

# DEUTERIUM OXIDE (D<sub>2</sub>O) IN WATER MEASUREMENT WITH THE INFRACAL FILTOMETER



## INTRODUCTION

One use for D<sub>2</sub>O or heavy water is as a moderator in pressurized heavy water nuclear reactors. Water is used to transfer the heat energy from the D<sub>2</sub>O to the steam turbine. The



measurement of D<sub>2</sub>O in water is important to determine whether there are any leaks between the water loop and the D<sub>2</sub>O loop. The InfraCal Filtometer can measure D<sub>2</sub>O concentrations in water from 0.01 - 5%.

## PRINCIPLE OF OPERATION

The InfraCal Filtometer is a fixed filter mid infrared analyzer designed for single component analysis. Unlike an FTIR spectrometer, it has no moving parts and an insignificant optical air path. This makes it portable, rugged and suitable for use in a field environment. It weighs less than 5 lbs. and can be operated from a battery pack or a cigarette lighter adapter cable. D<sub>2</sub>O has a specific absorption unique to water at 4.1 microns (2439 cm<sup>-1</sup>); therefore, quantitative measurements can be determined by the depth of the absorption band at this wavelength. An internal calibration table and easy-to-use operator interface allows for analysis by non-technical personnel.

## ANALYSIS

The measurement uses a transmission system and a sealed cell. The cell is filled with the liquid to be measured then placed in the InfraCal Filtometer for analysis. A beam of infrared light is passed through the sample and absorbance is measured by the detector. As the concentration of D<sub>2</sub>O increases, the absorbance increases. An internal calibration table converts the absorbance to the desired unit of measure. In less than one minute a result is displayed.

## 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

### Measurement Range:

0.05\* to 5%

### 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 Sealed Cell Holder Filtometer, Model CH-3

Part Number: 405-2015



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