

THE FORMATION OF MONODISPersed, NANOSPHERICAL SILICA PARTICLES BY SOL-GEL PROCESS IN THE PRESENCE OF ANIONS AS ADDITIVE

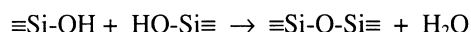
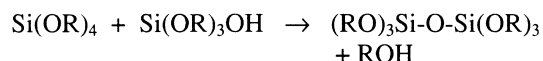
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ABSTRACT

Silica nanospheres were prepared through hydrolysis and condensation of tetraethylorthosilicate (TEOS) with small amount of water, ethanol and ammonia in the presence of anion additive. The addition of a small amount anion additive significantly reduced the mean particle size by ~ 60%, however, the particle sizes were widely distributed. Through controlling the mode of TEOS mixture addition and increasing the aging time, monospherical silica with a narrow distribution was produced.

INTRODUCTION

The sol-gel process is a common method for the synthesis of silica. The process involves simultaneous hydrolysis and polycondensation reaction of silicon alkoxide. The general reaction can be written as



It is generally believed that, during hydrolysis and condensation processes, the silicate monomer grows to form dimeric, cyclic, spherical particles or gel network.¹ Thus different morphology of silica can be produced by sol-gel process by careful control of parameters such as pH, water ratio, solvent and aging time.²⁻⁶ In this work, the synthesis of monosized silica spheres by careful control of the mode of reactant additions under basic condition in the presence of an anion electrolyte.

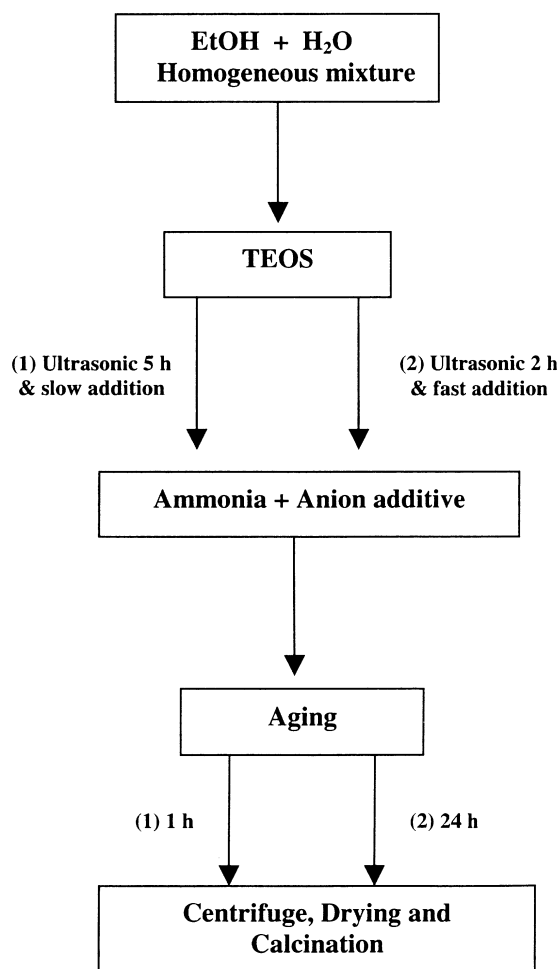


Fig. 1 : Flowchart for silica synthesis
 [(1) Route 1, (2) Route 2]