

A FAST METHODOLOGY FOR THE PREPARATION OF THE SEAWATER SOLUBLE FRACTION (SWSF) OF THE FUEL OIL

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Many operational problems have been described in the literature related to the preparation of the sea-water soluble fraction (SWSF) from oil mixtures in the laboratory. There is not a standard procedure which gives comparable and reproducible results (e.g. Ziolli and Jardim, 2002). Until now, practically all the SWSF preparation methods have been carried out in low energy-mixing systems, generally using magnetically stirring. This approach is time consuming, and the dissolution experiment can last several weeks. Here we describe a new method for the preparation of SWSF. This is based on a high energy system using ultrasonication which shortens the dissolution study to just a few days until equilibration is reached.

The experimental set up requires stirring oil in an ultrasonic bath for 30 minutes and a settling period of 48h. The system was held in darkness to avoid photodegradation. Water samples were recovered through a PTFE tub to monitor the progress of the dissolution. This was quantified using ultraviolet fluorescence spectroscopy (Ali et al., 1995). A diesel oil solution was used for the calibration of the fluorescence measurement. Deuterated standards were used to control recoveries at the end of the experiment and for quantification. The identification and quantification of the main individual hydrocarbons of the SWSF was carried out by GC-MS (gas chromatography-mass spectrometry).

Appraisal of the method has been done using a fuel oil sample (bunker C) mixed with water at different temperatures and salinities. The method has proven to generate reproducible SWSF. As expected, light polyaromatic hydrocarbons (PAHs) such as naphthalene and its alkyl derivatives, C1, C2 and C3-naphthalenes, were found to be the most abundant compounds in the SWSF (Figure 1). Their concentration in SWSF rises as a function of increasing water temperature and decreasing salinity.

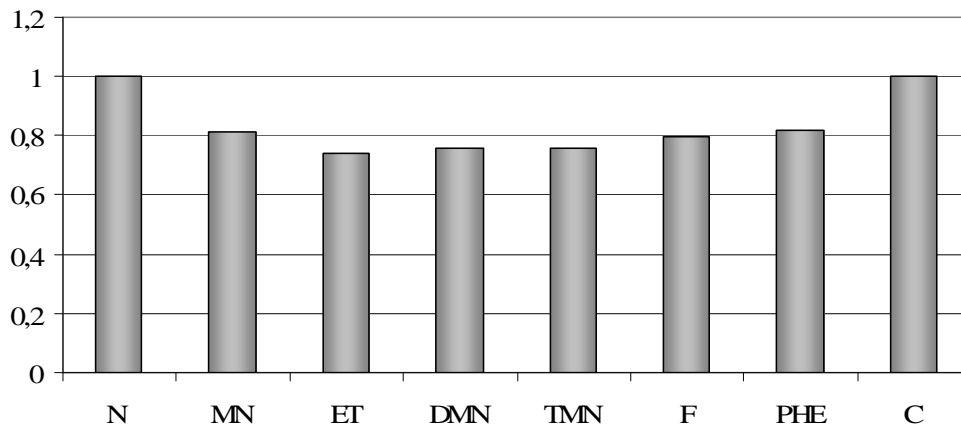


Figure 1. Relative abundance of the major light PAHs founded in the SWSF. N: Naphthalene; MN: Methylnaphthalenes; ET: Ethylnaphthalene; DMN: Dimethylnaphthalenes; TMN: Trimethylnaphthalenes; F: Fluorene; PHE: Phenanthrene; C: Carbazole.

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