



IFPRI Review Brief

Porosity and Pore Saturation Characterization

The International Fine Particle Research Institute wishes to commission a comprehensive critical literature review of quantitative measurement of porosity and saturation of powders and porous media.

Unsaturated and partially saturated porous structures are ubiquitous in particle technology. Characterizing porosity (or void fraction in powders) and the fraction of pore volume filled by gas or liquid are fundamental to understanding the material properties of these materials and therefore are primary measurements in design and analysis of associated products and manufacturing processes.

Different industries and disciplines tend to develop their own analytical methods for properties that are common in applications outside of their domain. Porosity and pore saturation are no exception, and for this reason a broad, critical review of relevant measurement methods is desired. The review should discuss the principle, methodology (including sample preparation), accuracy and reproducibility, cost, and applicability of each method. Direct methods such as intrusion porosimetry and indirect or surrogate methods such as compaction curves are in scope. It should cover methods that can be used for unconsolidated granular media (e.g., powders, soils) and consolidated porous media (e.g., tablets, catalyst pellets, cement).

Methods for characterizing pore structure, pore size distribution, and saturation distribution are out of scope unless they are also used for total porosity and saturation measurement. We put no restriction on the minimum or maximum pore size that is interrogated by each method, although this needs to be specified in the description of the method's principle. Finally, the review should consider the challenge of discriminating between void fraction (extragranular volume) and porosity (intraparticle pore volume) in methods for characterizing unconsolidated media.