UNIVERSITI TEKNOLOGI MARA

EFFECT OF TEMPERATURE AND PH VALUE ON THE RATE OF CORROSION

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ABSTRACT

Transmission gas pipeline is important part in oil and gas industries while a carbon steel is a primary material for construction the pipeline due its low cost and availability, but it is very susceptible to corrosion in Co_2 environment. There are several types of corrosion can occur in pipelines which is effect to the production of the oil and gas. Carbon dioxide (CO_2) corrosion one of the type of corrosion that occur in oil and gas industries that causes the pipelines failures. Aqueous carbon dioxide (carbonic acid) is corrosive and corrodes the carbon steel pipelines and it is influenced by several environment factors such as temperature, pH, and oxygen content. In this research, that factors temperature and pH are focusing in effect of corrosion rate. Main of the experiment are to study the effect of the temperature and pH in to the rate of corrosion. This experiment set up with the different temperature and pH Value such as 30°c, 50°c and 80°c and pH like pH 3, pH 5, pH 7, pH 9 and pH 11. In this research, the samples will measure their weight before and after experiment. Then, weight loss of the every samples are recorded to calculate the rate of corrosion. Based on the research that corrosion can occur when form higher temperature condition and low of pH environment. As the temperature increase, the corrosion rate will increase due to the dissolution of iron ion and formation of weak carbonic acid. In acidic condition, the present of H^+ ions make H^+ reduction cathodic reaction and corrosion rate is occur due to low of pH.

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1. RESEARCH BACKGROUND

Corrosion is natural occurring process where it can be defined as the deterioration of a material's properties due it interaction with its environment. Corrosion can lead to failures in plant infrastructure and machine which are usually costly to repair, in term of loss of contaminated products, environmental damage and possibly costly in term of human health. The driving force that causes metals to corrode is due to the natural consequence of their temporary existence in metallic form.

Transmission of gas pipelines is important aspect of national energy transportation infrastructure vital to the national economy. Usually the pipeline is operated in high pressure can occur pipeline failure, it can cause severe damage to human health and property and interruption of gas supplies (Gleen M.Light, 2003)But the most common problem occur in the pipelines is present of the corrosion which is a carbon oxide, hydrogen sulphide and water can form in a well. These compounds combine to form a corrosive environment under different environmental conditions such as temperature, pH, pressure and concentration (Venkatasubramaniam, 2009)

Besides, corrosion can effect to the structural integrity on a pipeline and make it unsafe vehicle for transporting potentially hazardous materials. The CONCAWE Oil Pipelines Management Group's Special Task Force reported that eleven accident that resulted in a gross spillage total of 516 m^3 in Western Europe in 1999.Then, the corrosion factors had been to measure in order to put a stop on the corrosion impact which are from the external or internal factors.