CHAPTER 6

CONCLUSIONS AND SCOPE FOR FUTURE WORK

6.1 CONCLUSIONS

The following conclusions are drawn based on the present experimental work:

- The best flow rate of OEH gas is 4.6 lpm.
- The optimum injection pressure of diesel fuel is 220 bar.
- The optimum injection timing of diesel fuel is 19º BTDC.
- The optimum diesel fuel temperature is 35ºC.
- The optimum cooling water flow rate is 90%.
- The optimum inlet air temperature is 35ºC.

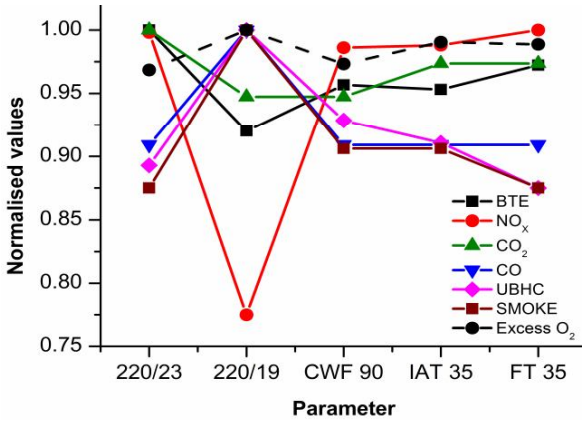

Figure 6.1 Comparison of behavior of various operating parameters

Figure 6.1 displays normalized values for various operating parameters. From the Figure, it is evident that when compared with other operating parameters, the OEH gas with diesel fuel injection pressure of 220 bar and 23^{o} BTDC gives higher brake thermal efficiency. At the same time it reduces all engine-out emissions except NO_X emission.

Hence, the DI diesel engine can be effectively operated with diesel fuel injection pressure of 220 bar and in retarded injection time of 19^{o} BTDC with the assistance of OEH gas. In retarded injection time only, the NO_X emission gets reduced along with all other engine-out emissions.

6.2 SUGGESTION FOR FUTURE WORK

Based on the present experimental work, the future investigations can be made on the following facets:

- Exhaust gas recirculation can be considered for reducing NO_X emissions.
- Cooling water flow rate effect can be analysed further especially by varying the flow rate with small steps.
- In future analysis, the effect of reduction in cooling water flow rate on cylinder material, lubricating oil, and on entire cooling water system can be considered.
- The present discussed operating parameters can be combined and an analysis can be made with the pairs of parameters such as varying the inlet air temperature and injection time, inlet air temperature and fuel temperature, injection pressure and inlet air temperature, injection pressure and fuel temperature, injection pressure and cooling water flow rate,

cooling water flow rate and injection time, cooling water flow rate and injection pressure, cooling water flow rate and fuel temperature, etc.,

- Some of the present discussed parameters can be analysed in LHR engines.
- Simulation works can be considered for analysis of combustion chemistry.
- The present analysis can be extended to multi cylinder diesel engines.
- The present analysis can be extended variable speeds and loads.
- The present analysis can be extended to transient conditions following recognised drive cycles.
- Use of RSM and Taguchi to reduce number of tests.
- Financial viability of entire system
- Whole process costing and effects on environment.
- The present analysis can be extended to very low temperatures, possibly sub-zero.
- The present analysis can be extended to evaluate the harmful effects of emissions by providing a ranking.