

Chemistry 2016: One Pot Hydrthermal Synthesis of HPA loaded Al-PILC Super Acid Catalyts- Suna Balci, Filiz Akti, and Timur Dogu, Gazi University, Turkey

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Abstract

Heteropoly acids (HPAs) which serve as both acidic and oxidation catalyst have restrictions in the applications due to their low surface area, degradation at moderate temperatures and solubility in polar media. One-step synthesis of HPA/Al-PILCs which combines the superior properties of both HPA and PILC structures carried out in this work was carried out firstly in this study for get rid of these restrictions. Texas Montmorillonite STx-1 and betonies from Anatolia were used as support materials using $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ and $\text{H}_4(\text{W}_{12}\text{SiO}_{40})$ syntheses were carried out at different with OH/M and W/Al under basic and acidic ion-exchange steps and finally carbonization was carried out at 300°C for 3 hours. XRD results showed that, pillaring by aluminium resulted in increase in basal spacing value of STx-1 from 1.54 nm to 1.89 nm and pillared structure was preserved by HPA incorporation with the resulted higher basal spacing. Nitrogen adsorption isotherms of samples reflected Type IV isotherm of the IUPAC classification. Up to 40 % decrease in BET surface area value of Al-PILC which was measured as $245 \text{ m}^2/\text{g}$ occurred at low HPA loading. Fourier transform infrared spectroscopy (FTIR) showed that the incorporation of the HPA caused considerable increase mainly in Bronsted acid sites. The stability of HPA in the structure is confirmed both by XRD, XPS and FTIR spectrums. It was concluded that the ion exchange under acidic conditions improved structural properties. Samples obtained from natural clay reflected the similar structural properties.

Biography

Suna Balci has completed the PhD at 1992 from Middle East Technical University. She has been working as a professor in Gazi University. Over 700 citations has been done to 25 papers in journals indexed by SCI and more than 55 presentations in international conferences in fields of porous material synthesis such that nanotubes, pillared clays and mesoporous silica materials, heterogeneous catalytic reactions and adsorption. She completed and still has working on big budget projects financed by national institutions.

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