

MONITORING QUALITY OF SODA BLACK LIQUOR OF OIL PALM EMPTY FRUIT BUNCH FIBERS IN TERMS OF STORAGE TIME AND TEMPERATURE

M. N. MOHAMAD IBRAHIM¹, W. D. WAN ROSLI² & S. B. CHUAH³

Abstract: The quality of black liquor from oil palm empty fruit bunch fibers pulping was determined through direct isolation of soda lignin using 10% hydrochloric acid at three pH fractions, i.e. pH 2, pH 4 and pH 6. Destructive methods such as nitrobenzene oxidation and ash contents determination were used in the study. pH 2 was found to be the most preferable fraction due to the highest lignin yield. Nitrobenzene oxidation showed that the predominant compound was vanillin, which was in the range of 44.9-52.1% of the total product. Syringaldehyde was the second major compound (ca. 21.5-30.8%), followed by *p*-hydroxybenzaldehyde. The moisture and the ash contents of pH 6 fraction were the highest followed by pH 4 fraction and pH 2 fraction, especially at longer storage time. Soda lignin has to be isolated in less than 15 days of storage regardless of storage temperature to prevent high rate of biodegradation activities.

Keywords: Black liquor, lignin, oil palm empty fruit bunch fibers, storage time, storage temperature

Abstrak: Kualiti likuor hitam daripada proses pemulpaan tandan buah sawit kosong ditentukan melalui kaedah pemencilan langsung lignin soda dengan asid hidroklorik 10% pada tiga nilai pH iaitu 2, 4 dan 6. Kaedah memusnah seperti pengoksidan nitrobenzena dan penentuan kandungan abu digunakan dalam kajian ini. pH 2 didapati memberi dapatan lignin yang tertinggi. Melalui ujian pengoksidaan nitrobenzena, vanilin adalah sebatian utama yang mewakili 44.9-52.1% daripada jumlah produk. Siringaldehyd pula merupakan sebatian kedua utama yang mewakili 23.1-30.8%, dan seterusnya diikuti pula oleh *p*-hidroksibenzaldehid. Kelembapan dan kandungan abu bagi sampel lignin yang dipencilkan pada pH 6 adalah yang tertinggi diikuti oleh pH 4 dan pH 2 terutamanya apabila disimpan lama. Kajian ini mendapati, bagi kedua-dua suhu penyimpanan, lignin soda perlu dipencilkan sebelum mencapai tempoh penyimpanan selama 15 hari untuk mengelakkan kadar aktiviti biodegradasi yang tinggi.

Kata kunci: Likuor hitam, lignin, serat tandan buah sawit kosong, masa penyimpanan, suhu penyimpanan

1.0 INTRODUCTION

Malaysia has over 2.5 million hectares of oil palm plantations that could yield more than 8 million tones of empty fruit bunches (EFB) annually. The enormous amount of EFB generated from palm oil milling operations pose serious environmental threat to the society. Fibrous derivatives from empty fruit bunch represent a renewable source

^{1&3} School of Chemical Sciences, Universiti Sains Malaysia, 11800 Minden, Pulau Pinang.

² School of Technology Industry, Universiti Sains Malaysia, 11800 Minden, Pulau Pinang.