Synthesis of Nanostructure SBA-15 using Stems of Sorghum Ash as Silica Sources

Seyed Naser Azizi, Elham Chiani

Analytical Division, Faculty of Chemistry, University of Mazandran, Babolsar, Iran, elham_chiani@yahoo.com

SBA-15 is a mesoporous SiO₂ with a hexagonal arrangement of channels with diameters in the range of 2–30 nm. It is expected to be useful in the synthesis of ultrafine, nanorod arrays, protein separations, and highly efficient catalyst even in its powder form [1-3].

Pure SBA-15 has been prepared using direct synthesis by hydrothermal method. SBA-15 nanozeolite obtained by using Stem of Sorghum Ash (SSA) as silica source, Amphiphilic block copolymer as a structure directing agent and phosphoric acid were used in SBA-15 synthesis. X-ray fluorescence (XRF) measurements of Stem of Sorghum Ash (SSA) showed that over 80% silica and XRF measurements of the calcined samples indicated the presence of phosphorus, which might provide additional Brønsted acid sites for potential applications in catalysis. Stems of Sorghum are an excellent source of high-grade amorphous silica which can be extracted from Stems of Sorghum Ash by a suitable alkali solution [4].

The resultant materials were analyzed by infrared (IR) spectroscopy, X-ray diffraction (XRD), and scanning electron microscopy (SEM) to identify the structure and particle sizes. The diameter of crystal particles was calculated from Deby-Scherrer equation which was approximately 10 nm.

In summary, SBA-15 nanoporous was successfully synthesized using Stem of Sorghum Ash as silica sources by hydrothermal method. In addition, XRF measurements revealed that in the presence of phosphoric acid additional Brønsted acid sites on which belong to the presence of phosphorous have been generated in the silica framework.

REFERENCES