World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:10, No:05, 2016

Study of the Adsorptives Properties of Zeolites X Exchanged by the Cations Cu2 + and/or Zn2+

Authors : H. Hammoudi, S. Bendenia, I. Batonneau-Gener, A. Khelifa

Abstract : Applying growing zeolites is due to their intrinsic physicochemical properties: a porous structure, regular, generating a large free volume, a high specific surface area, acidic properties of interest to the origin of their activity, selectivity energy and dimensional, leading to a screening phenomenon, hence the name of molecular sieves is generally attributed to them. Most of the special properties of zeolites have been valued as direct applications such as ion exchange, adsorption, separation and catalysis. Due to their crystalline structure stable, their large pore volume and their high content of cation X zeolites are widely used in the process of adsorption and separation. The acidic properties of zeolites X and interesting selectivity conferred on them their porous structure is also have potential catalysts. The study presented in this manuscript is devoted to the chemical modification of an X zeolite by cation exchange. Ion exchange of zeolite NaX by Zn 2 + cations and / or Cu 2 + is gradually conducted by following the evolution of some of its characteristics: crystallinity by XRD, micropore volume by nitrogen adsorption. Once characterized, the different samples will be used for the adsorption of propane and propylene. Particular attention is paid thereafter, on the modeling of adsorption isotherms. In this vein, various equations of adsorption isotherms and localized mobile, some taking into account the adsorbate-adsorbate interactions, are used to describe the experimental isotherms. We also used the Toth equation, a mathematical model with three parameters whose adjustment requires nonlinear regression. The last part is dedicated to the study of acid properties of Cu (x) X, Zn (x) X and CuZn (x) X, with the adsorption-desorption of pyridine followed by IR. The effect of substitution at different rates of Na + by Cu2 + cations and / or Zn 2 +, on the crystallinity and on the textural properties was treated. Some results on the morphology of the crystallites and the thermal effects during a temperature rise, obtained by scanning electron microscopy and DTA-TGA thermal analyzer, respectively, are also reported. The acidity of our different samples was also studied. Thus, the nature and strength of each type of acidity are estimated. The evaluation of these various features will provide a comparison between Cu (x) X, Zn (x) X and CuZn (x) X. One study on adsorption of C3H8 and C3H6 in NaX, Cu (x) X , Zn (x) x and CuZn (x) x has been undertaken.

Keywords : adsorption, acidity, ion exchange, zeolite
Conference Title : ICCS 2016 : International Conference on Chemical Sciences
Conference Location : Montreal, Canada
Conference Dates : May 16-17, 2016