

**Encapsulated  $PW_{12}$  on Titanium exchanged HY zeolite: A novel photocatalyst for photoreduction of Methyl Orange**

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The preparation, characterization and photoreactivity of encapsulated  $PW_{12}$  on Titanium exchanged HY zeolite is presented. The material was prepared by an ion-exchanged method with ammonium titanyl oxalate monohydrate aqueous solution first and then heteropoly acid is encapsulated by in-situ synthesis. The results of IR, reflectance spectra,  $^{31}P$  MAS NMR studies support the contention that the exchanged titanium species locate dominantly inside the zeolite cavities and not on the external surfaces and also the heteropolyacid in the supercage of zeolite. The encapsulated heteropolyacid on titanium exchanged HY zeolite exhibits charge transfer and electron transfer processes like semiconductor photocatalyst  $TiO_2$ . In the photoreaction of Methyl Orange a 20-fold increase in photoreaction rate is observed compared to HPA encapsulated photocatalyst. Similarly a four-fold increase in the rate is observed when compared to the appropriate HPA- $TiO_2$  colloidal system. Thus the prepared encapsulated  $PW_{12}$  on Titanium exchanged HY zeolite observe the photoinduced interfacial electron transfer from Titanium exchanged HY zeolite to encapsulated HPA and the synergistic enhancement of the catalytic activity of photoreduction of methylorange analogue to plant photosystem.