STUDY ON THE EFFECT OF CYCLOHEXANE CONCENTRATION ON MESOPOROUS SILICA NANOPARTICLES

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ABSTRACT

STUDY ON THE EFFECT OF CYCLOHEXANE CONCENTRATION ON MESOPOROUS SILICA NANOPARTICLES

Mesoporous silica nanoparticles (MSNs) were successfully synthesis using microemulsion method with different concentration of cyclohexane (C_6H_{12}). In this method, tetraethyl-orthosilicate (TEOS) act as silica precursor, Cetyltrimethylammonium bromide (CTAB) as surfactant and pore generating agent, and ammonium hydroxide (NH_4OH) as catalyst. The samples were analysed using SEM, EDX, XRD, UV-Vis and FTIR. Scanning Electron Microscope (SEM) image shows that the particle size of sample is smaller due to the increase the amount of C_6H_{12}. Energy Dispersive X-Ray Analyzer (EDX) confirms the presence of SiO_2. X-ray diffraction (XRD) determines whether the structure of the sample amorphous or crystalline. For sample 1 ml, 2 ml, 3 ml and 4 ml C_6H_{12} show they in amorphous form while 5 ml C_6H_{12} sample shows it is in crystalline form. The samples in amorphous form might be due to insufficient heat treatment. The energy band gap for the MSNs were determined using Tauc plot and shows increasing trend from 3.90 eV to 4.20 eV. The increases of energy gap show the decreases of size of particle. From FTIR analysis, the functional group including vibrational and bending modes present were determined. The synthesized mesoporous SiO_2 nanoparticles can be used for several applications such as drug delivery, bio-imaging, and biomedicine. In order to obtain high quality for MSNs, the reaction parameter can be improved in further research.