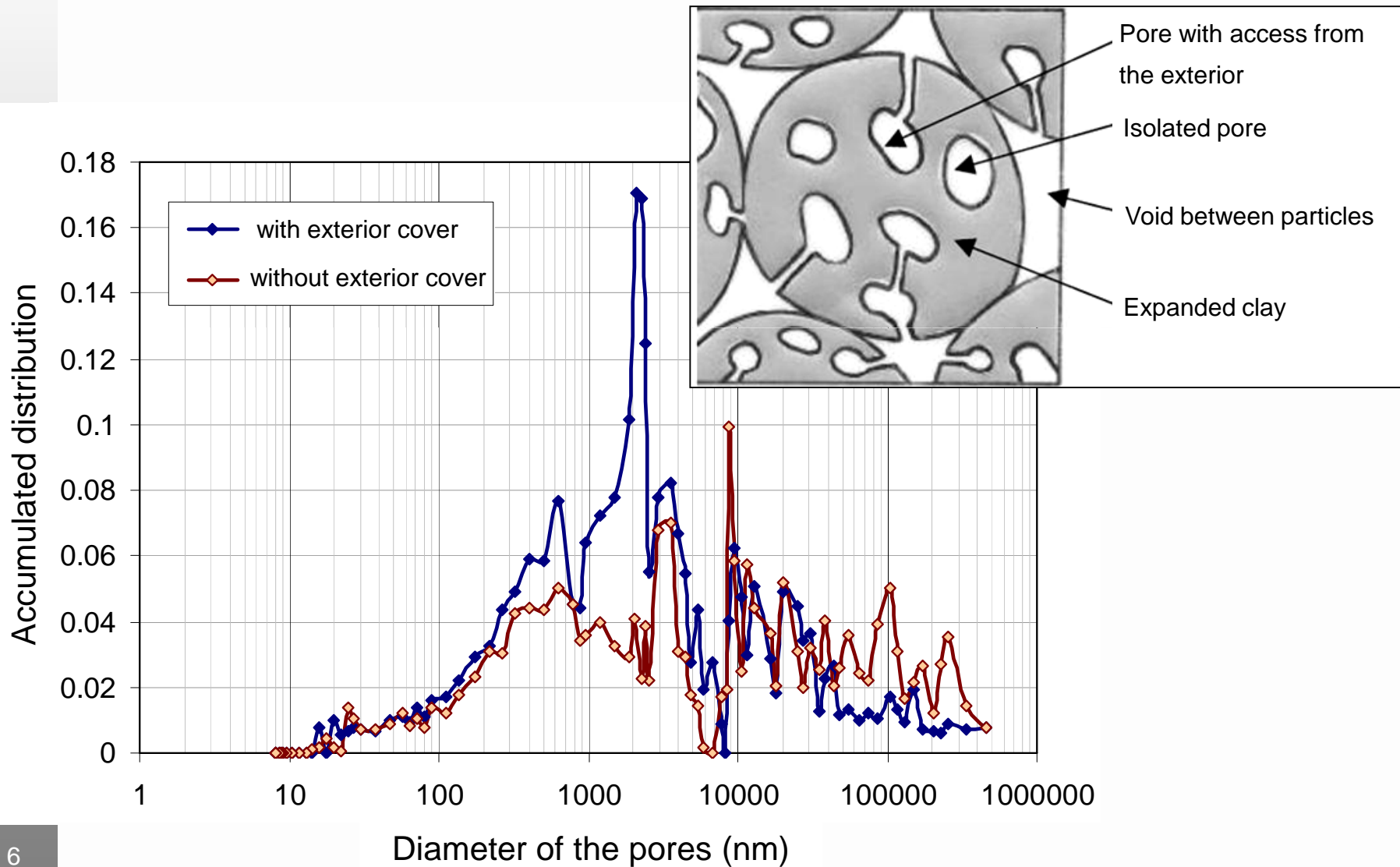
Veiga Pinto (1983)

1. Introducion



2. Study of single particles

- Mercury intrusion porosimetry

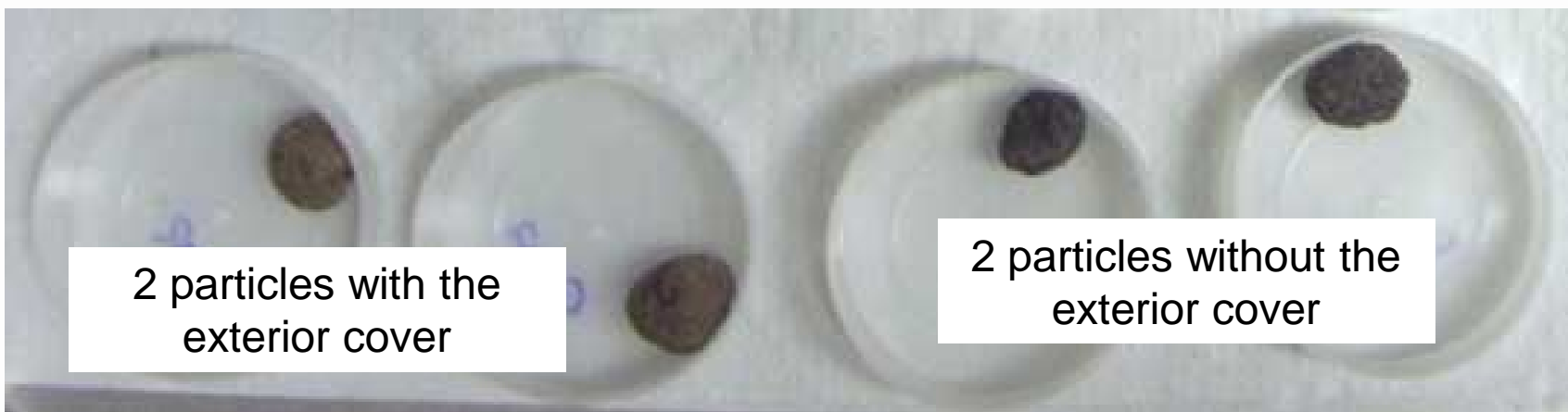


2. Study of single particles

- Water retention curve



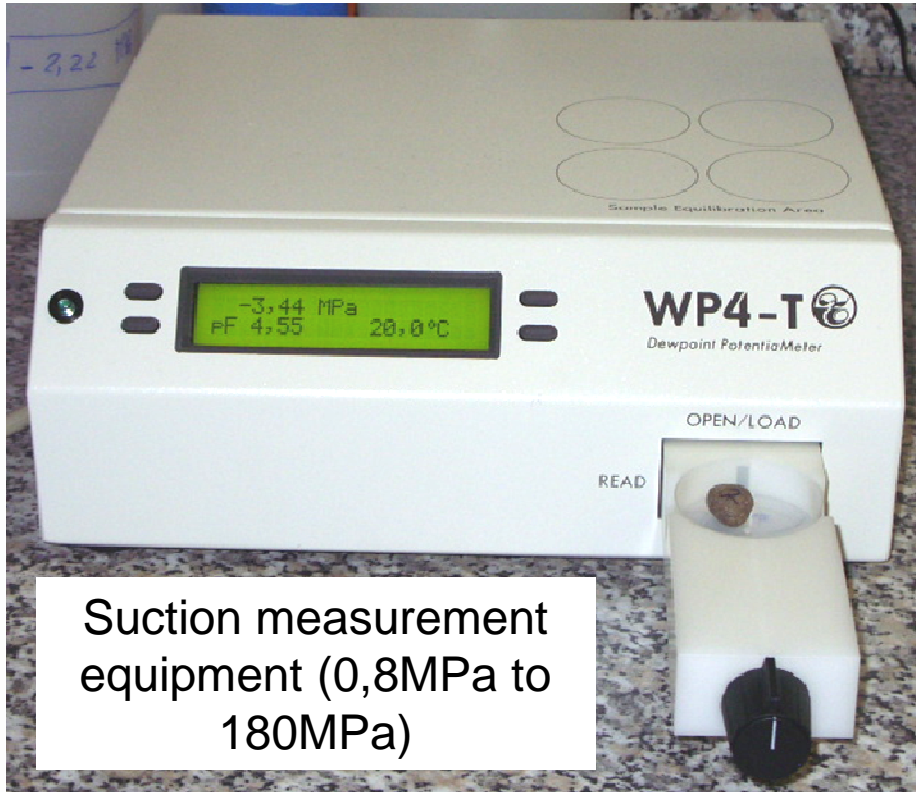
1- Drying: Saturated particles (vacuum followed by water injection)

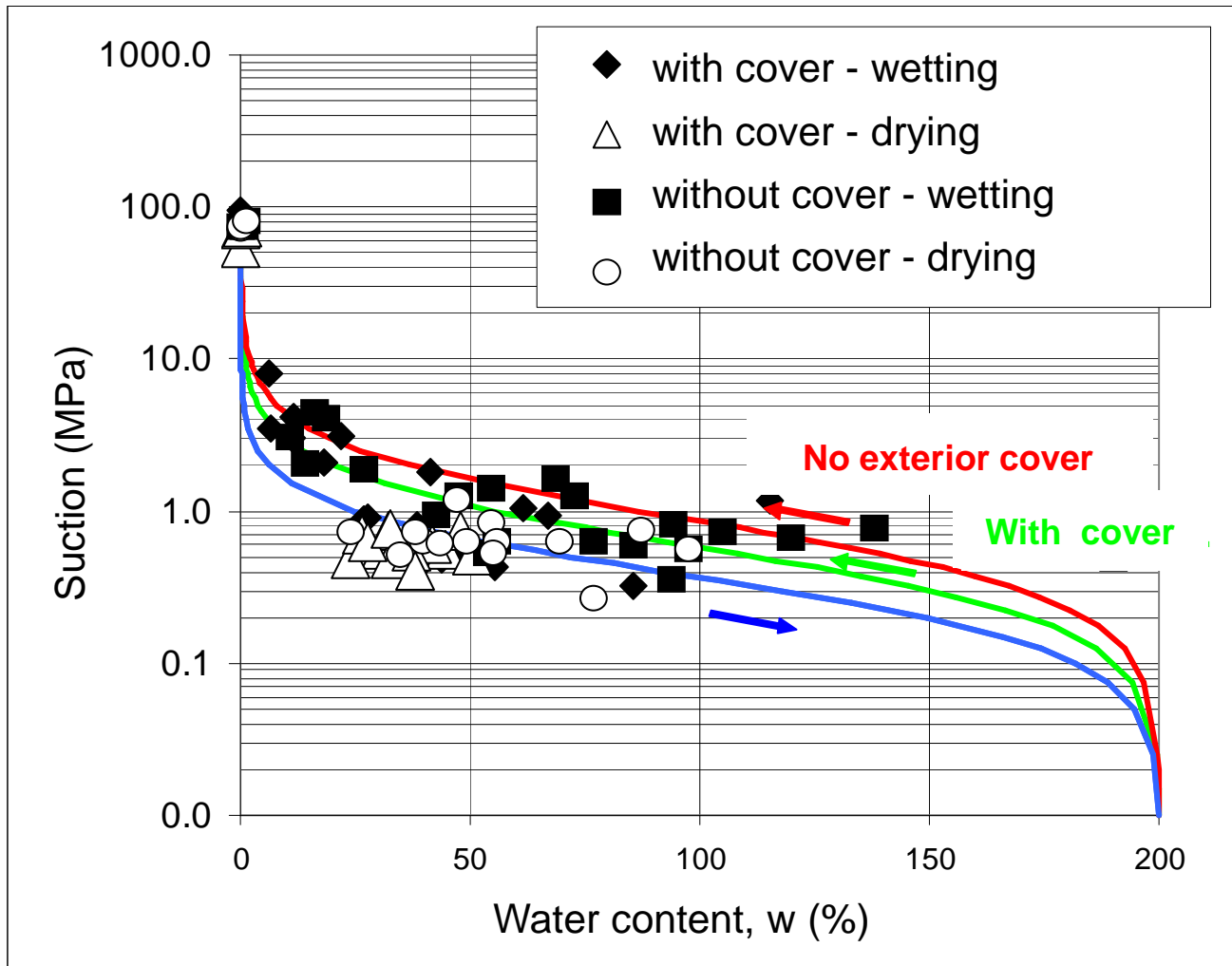


2- Wetting: Particles dry in laboratory environment

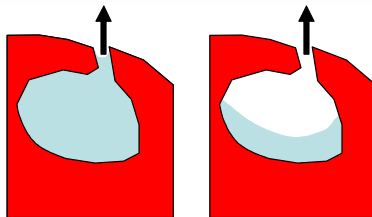


2. Study of single particles





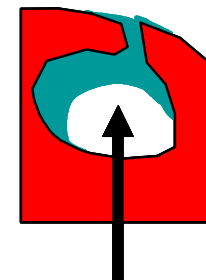
On drying, the water is retained by capillarity



difficult

easy

On wetting, the air is retained in the pores



2. Study of single particles

- Crushing tests



HR=50%
(laboratory
environment)



HR=75%



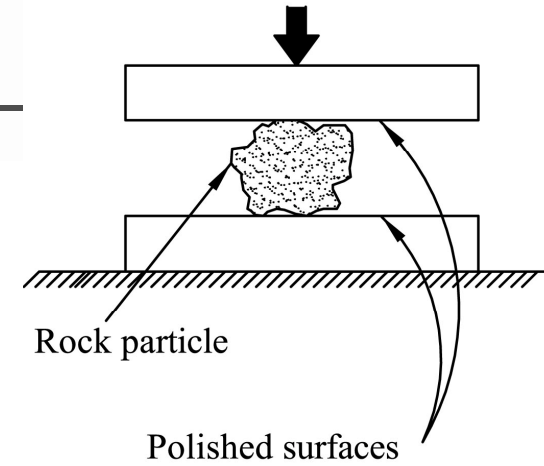
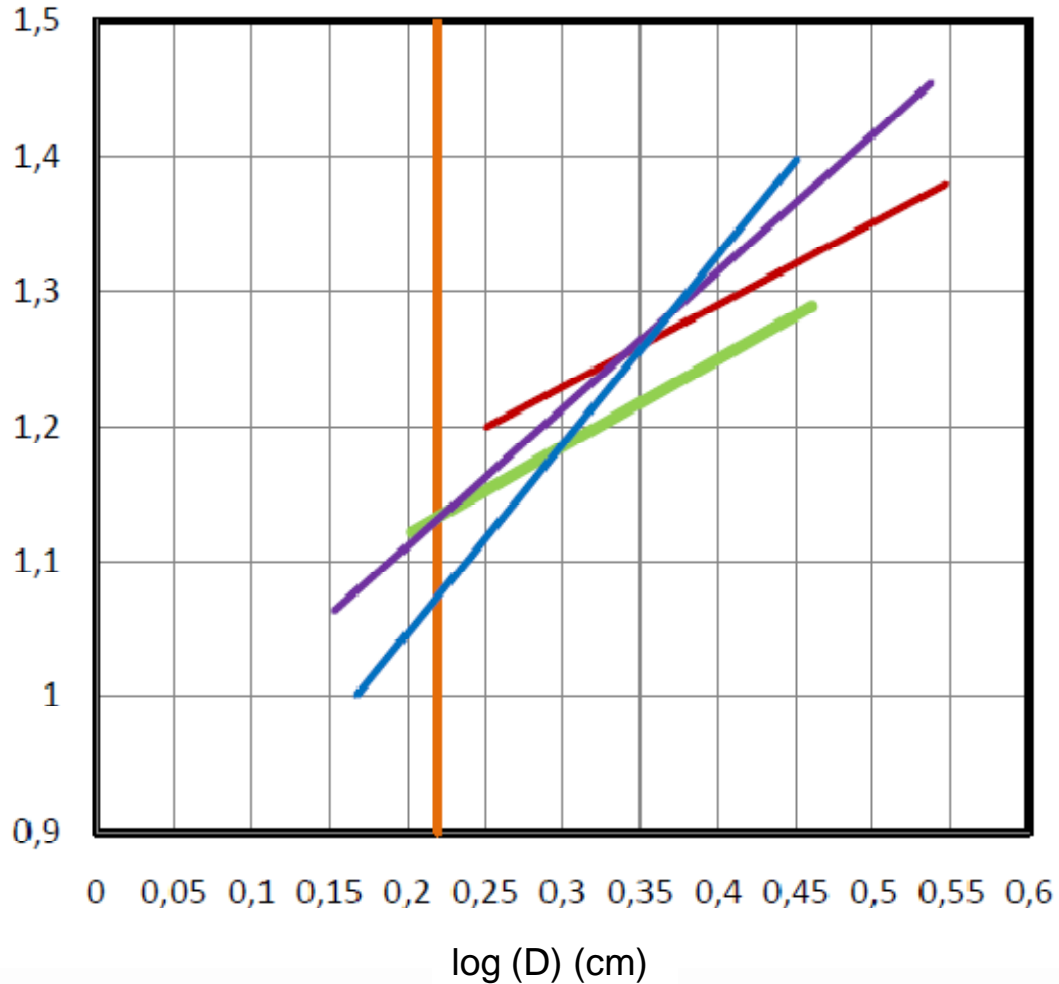
HR=85%



HR=100%
(saturation
using
vacuum)

2. Study of single particles

log (P) x10² (kPa)



- D=16mm
- HR=50% (dry)
- HR=75%
- HR=85%
- HR=100% (fully saturated)

HR (%)	η	λ
50 (dry)	11.3	0.6
75	10.3	0.6
87	9.4	0.8
100 (saturated)	6.5	1.3

$$P = \eta D^\lambda$$

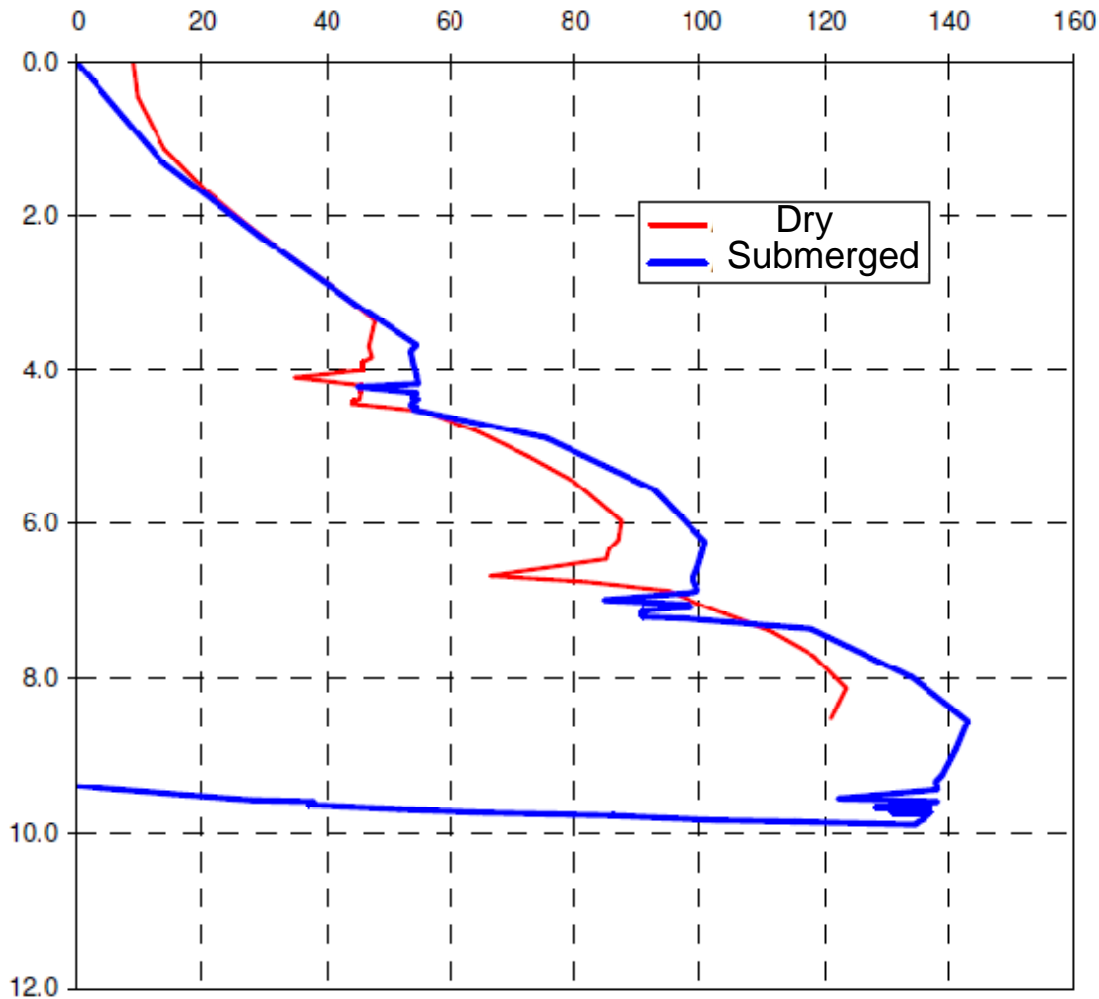


3. Study of aggregates

- Oedometric tests

Vertical stress (kPa)

Vertical displacement (mm)





4. Conclusions

The results of MIP tests and the water retention curves explain the influence of the exterior cover on the answer to changes in relative humidity (RH).

Crushing tests of particles for different RH show some sensitiveness to water.

The oedometric tests performed on dry and submerged aggregates did not present relevant differences. This may be because of the low stresses applied and also because the particles are difficult to be wetted.



4. Conclusions

Long term deformations due to climate (mainly wetting caused by rain) are not expected in embankments built with these materials, since breakage measured by particles crushing was not significantly increased with water presence.

If these results are confirmed, the material can also be used in the construction of drainage systems as its grading size distribution and other mechanical characteristics are not expected to be much affected by the presence of water.



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THE END

Thank you