CHAPTER 5

CONCLUSIONS AND FUTURE'S PERSPECTIVES

CHAPTER 5

5. CONCLUSIONS AND FUTURE'S PERSPECTIVES

The present work explores the feasibility of gasification of coconut husk for fuel gas production. Furthermore, the utilization of waste water of pulp and paper industry to engender the desired components in fuel gas has also been studied. Several experiments were conducted in fixed bed, fluidized bed gasification column and salient conclusions of gasification of unripe and impregnated coconut husk are illustrated in this chapter. Furthermore, the optimization was performed by Box-Behnken design method using RSM onto fluidized bed gasification and its conclusion has also been illustrated in this chapter. Future perspectives of this work were also recommended in this chapter.

5.1. Conclusions

- ED-XRF analysis confirmed the impregnation of Na, Ca which were responsible to brisk the gasification process.
- Humidified air is promising candidate which can be an alternative to air-steam blast for gasification process.
- Cold gas efficiency was found to be maximum of 77.11% for ICH25 in humidified air fixed bed gasification at HER of 0.3 whereas, for UCH it was held at 68.69 % at HER 0.2.

- For fixed bed gasification, the HHV value was found maximum as 11.31 MJ/Nm^3 when humidified air was retrofitted with CO_2 gas.
- The maximum hydrogen concentration in fuel gas for fixed bed gasification was found as 61% by with CH_4 concentration 13 % for ICH105 at HER 0.1 and gasifying temperature 850 ℃.
- Optimum condition of humidified air to CO_2 ratio was 1:1/3 for fluidized bed gasification.
- Highest H_2 concentration (56.01 vol%) was observed at gasifying temperature 900 ℃, but it is comparable to 850 ℃ (H_2 concentration 55.55 vol%) for fluidized bed gasification.
- CO_2 addition in the ratio of humidified air to CO_2 1:1/3 at gasifying temperature 850 ℃ produced HHV 5.34 MJ/Nm^3 of fuel gas in fluidized bed gasification.
- Optimized parameters were predicted as fluidized bed gasifying temperature of 887.56 ℃, HER 0.13, and humidified air to CO_2 ratio 3.74 by Box-Behnken optimization method of RSM.

5.2. Future's perspectives

During this study a lot of experiments have been performed to analyse the possibility to enhance the product quality. However, there are many works remained that can be done by the upcoming researchers, which are as follows:

- Co-gasification of blend of different biomass and/or coal can be done.
- Gasification can be performed with real humidified air coming out from cooling tower of thermal power plants.
- Material and energy balance should be performed in the gasifier.

- Kinetics, mass transfer and thermodynamic studies should be performed for the biomass gasification process.
- Study on pilot plant for biomass gasification can be performed.