

Investigation of the Pore structure of wood using Gas-Pycnometry and Mercury Intrusion Porosimetry

Mario Zauer and Alexander Pfriem
TU Dresden, Institute of Wood and Paper Technology

Experimental Methods

Gas Pycnometry

is an inert gas displacement method to measure the true volume of solid materials accurately.

- For exact cell-wall density and porosity

$$V_F = V_K - \left(\frac{p_E}{p_A - p_E} \right) \times V_Z \quad \swarrow \quad \rho_F = \frac{m_F}{V_F} \quad \searrow \quad \Phi = 1 - \frac{\rho}{\rho_F}$$

Mercury Intrusion Porosimetry

is a method based on the principle that mercury (non-wetting liquid) only intrudes into a porous system under pressure.

- For pore size distribution and average pore diameter

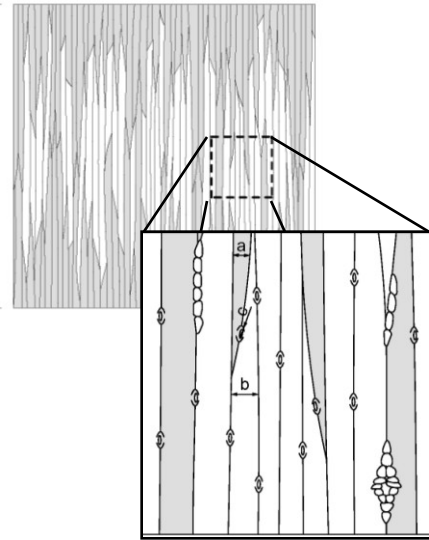
$$d_p = -\frac{4\gamma \cos\theta}{p}$$

Both methods should complement each other!

Experimental Methods

Restrictions due to the wood anatomy

- Unaccessible pores due to pit closings between tracheids
- Accessible pores via channels or openings with a smaller pore diameter - „Bottle-neck effect“



Intrusion of mercury into a sample of spruce wood

