CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Under the studied conditions with and without photocatalyst, ethylene was almost completely removed by the corona discharge. The ethylene decomposition efficiency decreased with increasing frequency. Since at a higher frequency, current is lowered leading to the reduction of the number of electrons generated. A higher applied voltage increased the C_2H_4 and O_2 conversions as well as CO_2 selectivity since current is increased with increasing applied voltage. A higher feed flow rate decreased both C_2H_4 and O_2 conversions and CO_2 selectivity because of decreasing residence time. For any given residence time, an increase in stage number of the sole plasma system enhanced remarkably the ethylene oxidation reaction. The presence of catalyst coated on glass ring did not affect significantly C_2H_4 and O_2 conversions and CO_2 selectivity. In case of coating on glass wool, both Degussa P25 and TiO_2 prepared by sol-gel method increased C_2H_4 and O_2 conversions and CO_2 selectivity because the energy produced from plasma generation activates TiO_2 to promote complete oxidation reaction. Interestingly, the presence of 1%Pt on TiO_2 increased CO_2 selectivity significantly as compared to blank Degussa P25 and blank sol-gel TiO_2 since Pt accelerates the formation of superoxide radical anion, $O_2^{\bullet-}$, and decreases recombination process.

5.2 Recommendations

Air should be used instead of pure oxygen in order to reduce the treatment cost. VOCs should be investigated using the present plasma system with and without catalyst. Other types of catalysts and supports are highly recommended to study for this application.