IOP Conf. Series: Materials Science and Engineering **206** (2017) 012021 doi:10.1088/1757-899X/206/1/012021

Effect of flow rate, duty cycle, amplitude, and treatment Time of ultrasonic regimens towards *Escherichia coli* harbouring lipase

W S A W Omar[1,2], A Z Sulaiman[1]*, A Ajit[1], Y Chisti[3], A L T Chor[4]

[1]Faculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang, Gambang 26300, Pahang, Malaysia
[2]Faculty of Applied Sciences, Universiti Teknologi MARA Cawangan Pahang, Bandar Jengka 26400, Pahang, Malaysia
[3]School of Engineering, Massey University, Private Bag 11 222, Palmerston North, New Zealand
[4]Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia

E-mail: ziad@ump.edu.my

Abstract. A full factorial design (FFD) approach was conducted to assess the effect of four factors, namely flow rate, duty cycle, amplitude, and treatment time of ultrasonic regimens towards *Escherichia coli* harbouring lipase. The 22 experiments were performed as the following values with six replicates of centre point: flow rate (0.1, 0.2, and 0.3 L/min), duty cycle (0, 20, and 40%), amplitude (2, 6, and 10), and treatment time (10, 35, and 60 min). The FFD was employed as preliminary screening in shake flask cultivation to choose the significant factors ($P< 0.05$) for further optimisation process. In this study, zero duty cycle signified non-sonication of amplitude and no treatment time effect to the *E. coli* culture. Also, the designated flow rate and amplitude accordingly showed no effect towards the amount of dry cells weight (DCW). DCW_1 was found significantly degraded after the exposure of high duty cycle and treatment time as other factors remained constant. Whereas for the lipase activity, no significant difference was observed in any main factors or interactions. Paired samples t-test confirms the result at a *p*-value of 0.625. This experimental study suggests the direct and continuous approach of sonication caused an adverse effect on the cells culture density.