CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this research, graphite was modified by varying milling time and metal loading for hydrogen storage. The result of hydrogen storage capacities of all the samples in this work are ranged from 0 to 0.5 wt% (released hydrogen). The milling process leads to the change in the crystallinity and the physical properties of graphite including pore volume, pore diameter, and surface area. Larger pore volume, depressed pore diameter and increased surface area are produced for the milled graphite. And it is these properties that enhance the hydrogen adsorption. Moreover, the graphite milled for 2 h achieves the highest hydrogen storage capacity. Nevertheless, the hydrogen capacity decreases for the milling time longer than 2 h due to the agglomeration of graphite. Types of metal loading have an effect on the amount of hydrogen adsorption/desorption. Graphite doped with Fe powder, K_2CO_3, and TiO_2 cannot improve hydrogen uptake. In contrast, the graphite doped with $ZrCl_4$ or VCl_3 increases the hydrogen adsorption capacity. Furthermore, the structure of the milled graphite is stabilized by adding the transition metal (Zr or V). In the case of type of adsorbent, carbon nanotubes can store hydrogen more than the un-modified graphite owing to the higher pore volume.

5.2 Recommendations

A reading pressure value could be expressed in higher resolution by using higher bit of computer processing unit (CPU) in AI module 210 data logger (A/D).

Applying adequate amount of sample during experiment compensating all possible errors could make the results more reliable. The sample loading must be performed carefully in order to reduce the errors.

The operating condition especially the temperature has an affect on the display pressure. As a result, the adsorption condition should be operated at constant temperature in order to enhance the pressure precision.

The last approach is to keep further on investigation with the modification of graphite such as metal-doped, or with the new storage materials, such as graphite nanofiber or metal hydride.