# CHAPTER I
# INTRODUCTION

Chemical or electrochemical reactions between the metal and its environment can cause the destruction of a metal through the process of corrosion. This includes electrochemical reaction in aqueous media, molten salts, or in other environments where two coincident reactions involve electron transfers. Oxidation of the metal liberates electrons, which are accepted by the reduction of another substance such as hydrogen ions or oxygen. The metal destruction also concerns the oxidation at high temperatures in a solid-gas reaction.

Water is an underlying mediator of corrosion, which usually contains elements in solution that accept electrons and which can dissolve the metal oxidation products. Water likewise enables the transport of the electrochemical species necessary for corrosion.

Aluminum rivets and screw fasteners act as sites which are particularly susceptible to corrosion with the presence of the water often found in those small gaps or crevices. This has been observed for example on the fuselage of some aircraft with important implications for lifetime of the plane. It has been suggested that the influence of capillary force could draw water into crevices between the rivet or screw, and the facing surface. Aluminium surface can be modified to retard or prevent the corrosion by means of minimization of the water uptake.

Corrosion in narrow gaps results from differential aeration. Since it is difficult for oxygen to penetrate into the small hole, the oxygen concentration in the crevice is then low. Once corrosion by differential aeration has begun, the corrosion would proceed at a relatively fast rate within a narrow fissure or crevice.

A crevice which is annular in shape, can exert the capillary force and therefore it is of interest to study the capillary rise in annular geometry. The objectives of this work are to distribute an account of the static interface that makes up the fundamental understanding of the capillary rise in annulus, to find the amount of water uptake inside annulus that can be utilized for surface treatment applications, and to compare the predicted capillary rise in an annulus with experiment. The studies of the static interface can then lead to the understanding of dynamic interface, which can be used to elucidate the corrosion problems.