Oil Polarity Assay

Catalogue Number: FS62

FOR RESEARCH USE ONLY

Not For Diagnostic Use

PRECAUTIONS AND STORAGE

Carefully read and understand these instructions before beginning any testing. This kit is for research use only, and is not for diagnostic use or for use in humans.

Wearing appropriate personal protective equipment such as gloves, lab coat and eye protection is highly recommended. In case of contact with skin or eyes, immediately rinse with plenty of water for 15 minutes and consult a physician.

This kit will perform as specified until the date printed on the outside of the box.

Store the kit at room temperature.

IF YOU HAVE PROBLEMS

Technical Service Contact Information

Phone:	800.692.4633 ext. 112
E-Mail:	info@oxfordbiomed.com
Hours:	M-F 8:30 AM to 5:00 PM EST

For us to serve you best, please have the lot number from the kit ready for us to reference.

KIT COMPONENTS

Polarity Indicator: A proprietary merocyanine indicator dissolved in *n*-butanol at 1.0 mg/mL

MATERIALS NEEDED BUT NOT SUPPLIED

1. A spectrophotometer capable of measuring absorbance at 532 nm
2. Disposable 1.0 cm cuvettes
3. Adjustable pipette with range from 20 µL to 1.0 mL
4. 5.0 mL glass test tubes
5. Vortex mixer
6. Small vials or bottles for collecting oil/shortening samples
7. 1-Butanol (*n*-butanol), ACS Grade or better

INTRODUCTION

Frying oil can go rancid due to many factors, including overheating, prolonged use and contamination from foods. There are many tests available to measure the degradation of cooking oils such as total polar materials, pH, viscosity, fatty acid composition and others described by the American Oil Chemists' Society. Several instruments are available to provide these results on a timely basis as well as dipstick assays which give qualitative results.

This kit is designed to quickly measure the change in polarity of a cooking oil due to oxidation and hydrolysis from heating. It is based on the properties of a merocyanine dye that undergoes a significant color-change when dissolved in solvents with differing polarities. The dye is dissolved in an oil-miscible solvent which then allows the polar components of the oil to interact with the dye, changing its color accordingly.

SAMPLE COLLECTION

1. Starting with a new batch of oil, collect a 5.0 mL sample and label it "Day Zero".
2. At the end of the day, note how many hours the oil/shortening has been heated and collect another sample in a new tube, labeling it accordingly.
3. If new oil is added to the frying vat to replenish the volume, take note of how much has been added as well as the time.
4. Refrigerate the samples until the final sample is collected.

When the user decides that the oil should be changed based on taste or smell, a sample should be taken, labeled "Final Sample" and the total number of hours used sould be noted.

RUNNING SAMPLES

1. Using a volumetric pipette, add 1.0 mL of 1.0 mL of *n*-butanol into a test tube.
2. Using a volumetric pipette, add 25 µL of the "Day Zero" oil sample into a test tube and mix VERY well for one minute on a vortex mixer until no mixing lines are visible.
3. Add 20 µL of the **Polarity Indicator** to the oil and mix well for one minute on a vortex mixer until no mixing lines are visible. Measure the absorbance at 532 nm.
4. The absorbance at 532 nm of the new, unused oil should be above 3.0 AU. If the absorbance is not this high, add an additional 20 µL of the **Polarity Indicator** and mix well.

5. Repeat this until the sample has an absorbance above 3.0 and record the total volume of dye added to achieve this number.
6. For the remaining oil samples, dilute with *n*-butanol and add the same volume of **Polarity Indicator** to each and mix well.
7. Measure the absorbance at 532 nm, plotting each sample against it time in hours.
8. Note the absorbance of the "Final Sample". This can be used as an end-point to determine the usable life of the oil.

Alternative Method: If you are not comfortable with pipetting 20 microliters of oil, then dilute the oil sample by adding 125 microliters of the oil to 5.0 mL of *n*-butanol and mix well. Use 1.0 mL of this solution to start at step 3, above.

Example: An experiment was performed with a household deep fryer and commercially available canola oil. The used oil had a Total Polar Compounds (TPC) concentration of 35.1% using the AOCS Official Method Cd 20-91, "Determination of Polar Compounds in Frying Fats". This spent oil was blended with new, unused canola oil that was also measured to have a TPC content of 4.1% to create 13.8% and 24.4% TPC standards, and were run as described above to produce the graph in **Figure 1**, below:

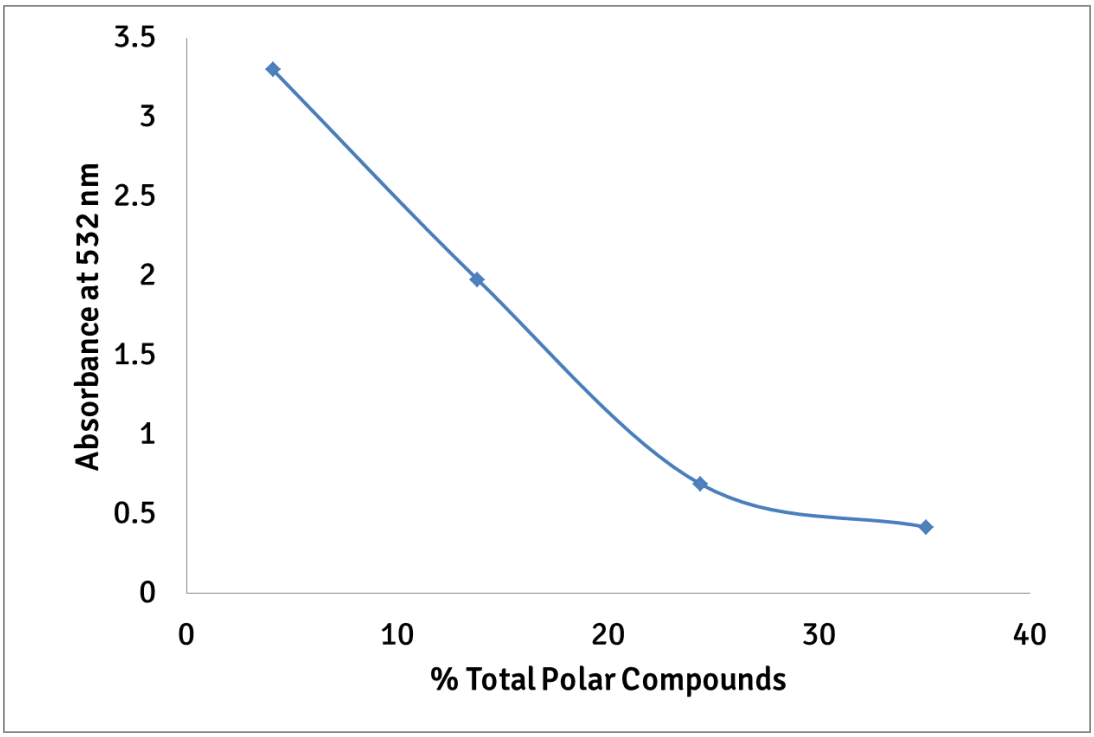

Figure 1: Canola oil polarities for four samples.

TECHNICAL NOTES

- There are many different types of oil, each with their own distinct properties. Variations due to different cultivars and also batch-to-batch inconsistencies may give different readings. It should be noted that the amount of **Indicator Solution** is only for a specific batch and type of oil, and may not correlate to other lots of the same material.

- Mixing is a critical part of this assay, and it is very important to make sure that all of the oil from the pipette has been transferred to the alcohol during dilution.

- Try to insert as little of the pipette into the oil when removing a sample as it will stick to the outside of the pipette.

- Wash out the sample that remains in the pipette by taking-in/pushing out solution when making dilutions. This will also help to mix the *n*-butanol with the oil.