CHAPTER 1

INTRODUCTION

1.1 Background of Study

Methane gas is one of the most prevalent gaseous in the air yet it still has its benefits. Methane is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock (Overview of Greenhouse Gases, 2010). A method of separation is used to the methane, CH4 gas from another mixture of gas that includes carbon dioxide, carbon monoxide, nitrogen oxide and sulfur dioxide in the combustion of natural gas. Polyvinyl chloride, PVC is introduced in this study of membrane preparation, characterization, and optimization for the separation of CO2/CH4 gas mixture.

1.2 Motivation

Global methane emissions from landfill are estimated to be between 30 and 70 million tonnes each year. Most of this landfill methane currently comes from developed countries, where the levels of waste tend to be highest (GreenHouse Gas Online, 2002). A recent study was done at Kampung Sg. Ikan Landfill in Kuala Terengganu where the rubbish or wastes from the city of Kuala Terengganu was collected and the date were collected where wastes were segregated according to their 13 types, such as 3D plastic, 2D plastic, glass, and so on. The datas collected shows the potential in engineering especially for chemical engineering to uncover the recovery of methane gas from landfill, where we may separate the methane, CH4 gas from the overall biogas which also consist of carbon dioxide, CO2 and many other gases.

1.3 Problem Statement

A recent study was done at Kampung Sg. Ikan Landfill in Kuala Terengganu where the rubbish or municipal solid wastes from the city of Kuala Terengganu was collected and the date were collected where wastes were segregated according to their 13 types, such as 3D plastic, 2D plastic, glass, and so on (Table 7.1). Methane can be achieved or obtained through solid waste, mainly food waste, through the precise processes and also through gas separation.

Table 1.3-1: MSW data from Kg. Sg. Ikan landfill for 3 weeks

Categories/Week	**1**	**2**	**3**	**Total**
Total waste (kg)	11010.00	13500.00	7040.00	31550.00
Waste weighed (kg)	9926.95	12453.20	7007.90	29388.05
Waste weighed (%)	90.16	92.25	99.54	93.15
Plastic 3D (kg)	362.59	480.00	274.30	1116.89
Plastic 2D (kg)	869.10	1164.50	665.30	2698.90
Metal (kg)	7.96	33.70	33.20	74.86
Aluminum can (kg)	100.61	195.90	107.30	403.81
Paper (kg)	843.60	878.40	741.30	2463.30
Pampers (kg)	873.35	1631.00	889.40	3393.75
Glass (kg)	200.72	235.70	142.10	578.52
Wood/Landscape (kg)	1099.51	2179.20	1802.30	5081.01
Polystrene (kg)	118.90	219.70	81.10	419.70
Bed (kg)	9.48	0.00	10.00	19.48
Textile (kg)	108.94	289.50	146.40	544.84
Food waste (kg)	4542.91	5227.60	2107.60	11878.11
Others (kg)	1063.62	1046.80	66.50	2176.92

Hence, we can deduce that Food Waste is the main contributor to the total municipal solid waste (MSW). Food Waste is also the main cause for methane formation.

1.4 Objectives

The following is the objective of this research:

1) To produce flat sheet PVC membrane for CH_4/CO_2 gas separation.
2) To characterize the produced PVC membrane physically.
3) To study the performance of the PVC membrane.

1.5 Scopes of Study

The following are the scope of this research:

1) The production of the PVC membrane with the NMP as a solvent according to ratio of 18: 82, 20: 80, 23: 77 and 25: 75 PVC to NMP via phase separation method.
2) The membrane is characterized to by using Scanning Electron Microscopy (SEM) and Fourier Infrared Spectroscopy (FTIR) devices.
3) The performance study of the produced membrane will be tested by gas single permeation device.