

## **A novel method of synthesis and a new insight into the vanadium incorporation in three dimensional mesoporous KIT-6**

**#Suman Chirra and \*N. Venkatathri**

Department of Chemistry, National Institute of Technology, Warangal 506 004, Telangana, India  
(Ph. +91 9491319976, E-mail: venkatathrin@yahoo.com)

**Abstract:** A nano-crystalline three-dimensional mesoporous KIT-6 and V-KIT-6 materials synthesized through a new sol-gel method. Various advanced techniques characterize the above-synthesized materials. The mesoporosity confirmed by Low angle Powder x-ray diffraction, BET-surface area analysis, and Transmission electron microscopic analysis. The vanadium incorporation established by the Field emission-scanning electron microscopy, Fourier transform Infrared spectroscopy, Raman spectroscopy, Electron spin resonance spectroscopy, and Ultraviolet-visible diffuse reflectance spectroscopy. V-KIT-6 catalyzes cyclohexane oxidation using  $H_2O_2$  and gives cyclohexanol and cyclohexanone as the products. The conversion (83% in 1 h) is remarkably higher in its class of compounds due to the presence of three-dimensional mesoporosity. The catalysts are found to be stable even after five successive cycles. A plausible vanadium species and catalytic reaction mechanism also proposed.

**Keywords:** *mesoporous materials, sol-gel synthesis, characterization, heterogeneous catalysis, catalysis mechanism, plausible vanadium species*