

# DESCRIPTION OF SORPTION ISOTHERMS AND CAPILLARY CONDENSATION WITH HYSTERESIS IN DISTRIBUTION OF MESOPORES

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An extended version of the computation model for sorption isotherms and capillary condensation from Churaev, Starke and Adolphs [1, 2] is introduced. This model combines the excess surface work ESW-model and disjoining pressure approach. Here it is applied for various pore size distributions of cylindrical mesopores. The idea is that during adsorption on the porewalls the approaching films will reach a metastable situation and collapse - capillary condensation proceeds. Evaporation is described with a modified Kelvin equation. Particularly for cylindrical pores is found much evidence that the surface tension is dependent on the pore size. Successfully computations of experimental data of sorption with nitrogen, argon and water on various nanoporous materials emphasize this dependency. Besides the entire computation of sorption isotherms with hysteresis (or no hysteresis in case of very small pores) it is also possible to determine the monolayer and specific surface area with the ESW model [3-5].

1. Churaev, N.V., Starke, G., Adolphs, J., *J. Colloid Interface Sci.* 221, 246 (2000).
2. Churaev, N.V., Adolphs, J., *Colloid J+ 62:* (4), 495 (2000).
3. Adolphs, J., Setzer, M. J., *J. Colloid Interface Sci.*, Vol. 180., 70 (1996).
4. Adolphs, J., Setzer, M. J., *J. Colloid Interface Sci.*, Vol.184. 443 (1996).
5. Adolphs, J.:” Modeling of Gas Adsorption at Porous and Dispersed Surfaces”, in *Surface and Interface Sciences* (ed. Arthur Hubbard), 2002.