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Capillary Condensations: Phase Transitions for Two Gravitation-Free Confined Systems ELINA VAN KEMPEN, JULIA D'ROZARIO, MARIE ROMANO, CAROLINA ILIE, SUNY Oswego — Due to van der Waals forces, the vapor contained inside a confined geometry is adsorbed and condenses into a liquid: capillary condensation occurs. Three possible phases can exist. The empty phase arises when there is no wetting, the film phase when a thin liquid film forms, and the full phase when the system is filled with liquid. The transitions between the phases were studied, in the cases of condensation between two parallel planes and within a cylinder. We derived the grand free potential for each phase as well as the potential differences between phases. By graphing a phase diagram, the triple-point was obtained, illustrating the possible coexistence of the three phases. In addition, the shape of the meniscus during film-full phase coexistence was found for the two parallel planes geometry. The understanding of capillary condensation is particularly valuable for industrial applications that use microscale or nanoscale materials.

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