200-PL-0011 August 2025

Measuring Samples with Large Optical Rotation

Introduction

Some pure liquids* cannot be measured with a polarimeter and a normal 100-mm-path-length cell because their optical rotation exceeds 90 degrees. JASCO offers cells with short path lengths that enable measurements of samples with a large optical rotation. This application note describes optical rotation measurements for orange oil with a 50-mm-path-length cell.

*Pure liquid: a liquid substance composed of only one type of molecule

Keywords

Polarimeter, short path length, pure liquid, orange oil

Fig. 1. *P-4200 polarimeter*

Experimental

Sample

Orange oil (research use)

System

Instrument: P-4200 polarimeter (Fig. 1)
Cell: RQC-451 8.5-mm rectangular quartz cell (path length: 50 mm) (Fig. 2)

Parameters

Light source: Na lamp
Wavelength: D line
D.I.T.: 5 sec
Repetition: 1 time

Fig. 2. *Rectangular cell*

Results and Discussion

The measurement results are shown in Table 1. The blank measurement was performed using a dry empty cell.[1] The use of a 50-mm-path-length cell allowed the optical rotation for orange oil to be measured without dilution, as the measured value remained within 90 degrees.

Table 1. *Results*

Optical rotation / °	Temperature / °C
49.107	20.4

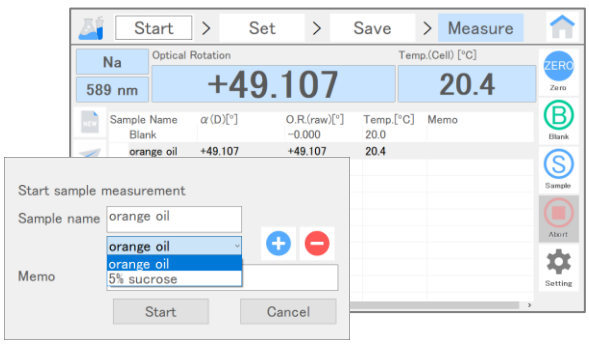

Fig. 3. *Measurement screen. Top: The current optical rotation and temperature are displayed in the monitor. Bottom: Sample names can be added to the list for future measurement.*

Conclusions

Using a short-path-length cell, samples with a large optical rotation can be measured without dilution.

References

1. United States Pharmacopeial Convention: “USP-NF 2024 Issue 3”, (2024).
2. Ministry of Health, Labour and Welfare: June 7, 2021, MHLW Ministerial Notification No. 220, “The Japanese Pharmacopoeia 18th edition”, (2021).