

# DETERMINATION OF UN SULFONATED MATTER IN LINEAR ALKYL BENZENE SULFONIC ACIDS WITH THE INFRA CAL FILTOMETER



## INTRODUCTION



Linear alkyl benzene sulfonic acids are one of the most common precursors for the surfactant industry. They are typically neutralized and added to liquid dish formulations or converted to a powder for laundry detergents. The acids are generally made by reacting sulfur trioxide (SO<sub>3</sub>) with linear alkyl benzene (LAB). The acid is digested and stabilized with a small water addition. The composition is typically:

- Active – 96%
- Sulfuric acid – 1.5%
- Water – 0.5%
- Un sulfonated matter – 2%

The composition (and acid color) will vary depending on the molar ratio of SO<sub>3</sub> to LAB as well as the digestion conditions. The un sulfonated matter (UM) conventionally refers to the total organic nonionics after neutralization. The UM is conventionally analyzed by petroleum ether extraction of the neutralized sulfonic acid. The method is fairly time consuming and involves large quantities of petroleum ether. The nonionics are a mixture of unreacted LAB, paraffins and sulfones. The composition will vary with reaction and digestion conditions, but are generally consistent within a given sulfonic acid class. All three of these components are readily extractable and all possess a hydrocarbon chain. The InfraCal Filtometer offers a quick and simple analysis for determination of hydrocarbon concentration.

## PRINCIPLE OF OPERATION

The InfraCal Filtometer is a compact, fixed-filter mid-infrared analyzer with no moving parts and an insignificant optical air path. It weighs less than 5 pounds and can be operated from a battery pack or a cigarette lighter adapter cable. This makes it portable, sturdy and operable in a range of ambient conditions typically found in field environments. An internal calibration table and easy-to-use operator interface allows for analysis by non-technical personnel. The InfraCal Filtometer is preset with a 3.4 micron fixed filter/detector and a horizontal ATR cubic zirconia crystal and provides an easy, fast and cost-effective method for analyzing the UM by measuring the amount of C-H (hydrocarbon) absorption. An internal calibration table converts the absorbance to the desired unit of measure. In less than one minute a result is displayed.



## METHODOLOGY

A petroleum ether extraction is done on a measured amount of sample (typically an 8 dram vial). A 50µl aliquot of extract is then deposited onto an ATR crystal. The solvent evaporates in a few minutes leaving a film of hydrocarbon. The hydrocarbon absorbance is proportional to the amount of organics deposited. This procedure takes less than 5 minutes—much quicker than the conventional gravimetric petroleum ether extraction method and uses a fraction of the amount of petroleum ether.

## PRODUCT SPECIFICATIONS

**Dimensions:** 6.5 x 6.5 x 5" (165 x 165 x 127 mm)

**Weight:** 4.5 lbs. (2.0 kg)

**Display:** 4 digit, 7-segment red LED, 5/8 in. character height

**Power Requirements:**

Voltage - 12 V dc, +2% max.

Power - 7.5 watts max., 5 watts typical

Input - Switchcraft 760 plug or equivalent, center positive

**Suggested Power Sources:**

Wall supply; AC/DC converter type (supplied as standard)

12 volt auto battery adapter connector

Portable 12 volt battery pack

**Operating Temperature Range:**

40°F (4°C) to 110°F (45°C)

**User Selected Calibration:**

Zero balance adjustment

Up to 20 point curve fitting calibration

**Communications Port:**

RS232 port, 9-pin D-Sub female, PC compatible, for upload to PC, datalogger or printer

**InfraCal Analyzer, Model HATR-T2**

Part Number: 405-1009