CHAPTER V
CONCLUSIONS

The reduction of nitric oxide by graphites was studied by using thermogravimetric system together with the steady state reaction kinetics. Micro 450 and SP-1 graphite samples were used in this study. The reaction rates for the reduction of nitric oxide by two samples of graphite were determined at NO concentration of 6%, 20% and 40% over a range of temperature of 500-800 °C. TOF increased as the reaction temperature and NO concentration increased. The results indicated that reaction temperatures and NO concentrations have great effect on TOF rates, the rates based on per active site.

It was found that the reaction rate equation was the first order with respect to the NO concentration at temperature below 650 °C while at higher temperatures the fractional order was observed. This fractional order is probably due to the effect of CO produced at high temperture on the reduction of NO by graphite.

A significant increase in the activation energy at 6% NO concentration was observed in both micro 450 and SP-1 graphites at the temperature above 600 °C and 650 °C, respectively. This increase in activation energy may be attributed to a change in the reaction mechanism. However, the temperature break in Arrhenius plot cannot be observed at other NO concentrations. Because there may be only one dominated reaction mechanism for 20% and 40% concentration. It was found that the decrease in the activation energy occurred when the NO concentration increased. This result also suggests that this reaction needs lower energy to occur in the high concentration of NO.

In comparison with other studies, the results show an agreement as to the temperature of the break point. It is observed to occur at temperatures in the range of 600-800 °C. It should be noted that the temperature "break" was found in experiments with NO pressure of 1.0-10.1 kPa. The reaction rate constant in this study was higher than that of other studies because it was calculated based on active surface area instead of total surface area.