

## CHAPTER I INTRODUCTION



The most widely use petroleum product in Thailand is high-speed diesel fuel oil which is essential for transportation, such as trucks, trains, fishing boats, electricity generation and most importantly pick-up trucks. In addition, diesel oil is applied in tools and agricultural machinery. People are interest in lower cost diesel oil more than a brand name, so trading of the low cost and no brand name diesel oil is very easy. The illegal diesel oils are about three baht per liter lower cost than normal diesel oils because they do not cover tax and vat. This factor leads to oil smuggling.

Therefore, it is essential to suppress the oil smuggling. Otherwise, the free trade oil market will be destroyed by illegal oil trading. Then, a vendors and legal oil trade will not be able to continue the business and people will be in trouble with low equality of oil. Furthermore, a government will lose about one million per year income from tax.

A method to prevent the oil smuggling is to add chemical marker into diesel oil. The marker is easily detected by a simple field test and can be supplied as highly concentrated solution in oil-compatible solvents. Furthermore, the markers must be developed to produce a color that is clearly distinguishable from any color imparted by extracted oil impurities.

The markers of the present invention are "silent" in that at the levels at which they are used. They provide substantially no color to the petroleum product, but undergo a reaction during a detection procedure. The silent nature of the markers of the present invention make them particularly suitable as markers in non-dyed petroleum products, but they are suitable in dyed petroleum products, as well, where the markers do not alter the color imparted by the dyes. The silent nature of the markers of the present invention also is advantageous in that they cannot be detected without an appropriate extraction system, making misuse or dilution of a petroleum product mixed with a marker of the present invention more difficult.

### **Purpose of Research**

1. Synthesis of the marker dyes for diesel fuel oil from cashew nut shell extract and aniline and alkyaniline.
2. Develop the analysis methods of the marker dyes in diesel fuel oil for the field and laboratory test.
3. Study the color appearance of the marker after the conversion of position and the number of substitution in diazonium salts of aniline and derivatives compounds.

### **Scope of Research**

This research focuses on the azo dyes that were synthesized from methylsalicylate, 2-ethyl-1-hexyl salicylate and esterified-cashew nut shell extract coupling with diazonium salt of aniline, *o*-toluidine, *m*-toluidine and *p*-toluidine. The azo dyes were characterized by FT-IR and NMR spectroscopy. Analysis methods would be developed to monitor the presence of marker dyes. In addition, these novel azo dyes would be examined both in field test and laboratory for the possibility of using theses as a marker dye in commercial diesel oil. Finally, the stability of these marker dyes and marked diesel fuel would be investigated during storage for three months.

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