S2.4.3 - *Determination of the First Bubble Point by Capillary Flow Porometry*

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The largest pore size often called the first bubble point (FBP) is one of the most sought-after properties of a porous material. This value correlates with particle retention properties and may strongly influence the total flux characteristics of a sample. The first bubble point is especially important in applications, such as filtration when certain solutes must be retained. The ASTM F-316-03 defines the FBP as “the pressure at which the first continuous stream of gas bubbles is detected”. Since fully automated instruments cannot follow a visual determination, various experimental approaches exist to replicate this technique. In this work, we present the determination of the largest pore size in different filtration media by using a first bubble point tester POROLUX™50 utilizing digital pressure and flow sensors. As in capillary flow porometry, the determination of the largest pore size by the bubble point tester is based on spontaneous wetting of a porous material by an inert liquid with subsequent displacement of the liquid from the largest pore by application of increasing gas pressure. The pressure required to expel the wetting liquid out of the largest pore is

converted to pore size with the Young-Laplace equation. Different definitions of the FBP exist, and as a consequence, the resulting pore sizes may vary depending on the selected criteria. This work summarizes the various experimental approaches to determine the largest pore size, and reports findings and routes towards optimization of FBP determination. The differences between measured and calculated first bubble points will be illustrated followed by the discussion of the effect of different wetting liquids on the FBP determination. These studies provide useful guidance for the application of the automated FBP tester in the largest pore size determination.

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Dana Dutczak received her master's degree in chemical engineering from the Cracow University of Technology in Poland. In 2007 she began work as a research scientist at Münster University of Applied Sciences in Germany. Her interest in material characterization, in particular in optical spectroscopy brought her to Utrecht University (The Netherlands) where she conducted her Ph.D. studies. In 2013 she received Ph.D. in Physical Chemistry. In 2014 she took up a postdoctoral position at the University of Tübingen (Germany) where she worked on crystal structure determination from X-ray powder diffraction patterns. In April 2019 she joined the Porometer team where she works in the field of capillary flow porometry and managing a Porometer Application Laboratory. Her research interest focus on the characterization of the micro and nanopores in filtration media.

Keywords:
Bubble point
Largest pore size
Capillary flow porometry