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Effects of Acid Treatment on Surface Characteristics of the Oxides, CoO, MnO₂ and ZnO

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Abstract — Metal oxides are commonly used as oxidation catalysts. The present work investigates the effects of treatment with 0.5 and 1.0 N H₂SO₄ on the surface characteristics of three oxides, CoO, MnO₂ and ZnO. The materials along with the parent oxides were characterized by powder XRD, FT-IR and SEM measurements. BET surface area and pore characteristics as well as cation exchange capacities of the materials were also determined. Significant differences were observed in the materials following acid treatment. These differences in the physico-chemical characteristics of the two sets of materials, were discussed on the basis of the possible use of the materials as oxidation catalysts.

Keywords : *CoO, MnO₂, ZnO, acid treatment, surface area, pore volume, cation exchange capacity.*

INTRODUCTION

Oxides have been widely used for many technological applications, such as coating, catalysis [1, 2], battery cathodes [3, 4], gas sensors [5], electrochromic films [6], and fuel cell electrodes [7, 8] etc. These applications are closely related to surface area of the materials. Metal oxides (MO_x) belong to an important category of materials because of their varied structures, stoichiometry, chemical and physical properties. They are frequently used in various industries for their semiconducting properties. The metal oxide are useful as sensor for their low-cost, light weight and simplicity [9]. Oxides with the perovskite-type structure containing cobalt, namely SmCoO₃, is a good candidate for gas sensing applications. It exhibits fast electrical

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