



CHAPTER V

CONCLUSION AND SUGGESTION

In summary, amino azo dyes in this study were synthesized from

1. The coupling reaction of ethyl-2-aminobenzoate and aniline derivatives.
2. The coupling reaction of hexyl-3-aminobenzoate and aniline derivatives.

The influence of substituent groups on aniline such as nitro, chloro and methyl groups was studied. Only amino azo dyes having substituent group as nitro group in o- and p- positions such as ethyl-2-aminobenzoate-2-nitrophenyl azo, ethyl-2-aminobenzoate-4-nitrophenyl azo, ethyl-2-aminobenzoate-2-chloro-4-nitrophenyl azo, hexyl-3-aminobenzoate-4-nitrophenyl azo, and hexyl-3-aminobenzoate-2-chloro-4-nitrophenyl azo except hexyl-3-aminobenzoate-2-nitrophenyl azo were conveniently used as markers in HSD. They had more advantages than the other amino azo dyes having substituent groups on aniline as chloro and methyl. They could be detected by simple method using the extraction with the suitable alkaline solution in the volume ratio of HSD and the extraction solvent 4:1. But they could not be detected without an appropriately reactive extraction system. These markers added in HSD reacted with the suitable extraction solution and then produced a red color in the extracted phase, while HSD without marker produced a pale yellow in the extracted phase. The distinction between marked and unmarked following up the extraction procedure could be observed with the naked eyes. Therefore, they could provide a very simple qualitative test for the presence of the marker. On the other hand, they could be tagged in HSD as low as 1- 6 ppm and provided a good relatively quantitative determination with use of

UV/VIS spectrophotometer. However, quantitative determination in the field test may be made with an appropriate colorimetric equipment.

Providing good miscibility with non-polar petroleum fuel of dyes by increasing the long-chain alkyl group of the esterifying acid from C₂ to C₆ alkyl, it was found that hexyl-3-aminobenzoate azo could not directly dissolve into fuel. Also, it may give more difficulty in extraction with petroleum-immiscible organic solvent so the extracted phase developed the weaker color. Of course, the treat rate of hexyl-3-aminobenzoate azo dyes were higher than ethyl-2-aminobenzoate azo dyes.

The stability of said dyes in HSD was studied. The results showed that they were still stable in HSD and could be detectable at the amount added after the usual storage period of three months.

SUGGESTION

It was found that in the storage period the yellow color of HSD might be stronger, resulting that the extracted phase appeared stronger yellow. Thus absorption in the wavelength of 400- 480 nm would increase which could interfere with absorption in the wavelength of the extracted markers in this study. Marker that could develop the color of the extracted marker from purple to blue (longer wavelength) should be better to use.