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基于压汞法无烟煤孔隙结构的粒度效应

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Particle Size Effect of Pore Structure of Anthracite by Mercury Porosimetry

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摘要/Abstract

摘要：

不同粒度对压汞法孔隙结构测定结果的影响称为粒度效应，其可影响煤孔径分布的测定。结合粒度测试和扫描电镜观察等方法，通过开展2组无烟煤5个不同粒度系列的压汞实验，分析不同粒度孔隙结构的差异。结果显示：①随着粒度变小，总孔容增量不断增大，中—大孔的孔容和孔比表面积增量最显著，孔容和孔比表面积的展布特征由单峰态变为双峰态；②随着粒度变小，退汞率显著降低。研究认为，煤颗粒的大孔增量并非真实存在的煤中孔隙，主要为颗粒间空隙所贡献。粒度变小导致孤立形式的封闭胞腔孔和气孔得到有效释放。煤颗粒退汞结束后大部分水银仍滞留于颗粒间空隙，由此造成低退汞率的假象，煤颗粒的退汞率不能指示孔隙连通性。当煤粒径大于3mm时，基于压汞法孔隙结构的粒度效应才可忽略不计。

关键词： 压汞法, 无烟煤, 孔隙结构, 粒度效应

Abstract:

Particle size effect,which is the influence of coal particle size on the mercury porosimetry mesurement of coal powder,may lead to incorrect interpretation.It's necessary to pay attention to particle size effect for recognizing the pore structure of coal.Mercury porosimetry experiment was conducted with two groups of anthracite in five different particle sizes,which were 2-3cm,40-50 mesh,90-100 mesh,140-200 mesh and >200 mesh respectively,combined with particle size measurement and SEM observation.With the decrease of particle size,the total pore volume increases,especially the increment of pore volume and specific surface area between mesopore and macropore.The pore size distribution and specific surface area distribution change from unimodal distribution to double hump distribution.The increased macropore volume is not interior pores.With the decrease of particle size,mercury extrusion efficiency significantly reduces.The smaller the coal samples were crushed,the more closed pores were released.Most mercury is stranded in interparticle voids of coal powder after mercury withdrawal,which leads to the incorrect appearance of low extrusion efficiency,and can't indicate the connection of pores.When coal particle size is bigger than 3mm,particle size effect of pore structure by mercury porosimetry can be neglected.

Key words: Mercury porosimetry, Anthracite, Pore structure, Particle size effect

中图分类号:

TE122.2

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