CHAPTER V
CONCLUSIONS

Polyaniline emeraldine base was synthesized by chemical oxidative polymerization in acid condition by using ammoniumperoxydisulfate as an oxidant. The FT-IR and UV-Visible results could confirm that in this work polyaniline emeraldine base was synthesized. These results are consistent with that of Zeng *et al.* (1998). The emeraldine base form of polyaniline was protonated to the conducting form of polyaniline by using hydrochloric acid and maleic acid. The undoped and doped polyaniline were prepared in the pellet form.

The FT-IR and UV-Visible results could also confirm that protonation doping only occurred at imine introgen and converted it to bipolaron and polaron structures. The EA results indicated that the doping levels increased dramatically with the doping ratio. By the effect of acid type, HCl had higher efficiency doped than MA at doping ratio < 2 because HCl is a stronger acid than MA. The XRD results have shown that the crystallinity structure of acid-doped polyaniline increased with increasing doping ratio.

The electrical conductivity of acid-doped polyaniline depended on the doping level, the electrical conductivity at saturated doping level ~4 S/cm for both of acid dopants. They also depended on crystallinity according to the power law equation: $\sigma = a[\%Crystallinity]^b$. The crystallinity effect of PANI-MA (b=22) is larger than that on PANI-HCl (b=17). For gas sensor application, PANI-10MA was suitable for use as a CO sensor because it had a high conductivity and sensitivity. The sensitivity of PANI-HCl was largely affected by the effect of doping level, but some enhancement of sensitivity of PANI-MA may be associated with charge mobility. However, the sensitivity of all doped polyanilines increased with CO concentration following power law equation: $\sigma = a[CO]^b$, b ~0.35-0.75. According to the sensitivity of PANI-10MA/zeolite A composite results, all zeolites A reduced sensitivity of PANI-10MA to CO, because of the decrease of PANI-10MA free volume. But b is the same as PANI-10MA. This result could be useful to control the sensitivity of polyaniline when used as CO.