# Chapter IV

Conclusions

By comparing between the two API-MS technique, ESI-MS and APCI-MS, it has been found that ESI-MS was a much more sensitive method for quantitation of aspartame. In neutral solution, the detection limit for aspartame analysis by ESI-MS was 0.1 ppm in which 50 μL of this solution was required for each analysis. This yield the absolute detectable amount of aspartame of 0.005 μg. For APCI-MS analysis, the minimum detectable concentration was 5.0 ppm and the minimum amount of aspartame required was 0.25 μg. ESI-MS also gave a better sensitivity for the detection of almost all aspartame degradation products including aspartic acid, aspartyl phenylalanine, diketopiperazine, phenylalanine and phenylalanine methyl ester. Ionization of aspartame and all its degradation products by ESI-MS under optimal condition yielded only molecular ions of the protonated species without any fragmentation. This result provides a way for studying of aspartame stability under various condition since it will be of certain that the degradation products detected by ESI-MS must be preexist in the sample not the fragmented products during ionization.

With the established ESI-MS method, the stability of aspartame at various pH, temperature and time were studied. It was found that between pH 2-10, aspartame in

the aqueous solution was most stable at pH about 2-4 and least stable at pH 10. It was also found that not only the rate of aspartame degradation were different when kept under different pH conditions, but the pathways of degradation were also different. Summary of degradation pathways is as follows:
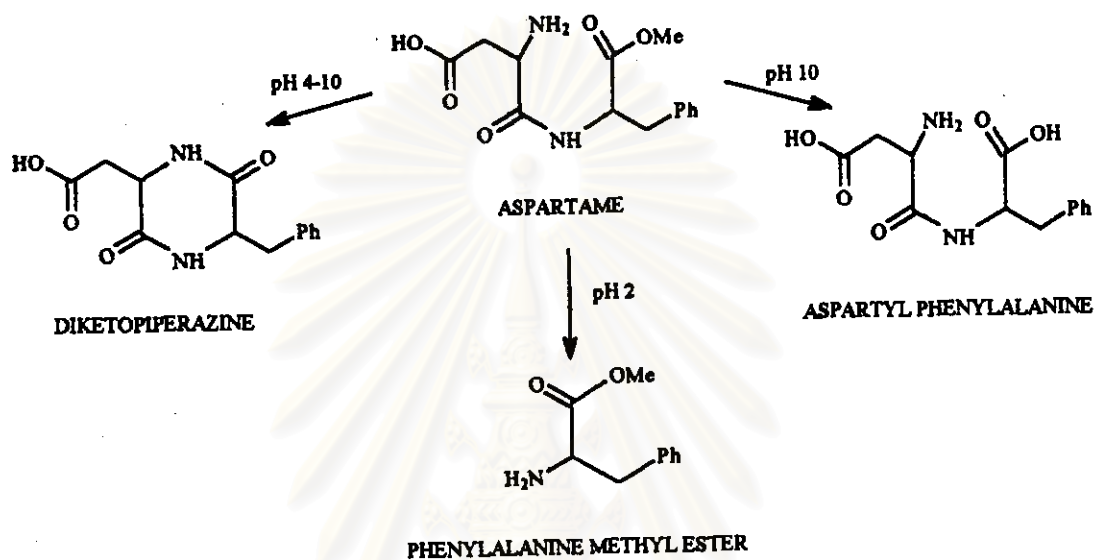
This study also shows that the stability of aqueous aspartame solution was decreased if the solution was kept at higher temperature.

Analysis of softdrinks sweetened with aspartame sold in Bangkok showed that when kept for 8 months the amount of aspartame dropped to 20 % of the original value.

Analysis of dry products such as sweetener sold in Bangkok showed no detectable aspartame degradation products. Dissolving these products in either room temperature water or 100 °C water and the resulted solution kept for 10 min, showed no significant amount of degradation products.