CONSTANT LOAD EFFECT ON FRACTURE OF POLYMER CONCRETE (PC) DUE TO ENVIRONMENT

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ABSTRACT

The behavior of compact tension (CT) polymer concrete (PC) when exposed to air, water (**pH=7**) and sulfuric acid (**pH=4**) were investigated over a period of one and three weeks, respectively. In this study, CT specimen exposed to air will be considered as optimum condition. Also the effect of environment to PC on the fracture toughness was studied. The decrease in fracture toughness was dependent on the type, concentration and pH of the corrosive solutions. In water and sulfuric acid exposure, PC did show reduced the fracture toughness compared to optimum specimen. Water was the most corrosive media compared to others as it reduced about **15.71%** of the fracture toughness. The reduced fracture toughness corresponded to the increasing in pH value. There was linear correlation between the fracture toughness and stiffness. The highest fracture toughness was air at **1.89MPa$\sqrt{m}$** having stiffness **0.3875kN/mm** while the lowest fracture toughness was three weeks immersed in water at **1.59MPa$\sqrt{m}$** having stiffness **0.3000kN/mm**. A fixture was fabricated to conduct constant load test at 90%, 80% and 70% of fracture toughness. PC immersed in sulfuric acid for a week and three weeks show increasing percentage of life time to failure due to fracture at all loading rate. For 80% of fracture toughness loading, there was slightly different in large decreasing percentage of life time to failure for PC immersed in a week (**94.95%**) compared to three weeks immersed in water (**86.77%**). The reduced of percentage life time corresponded to suddenly increase uptake of water for the first week immersed. From the observation, decreasing life time to failure due to fracture for PC in all condition had no correlation with increasing load conducted for constant load test.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

In a rapidly changing environment of today's global construction industries, players need flexibility, expertise and creativity to perform effectively and efficiently in order to be ahead of their competitors. Many research had be done to find and improve materials use in the construction industries.

As we know, even conventional Portland cement concrete physical properties and relatively low cost but it has a number of shortcomings include poor flexural strength, poor tensile strength, high porosity, freeze thaw deterioration, destruction by corrosive chemicals etc (Popovics, 1979). These disadvantages well known to engineer and can be allowed in most application. This research actually continues from the past research; therefore in this research not border about the composts of polymer concrete (PC) use in the experimental work as use the same as before.

Interaction between materials and environments can results in slow crack growth (Parkin, 1975). Most of the concrete in practical are subject to attack by corrosive environments require suitable protection for it. Engineering materials often contain flaws, crack or in-homogeneities that propagate to cause fracture under the service loading conditions. The flaws may grow and propagate to critical seizes that eventually leads to catastrophic failures (Yakub, 2004)