GENERAL INTRODUCTION

One of the prominent problems of nearly all industries is the corrosion of metals and alloys. In 1959 Uhlig(1) made a survey of losses by corrosion in the U.S.A. and reported a rate in excess of 5.5 billion dollars per annum and suggested that 900 million dollars per annum may be saved by better corrosion protection methods. According to Rajagopalan(2) the cost of corrosion in India has been estimated at Rs. 154 crores (1540 million) annually.

The metals like Iron, Aluminium, Copper, Zinc, Lead, Nickel and their alloys are widely used in industries. Some of them are in short supply and are likely to be exhausted in the near future. The conservation of our natural resources of important metals is a problem of top priority.

In India, the natural resources of the base metals are meagre and one has to look for other metals like aluminium and its alloys because of their important properties like high strength, excellent heat and electrical conductivity, high free energy, freedom from product discoloration, low maintenance cost, non magnetic, non toxic, high atmospheric corrosion resistance, low density, ease of machining and fabrication, extremely attractive brightness and finish. The importance of utilization of aluminium in India is obvious,
because the resources of other non-ferrous metals are limited, aluminium being the only abundant non-ferrous metal.

The demand of aluminium has increased from 50,000 tons in 1916 to 150,000 tons in 1966 and was estimated to be 300,000 tons in 1971-72(3). The progress of aluminium industries in India is linked with the development of hydroelectric power(4). The uses of aluminium and its alloys in the chemical industries are too many to express in a single article. Corrosion resistance of aluminium is the main consideration of the chemical industries.

Admittedly, aluminium cannot be used for all types of equipment and under all conditions of production for all types of chemicals. Despite earlier disappointments encountered with aluminium in some chemical industries, it is regarded as one of the most important metals used to-day by those industries according to Murthy(5).

The remarkable resistance of aluminium towards atmospheric attack is due to the formation of an oxide film on the surface. However, in circumstances leading to deterioration of this protective film, aluminium is corroded.

During the period 1931-1939, Evans, U.R., Bannister, L.C., Hoar, T.P., Thornhill, R.S., Agar, J.N. and others laid the foundation of the electrochemical theory of corrosion. The division of inhibitors into anodic (efficient but dangerous) and cathodic (safe but not very effective) was laid down in
In India corrosion studies are conducted by National Metallurgical Laboratory at Jamshedpur, Defence Research Laboratory at Kanpur and at Hyderabad Central Electrochemical Research Institute at Karaikudi (Tamil Nadu), Naval Research Laboratory, Bombay; Indian Institute of Science at Banglore, Central Salt and Marine Chemicals Research Institute at Bhavnagar and Chemistry Department, University School of Sciences, Ahmedabad. The systematic work on corrosion and its prevention has been laid down in India by Rajagopalan, K.S., Sanyal, B., Ramachar, T.L., Trivedi, A.M., Vasu, K.I., Lahiri, A.K., Subramanyan, N., Sushadri, K., Shibad and others.

The present study is an extension of the previous work carried out at our laboratory by the students of the late Prof. A.M. Trivedi, Professor of Chemistry, University School of Sciences, Gujarat University, Ahmedabad. The work essentially consists of inhibition studies of aluminium manganese alloy (3S) (also known commercially as 3003) in variety of media which include acid, alkali and salt water solutions and local water supply (hard water) of Gujarat University Campus. Extensive data are available on inhibition of metals and alloys by a large number of organic compounds such as amines, mercaptans and thioureas. However, very scanty data are found in literature regarding inhibition by colloids, amino acids and carbohydrates. Most of such compounds are readily available.
in nature. These compounds are usually quite cheap and are usually non-toxic.

In the present work, inhibition of the aluminium alloy by colloids, amino acids etc., has been studied in stagnant, slowly moving and rapidly moving conditions.

Corrosion losses are measured by the weight loss method which is supplemented by galvanostate measurement study. The results obtained have been discussed and an attempt has been made to discuss the mechanism of inhibition in light of the existing theory on inhibition.