CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The hydrogen accumulation inside the cups depends significantly on the cup material and geometry. The variation of hydrogen pressure in the cups with time was similar for the two materials at the temperature of interest; however, the attainment of hydrogen steady state pressure in the carbon steel cups was faster than in the stainless steel cups and the plateau pressure dramatically lower.

The thinner cups yielded a lower hydrogen pressure accumulation at steady state. The achievement of plateau pressure the carbon steel cup was faster as the thickness decreases. In contrast to stainless steel cup, the thicker cup yielded the shorter time for pressure to achieve steady state.

The establishment of hydrogen steady state pressure in the larger cup was faster and the plateau pressure was higher than the smaller cup.

The carbon steel cup can monitor the changes better than the stainless steel cup.

At the same conditions, the results from modelling show good agreement with the experimental results reported in the thesis of Kongvarhodom (2014).

5.2 Recommendations

Experiments for measuring the hydrogen permeability of cup materials; carbon steel and stainless steel in this work are required to validate the model results of hydrogen accumulation inside the cup.

For the material effect, the surface area inside the cup is very important. Consequently, the dimensions of the cup are essential. The diffusion at the top of the cup sometimes should be included in the equation.

For designing the dimension of the cups, the size of the pipe that is used to install the cups and the installing method should be considered.

The actual experiment at the same conditions used in the modelling should be done and then compared to the modelling results.

For the experimental set up, the plateau pressure inside the cup and the sensitivity of pressure transducer should be considered. Moreover, for safe operating conditions, the maximum hydrogen pressure inside the cup should be less than 100 kPa. Thus, the hydrogen pressure inside the cup could be modelled to predict the results before doing an experiment.