

CHAPTER I

INTRODUCTION

During the past 20 years, refiners and petrochemical producers have experienced a serious increase in catalyst poisoning and corrosion in processing equipments. This phenomenon may be partially explained by the diversification of the feedstock supply resulting from the need to optimize the profitability of refining and petrochemical operations. The utilization of a more diverse feedstock supply containing metal impurities has led to operating problems such as corrosion of aluminum alloys in steam cracker cold boxes and poisoning of catalysts.

Mercury present in these feedstocks forms amalgam with the catalyst components and material of apparatus such as palladium, platinum, copper, aluminum, etc and hence deteriorates the catalytic activity of catalyst and corrodes the material of apparatus. Thus the cost of maintenance and toxic waste disposal due to mercury contamination contributes significantly in overall cost of operation. Mercury is a corrosive substance and a serious catalyst poison even at level of 50 ppb. So, total concentration of less than 5 ppb is desirable before any transformation processes

The removal of such contaminants is also desirable from the environmental standpoint as atmospheric pollution by heavy metals has a direct impact on health through respiration. Therefore search for mercury removal process is desirable and understanding the behavior of existing forms and problems associated with its removal will be very useful information in order to develop an efficient and eco-friendly process.

In this regard, the adsorption kinetics of metallic mercury in n-heptane was studied on various types of zeolites, *i.e.*, X, Y, L, Omega, Beta and CMG273 (commercial adsorbent: CuS impregnated on alumina) in a batch system at temperatures 30°C, 40°C and 50°C under atmospheric pressure conditions. Further, in a adsorption isotherm study for the same, Langmuir model was used to correlate mercury concentration between solid and liquid phases. Also, the performance of CMG273 was tested in a continuous system in order to provide basis for predictive model for breakthrough time.