



S2 POLAR – Elemental Analysis of Edible Oils

- Spectrometry Solutions

Innovation with Integrity

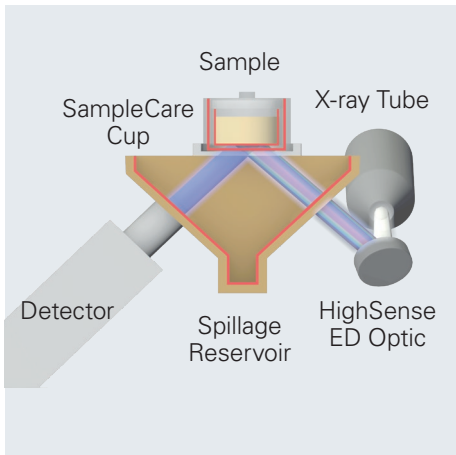
EDXRF



S2 POLAR – Elemental Analysis of Edible Oils



S2 POLAR – Compact for on-site process control



SampleCare™ with HighSense™ beam path



Vegetable oils for fast elemental analysis

Edible Oil Analysis: Fast and Reliable Process Control with S2 POLAR

Food such as vegetable oils or edible oils are subject to extensive regulations regarding exact control and monitoring of elemental ingredients. To determine these ingredients, Optical Emission Spectrometry (ICP-OES) is often used. However, elemental analysis by using ICP-OES is quite complex. It is requiring extensive analytical expertise, high efforts for sample preparation via digestion, dilution or emulsion, time-consuming recalibrations several times a day, and high operating costs for the necessary argon plasma gas.

Simple Process Elemental Analysis with shortest Time to Result

Many steps in edible oil production do not require a cumbersome ICP-OES method. Especially in process control, when ease of use and short time to result is more important, Energy-dispersive X-ray fluorescence (EDXRF) analysis with the S2 POLAR is the method of choice. In oil refinery processes, P is one of the key elements for proper process control, as phospholipids can have a negative impact at various process steps and on the properties of the final product. In such case, total P is measured to monitor the phospholipids removal accordingly.

P, S, and Cl in Used Cooking Oil (UCO)

For food preparation, cooking oil is used frequently in fast-food chains and restaurants. Later the Used Cooking Oil (UCO) is recycled and further used for biodiesel production. In biodiesel, elements such as P, S, and Cl must not exceed certain limits that easily can be monitored with the S2 POLAR. The fast time-to-result analysis with the S2 POLAR when a truck or vessel load is waiting for its approval in a biodiesel refinery is another advantage of the compact instrument.

S2 POLAR Advantages

- Quick and simple sample preparation
- Reliable results within minutes
- Low cost of ownership



Top-performing Oil Analysis:

S2 POLAR with

- HighSense™
- SampleCare™
- TouchControl™

Safe Liquid Sample Handling with SampleCare™ Technology

High instrument uptime is crucial for process operation monitoring. This is ensured with Bruker's SampleCare™ technology. SampleCare cups prevent sample leakages of your liquid samples and protect important system components. This guarantees utmost instrument availability, at your fingertips, whenever needed.

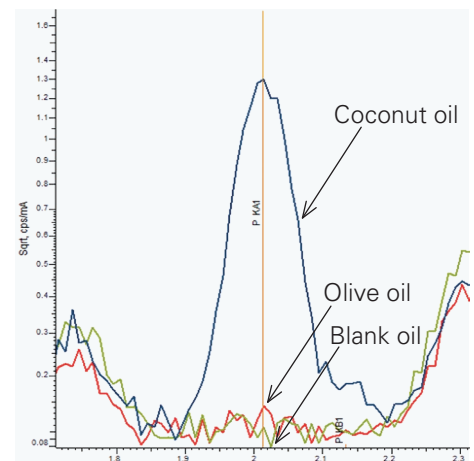
Excellent Results for demanding Edible Oil Applications

Key elements to monitor in edible oils or Used Cooling Oils are on a low concentration level and therefore the analytical task is quite challenging. Here, P, S and Cl are the most important elements, others such as K, Ca, Fe, Ni, Cu are also of interest. The multi-element capability of the S2 POLAR enables quantification of all these elements in one go.

The analytical data shown here in this brochure demonstrate that the S2 POLAR is fully suitable for this kind of food applications.



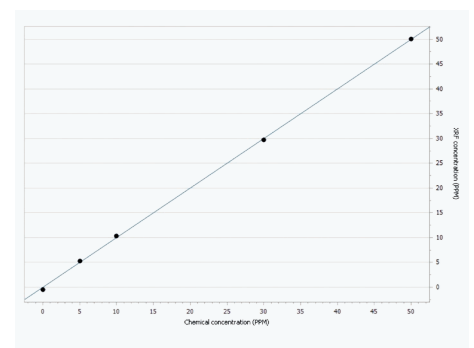
TouchControl operation of S2 POLAR



Overlaid P signals of various edible oils. The coconut oil sample contains 23 ppm P while the olive oil sample is < 1.8 ppm P

# Measurement	P [ppm]
Rep 1	10.4
Rep 2	10.4
Rep 3	10.2
Rep 4	10.2
Rep 5	10.2
Rep 6	10.4
Rep 7	10.2
Rep 8	10.2
Rep 9	10.1
Rep 10	10.3
Mean value	10.22
Min. value	10.1
Max. value	10.4
Abs. std. dev.	0.11
Rel. std. dev. [%]	1.10

Repeatability measurements of a QC oil sample with 10 ppm P



Calibration curve for P for the low concentration range of 0 to 50 ppm



Features and Benefits

	Specification	Benefits
Applications	<p>Elemental analysis of all types of vegetable oils, such as soybean, rapeseed, sunflower, peanut, coconut, olive, and palm oil.</p> <p>Elemental analysis of edible oils or cooking oils, as incoming raw material or at different steps of the refining process.</p> <p>Analysis of Used Cooking Oil (UCO). UCO is often recycled and used as raw material for later use in biodiesel.</p>	<p>Excellent analytical performance for key elements such as P, S, and Cl. Due to the multi-element capability of the S2 POLAR, other elements such as K, Ca, Fe, Ni, Cu can also be analyzed. Also suitable for matrices with higher viscosity</p>
Atmosphere Modes*	Helium mode Vacuum mode	Optimal light element analysis of liquids Low cost of operation
Sample Preparation*	Liquid cups, SampleCare™ cups, Prolene and Mylar® foils, pipettes, balance	Accessories ensure best analytical performance of liquid samples. Low-cost per sample due to standardized liquid cups
Further Options*	Emergency Machine Off (EMO) Uninterruptible Power Supply (UPS) Sample rotation	Compliant with safety requirements Enables removing of liquid samples Enhanced precision for inhomogenous samples, such as polymer pucks
X-ray Tube	50 W, high-power X-ray tube, max. voltage 50 kV, with polarizing HighSense™ beam path Optionally: 30 kV max.	Max. power for short measurement times and high sample throughput, beam path optimized for petrochemical materials Simplify regulatory efforts (e.g. Austria, France, Belgium, Luxembourg, Italy, Taiwan)
Detector	HighSense™ ULS Silicon Drift Detector	Highest count rates for fast analysis, low LLD
TouchControl™	Integrated 12.1" TFT touchscreen, multilingual user interface: English, German, French, Spanish, Portuguese, Italian, Russian, Chinese, Korean, Japanese (others on request)	IslandMode™ without external PC Intuitive and easy-to-use, in your own language
Connectivity	Ethernet port RJ45, 3x USB ports for mouse, keyboard, and printer; HDMI/VGA ports for external display, remote access via TCP/IP	IslandMode™ but not isolated, various options for printing and network data transfer, even fully remotely
Power Supply	100-240 V, 50/60 Hz, max. 600 VA	Standard wall plug
Dimensions; width x depth x height, weight	46.6 x 74.5 x 37.0 cm, 55 kg 18.3" x 29.3" x 14.6", 121 lbs	Small and compact for installations with limited space, e.g. in central labs, operating labs or at-line close to the refining process
Quality & Safety	DIN EN ISO 9001:2015, DIN EN ISO 14001:2015, 2006/42/EC (CE-certified Machinery directive), 2014/35/EC (Electrical equipment), 2014/30/EC (Electromagnetic Compatibility), German Type Approval and Vollschutz according to BfS RöV, Fully radiation-protected system; radiation <1 µSv/h (H*), Compliant to ICRP, IAEA, EURATOM	

* Optional packages

Bruker AXS is continually improving its products and reserves the right to change specifications without notice.
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