



DETERMINATION OF AROMATIC HYDROCARBONS IN ELECTRICAL INSULATING OILS

**GOST 28640-90 (IEC 60590-77)
DIN IEC 60590-1986-09**

INTRODUCTION

One of the most widespread liquid electrical insulating materials is transformer oil. It is used to fill the pores in the fiber insulation and the space between the windings, thereby increasing the dielectric strength of the insulation and improving the heat removal from the windings and the core of a transformer. The oil is also used in high-voltage current breakers. The most important quality parameters of insulating oils are their dielectric properties, fast heat transfer and moisture resistance.

The insulating oil is produced during crude oil refining, and the foreign impurities should be removed from the oil distillate, in particular, aromatic hydrocarbons that decrease oil resistance to oxidation, its dielectrical properties and fluidity at low temperatures. Therefore, regulations impose limit on the concentration of aromatic hydrocarbons in the electrical insulating oils.

The infrared spectroscopic methods provide monitoring of the aromatic hydrocarbon content in insulating oils in a range of **1.2–60%**. Basing on the results of analysis, one can promptly respond to degradation of the quality parameters during the process of oil production, as well as ensure the high quality of the final product and prove-in performance. Infrared spectroscopy may also be used for quality control of mineral insulating oil.

EQUIPMENT AND REAGENTS FOR ANALYSIS

The following equipment and reagents are used for analysis:

- Fourier-Transform Infrared spectrometer InfraLUM[®] FT-08 (with software);
- Sealed liquid cell of fixed path length (from 0.05 to 0.3 mm), the path length should be chosen according to the expected concentration of aromatic hydrocarbons in the analysed sample;
- Personal computer

ADVANTAGES OF InfraLUM[®] FT-08 SPECTROMETERS

- Easy to operate
- High selectivity
- Spectrum scanning is just one minute
- No sample pretreatment needed
- Various accessories may be used for analysis

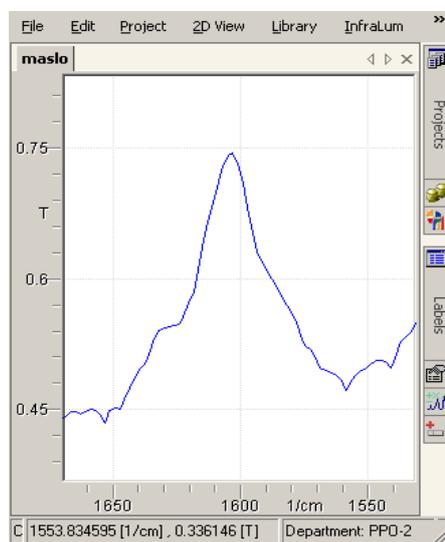
MEASUREMENT METHOD

A sealed liquid cell is filled with the analysed sample and is installed in the cell compartment of an InfraLum[®] FT-08 FTIR spectrometer. Infrared spectrum of the sample is recorded in the range of 1700–1500 cm^{-1} , with resolution of 2 cm^{-1} and scanning time of 60 s.

EXAMPLE OF A REAL ANALYSIS

Screenshot of the region of the absorption spectrum of insulating oil recorded with a resolution of 2 cm^{-1} and scanning time of 60 s.

The characteristic absorption peak of the aromatic structure is observed at the 1610 cm^{-1} wavenumber. Concentration is calculated using software for InfraLUM[®] FT-08 FTIR spectrometer.



The contents of this paper are subject to change without notice.
The information in this leaflet is supplemental. To get more specific information on this method, please contact the developer of this application Lumex Ltd.