

UNIVERSITI TEKNOLOGI MARA

**EXTRACTION OF LIGNIN FROM BLACK LIQUOR
FOR APPLICATION AS LOSS CIRCULATION
MATERIAL IN DRILLING MUD**

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ABSTRACT

Well exploration and drilling are the most expensive process in oil and gas industry. Some of the materials that are used plentiful during drilling process are lost circulation material (LCM). The materials are used to prevent the loss of drilling fluid into the natural or induced fracture. Black liquor (BL) are the liquid by-product of the kraft pulp process in the paper industry. This waste could be disastrous if release to natural water stream because it has a very high pH value. The valuable lignin contain in BL are abundant and it uses as LCM in drilling fluid is no stranger. In this research, the lignin extracted from BL will be used directly as LCM in drilling mud. The DOE Taguchi method are used during the extraction with two parameter level, types of acid used and two different pH value. The mass percent yield of the extracted lignin are increase as the pH value are lower. It is also proven that lower the pH value of acidic BL, the more yield the extracted lignin based on the analysis done on it physical properties done using FTIR.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

In these past years, the decline of the oil and gas industry in term of market price and so on due to the decrease in the demand from some of the countries due to insipid economic growth and coupled with surging US oil production (Tim, 2015). According to Tim (2015), from 2010 until mid-2014, world oil prices had been fairly stable, at around \$110 a barrel. But since June 2014, prices have decreases more than half. Brent crude oil has now dipped below \$50 a barrel for the first time since May 2009 and US crude is down to below \$48 a barrel. This kind of situation also put a lot of stress to the oil based company such as PETRONAS, SHELL and so on, making them stop some of their oil production rig and decrease their production rate because the price of the oil cannot accommodate the production prices. The cost of oil production from the crude oil extracted from the earth are quite expensive especially its capital cost in well exploration. One of the expensive process is the drilling of the oil well to produce the natural gas from the reservoir. This drilling process takes up several equipment, material, times, professionals as well as a lot of money. Some of materials used in the drilling process is drilling mud.

Drilling mud is a very important part in rotary drilling process of a well. Different types of chemicals and polymers are used in designing a drilling mud to meet some functional requirements such as appropriate mud rheology, density, mud activity, fluid loss control property and many more (Amanullah *et al.*, 1997). Drilling mud which is also known as drilling fluid has a several important function in well drilling. Some of that function are it act as lubricant for drilling tools so that the tools can easily break the rock and turns it into cuttings. This cuttings will be pushed up to the surface by pressure build up from the drilling mud. In course of drilling well, the drilling mud can be differentiate into many types which some of them is water and oil- based drilling fluids. The selection