

热力学

毛细上升法研究水处理滤料的表面热力学特性

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摘要 基于Washburn方程用亲油亲水比(LHR)比较了0.9~1.2 mm无烟煤、锰砂和石英砂滤料的润湿性;同时以正己烷、1-溴萘、甲酰胺和去离子水为探针液,用Washburn方程和van Oss-Chaudhury-Good(vCG)理论对滤料表面自由能成分进行了估算。实验测得无烟煤、锰砂和石英砂的LHR值依次为1.93、0.75和0.69,说明无烟煤的亲油性较好而锰砂和石英砂表现出了亲水性;估得无烟煤、锰砂和石英砂滤料的表面自由能非极性成分和极性成分依次为38.8、38.0、37.7 mJ·m⁻²和0.73、6.8、8.7 mJ·m⁻²,初步说明水处理滤料的表面润湿性与其表面自由能极性成分 γ_{ABs} 之间有一定的相关性;而后者归因于滤料的表面化学组成。

关键词 [水处理滤料](#) [润湿性](#) [表面自由能成分](#) [Washburn方程](#) [亲油亲水比](#)

分类号

Capillary rise for thermodynamic characterization of wastewater treatment filter media

Abstract

The wettabilities of anthracite, manganese sand and quartz sand particles with a size range of 0.9—1.2 mm were compared using the Lipophilic Hydrophilic Ratio(LHR) concept which was defined on the basis of the Washburn equation, and their surface free energy components were also estimated using the Washburn equation and van Oss Chaudhury Good(vCG) theory with n-hexane, α -monaphthalene, formamide and water as probe liquids. The calculated LHR values of anthracite, manganese sand and quartz sand were 1.93, 0.75 and 0.69 respectively, showing that anthracite was lipophilic comparatively while manganese sand and quartz sand were hydrophilic. Furthermore, the estimated surface free energy apolar components and polar components of anthracite, manganese sand and quartz sand were 38.8, 38.0, 37.7 mJ·m⁻² and 0.73, 6.8, 8.7 mJ·m⁻², showing that the wettabilities of filter medium were correlated to their surface free energy polar components; and the latter could be ascribed to the differences in surface chemical structure of different filter medium.

Key words [wastewater treatment filter media](#) [wettability](#) [surface free energy component](#) [Washburn equation](#) [Lipophilic Hydrophilic Ratio](#)

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