Synthesis of high quality KIT-6 and SBA-15 mesoporous silicas using low-cost water glass, through rapid quenching silicate structure in acidic condition

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KIT-6 and SBA-15 ordered mesoporous silicas were obtained under various synthesis conditions using water glass as a low-cost silica source. The products were characterized with X-ray powder diffraction, N_2 adsorption, transmission electron microscopy, and scanning electron microscopy. The result showed that the initial mixing condition was a decisive factor for the structural order and mesoporosity. High-quality KIT-6 and SBA-15, even better than products from tetraethoxysilane, were obtained when the reactants were mixed very rapidly to cause instant quenching of silicate structures in acidic solution containing nonionic surfactants. This procedure was highly reproducible and suitable for a large-scale synthesis.