# Studies on the Acidity and Ionic Conductivity of Supported Heteropoly Compounds.

March, 1990

Reiji OHTSUKA

Acidity and ionic conductivity of silica-supported heteropoly compounds (HPC) such as $H_3PMo_{12}O_{40}$ and $H_7PMo_8V_4O_{40}$, and their sodium, potassium and cesium salts have been studied.

Characterization of HPC has been carried out by means of X-ray diffractometry (XRD), electron spin resonance (ESR) and nuclear magnetic resonance (NMR) spectroscopies. In the $H_3PMo_{12}O_{40}$ supported on silica ESR spectra showed three signals due to molybdenum(V) with three different surroundings ; at the interface between $H_3PMo_{12}O_{40}$ adsorbate and silica support, at the outer-surface of $H_3PMo_{12}O_{40}$ layer and in the bulk of $H_3PMo_{12}O_{40}$ adsorbate. At low loading of HPA mobility of proton in HPA on silica has been found to increase when the two-dimensional aggregate of HPA is formed on silica, while it decreases as the three-dimensional one is foemed at higher loadings.

Acidity function $H_0$ of silica-supported HPC has been also studied in connection with their catalytic activity for the dehydration of t-butyl alcohol. $H_0$ was determined spectrophotometrically. Linear relationships are established between the $H_0$ obtained and the amount of HPC supported or the catalytic activity for the dehydrations of t-butyl alcohol. This dependency confirms that the dehydrations of t-butyl alcohol in liquid and gaseous phases proceed through the pseudo-liquid and outer-surface mechanisms, respectively.

Ionic conductivity for HPC has been dealt with their response as humidity sensor. Ionic conductivity of HPC has been found to increase with increasing the acidity. Also, the preaparations of HPC humidity sensors utilizing Sol-Gel method and using porous glass as support are examined.