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Oil-Analysis Standards

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CALIBRATION AND VERIFICATION STANDARDS



METALS IN OIL STANDARDS


SULFUR IN CRUDE OIL

FLASH POINT STANDARDS

TAN & TBN STANDARDS



VERSION 10.0



*The benchmark
for accurate
measurements*

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& Verification
Standards for the
Analysis of:**

- Lubricants: New and In-service
 - Lubricant Additives
 - Petroleum Products
- Organic Fluids / Materials



Metals in Crude Oil
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Through our all-encompassing ISO 9001 certification and laboratory focused ISO 17025 / Guide 34 accreditations, SCP SCIENCE / CONOSTAN has proven that it can provide the best and most reliable products and reference materials available in the industry. At SCP SCIENCE / CONOSTAN , we are truly dedicated to providing and exceeding the quality you require.

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SCP SCIENCE is a leader in the field of standards and volumetric solutions and yet one of our key goals is to continually improve to serve you better. Our websites (www.scpscience.com and www.CONOSTAN.com) include many new products in response to your requests and to the new requirements of governments and organizations. Should you require a product that is not listed on our websites, please do not hesitate to contact our Customer Service Group.

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ABOUT CONOSTAN

Our Reputation

SCP SCIENCE is proud to present CONOSTAN - the world's most trusted name in oil standards, whose industry-leading position is the result of a uniquely superior product chemistry and manufacturing technology together with proprietary blending techniques.

The CONOSTAN brand history dates back 35 years, when the U.S. Department of Defense's Spectrometric Oil Analysis Program Standards Committee required calibration standards to analyze metals in lubricating oils to conduct wear metals analyses. At the time, commercially available metals in oil standards were unreliable and made calibrating analytical instrumentation difficult. CONOSTAN's research and development department created the chemistry for producing reliable element in oil standards, which were adopted by the Department of Defense.

CONOSTAN is also the only source of multi-element metallo-organic standards in the history of the National Institute of Standards and Technology (NIST) — the (NIST-1085 b) reference material is CONOSTAN S-21:300.



Our Products

Oil standards are used extensively in the calibration and operation of instruments that analyze elements in oil and other organic fluids. Our product lines offer a wide variety of reference standards, solvents, and reagents for ICP, DCP, rotating disk electrode, XRF, AA, and other analytical spectrometric techniques.

Our products are optimized for:

- **Compatibility** – We offer combinations of 38 different elements over an extensive concentration range.
- **Solubility** – Our standards are soluble in a variety of substances: ketones, mineral oil, xylene, kerosene, etc. We also produce blank oils and *PremSolv*, a kerosene alternative, for use as solvents.
- **Volatility** – Our standards are made in ultra-pure, highly processed hydrocarbon oil only: no solubilizers are used, making our standards extremely stable to volatile loss.
- **Viscosity** – The viscosity range of our standards at room temperature is ideal for instrumental applications.
- **Instrumental response** – Our standards provide excellent analytical response over a wide range of applications.
- **Shelf life** – All CONOSTAN element standards and spectroscopy products have a one-year minimum shelf life from the date of shipment.

METALLO-ORGANIC STANDARDS

Applications

CONOSTAN standards are used extensively in a variety of industries: energy, environmental, aircraft, railroad, automotive, heavy equipment, mining, chemical and others. Essentially, wherever calibration of instruments for analyzing elements in oil and other organics is needed, CONOSTAN standards provide consistent composition and performance.

Typical Uses:

1. For ICP, DCP, AA and rotating disk emission spectrometric determinations of trace metals in organic materials, such as wear metals in used lubricating oils.
2. In AA and ICP spectrometric analyses of oils and other organics for As, Ba, Cd, Cr, Pb, Se, and other metals of environmental concern.
3. In AA and ICP emission analyses for trace metals in organics such as Co and Ni from metal-catalyzed reactions.
4. For XRF determinations of multi-element mixtures in organic systems such as Fe, Ni, Cu, and V in crude oils.
5. For emission spectrometric determinations of additive metals such as Ba, Ca, Mg, P, and Zn for quality control of motor oil formulations.
6. As internal standards and matrix adjustment components, and for the preparation of special multi-element blended standards to meet specific calibration requirements.



Eliminate the need to change ICP Sample Introduction components for different applications by using the

MINI X-FLOW NEBULIZER

Whether your samples are new or used oils, clean waters, suspensions, sludges or in HF, the Mini X-Flow Nebulizer (Cat. # 020-060-611) can handle them all - and with the best performance coupled to a Cyclonic Spray Chamber.

METALLO-ORGANIC STANDARDS (CONT'D)

CONOSTAN metallo-organic standards are oil-based metal calibration standards for use with ICP, AA, rotrode, XRF, DCP, flame emission, and other instruments.

Single-Element Standards

Blended in 20 cSt blank oil (size: 50 g)

| Elements | 1000 ppm | 5000 ppm |
|-----------|-------------|-------------|
| | 50 g | 50 g |
| Ag | 150-100-475 | 150-500-475 |
| Al | 150-100-135 | 150-500-135 |
| As | 150-100-335 | - |
| B | 150-100-055 | 150-500-055 |
| Ba | 150-100-565 | 150-500-565 |
| Be | 150-100-045 | 150-500-045 |
| Bi | 150-100-835 | 150-500-835 |
| Ca | 150-100-205 | 150-500-205 |
| Ce | 150-100-585 | 150-500-585 |
| Cd | 150-100-485 | 150-500-485 |
| Co | 150-100-275 | 150-500-275 |
| Cr | 150-100-245 | 150-500-245 |
| Cu | 150-100-295 | 150-500-295 |
| Fe | 150-100-265 | 150-500-265 |
| Hg | 150-100-805 | - |
| In | 150-100-495 | 150-500-495 |
| K | 150-100-195 | 150-500-195 |
| La | 150-100-575 | 150-500-575 |

| Elements | 1000 ppm | 5000 ppm |
|-----------|-------------|-------------|
| | 50 g | 50 g |
| Li | 150-100-035 | 150-500-035 |
| Mg | 150-100-125 | 150-500-125 |
| Mn | 150-100-255 | 150-500-255 |
| Mo | 150-100-425 | 150-500-425 |
| Na | 150-100-115 | 150-500-115 |
| Ni | 150-100-285 | 150-500-285 |
| P | 150-100-155 | 150-500-155 |
| Pb | 150-100-825 | 150-500-825 |
| Sb | 150-100-515 | 150-500-515 |
| Si | 150-100-145 | 150-500-145 |
| Sn | 150-100-505 | 150-500-505 |
| Sr | 150-100-385 | 150-500-385 |
| Ti | 150-100-225 | 150-500-225 |
| V | 150-100-235 | 150-500-235 |
| W | 150-100-745 | 150-500-745 |
| Y | 150-100-395 | 150-500-395 |
| Zn | 150-100-305 | 150-500-305 |

| | 100 ppm |
|------------|-------------|
| As* | 150-103-331 |
| Sc* | 150-103-341 |

* size: 100 g, 20 cSt

| | 2000 ppm |
|-------------|-------------|
| Sc** | 150-500-215 |

** size: 50 g, 20 cSt

| | 100 ppm | 1000 ppm |
|--------------|-------------|-------------|
| As*** | 150-101-331 | 150-102-331 |
| Hg*** | 150-101-801 | 150-101-805 |
| Se*** | 150-101-341 | - |

*** size: 100 g, 75 cSt

Multi-Element Standards



See detailed
Certificate of Analysis
on page 31

Blended in 75 cSt blank oil

| ppm | S-12 | | S-21 | | S-21+K | |
|------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 100 g | 200 g | 100 g | 200 g | 100 g | 200 g |
| 10 | 150-012-001 | 150-012-009 | 150-021-002 | 150-021-018 | 150-021-042 | 150-021-051 |
| 30 | 150-012-004 | 150-012-012 | 150-021-008 | 150-021-027 | 150-021-045 | 150-021-056 |
| 50 | 150-012-006 | 150-012-014 | 150-021-010 | 150-021-030 | 150-021-047 | 150-021-058 |
| 100 | 150-012-002 | 150-012-010 | 150-021-003 | 150-021-019 | 150-021-043 | 150-021-052 |
| 300 | 150-012-005 | 150-012-013 | 150-021-009 | 150-021-028 | 150-021-046 | 150-021-037 |
| 500 | 150-012-007 | 150-012-015 | 150-021-011 | 150-021-031 | 150-021-048 | 150-021-059 |
| 900* | 150-012-008 | 150-012-016 | 150-021-015 | 150-021-035 | 150-021-049 | 150-021-061 |

* 900 ppm nominal value, 885 ppm actual value.

S-12: Ag, Al, Cr, Cu, Fe, Mg, Na, Ni, Pb, Si, Sn, Ti

S-21: Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, P, Pb, Si, Sn, Ti, V, Zn

| ppm | AM-Special | | |
|------|-------------|-------------|-------------|
| | 100 g | 200 g | 400 g |
| 500 | 150-250-010 | 150-250-023 | - |
| 900 | 150-250-014 | 150-250-027 | 150-250-004 |
| 1000 | 150-250-006 | 150-250-016 | 150-250-001 |
| 2000 | - | 150-250-017 | - |
| 2500 | 150-250-007 | 150-250-018 | - |
| 3000 | 150-250-009 | 150-250-020 | - |
| 4000 | - | 150-250-021 | - |
| 5000 | 150-250-011 | 150-250-024 | 150-250-003 |
| 6000 | 150-250-012 | - | - |
| 7000 | 150-250-013 | 150-250-025 | - |

AM-Special: Ba, Ca, Mg, P, Zn

Custom Blends

If you require a combination or concentration of elements that we do not routinely stock, custom blends are available and can be shipped within two working days. To order, you may fill out and mail the form on page 27 of this booklet. We can make:

- Any combination of elements listed here at custom concentrations
- Single-element standards at custom concentrations
- S-21, S-12, and AM-Special blends at custom concentrations
- Additions to S-21, S-12, and AM-Special blends

Size: available in 100 g, 200 g, and 400 g

Complete the custom quotation request form on page 27 and return it to us.

Or, visit www.scpscience.com and request a custom quote online.

METALLO-ORGANIC STANDARDS (CONT'D)

D-Series Standards for Joint Oil Analysis Program (JOAP)

Direct from the Original Source

CONOSTAN D-Series standards are available directly from SCP SCIENCE. Each D3, D12, and D19 standard is furnished with a Certificate of Analysis.

CONOSTAN is the original source of D-Series standards. More than 35 years ago, the U.S. Department of Defense's Spectrometric Oil Analysis Program Standards Committee required standards for its wear metals analysis programs.

With no reliable commercial source of metals in oil standards, CONOSTAN's research department set to work in developing a reliable standard. The result was CONOSTAN's uniquely superior product chemistry, which was adopted by the Department of Defense for its D-Series standards.

As with all CONOSTAN products, you are guaranteed that the D-Series of standards are extremely stable and accurate.



Cross Reference with U.S. Department of Defense Stock Numbers

| CONOSTAN product | Dept. of Defense NSN | Catalogue # |
|------------------|----------------------|-------------|
| D3-100 | 9150-01-283-0249 | 150-300-019 |
| D12-5 | 9150-01-307-3343 | 150-300-005 |
| D12-10 | 9150-00-179-5145 | 150-300-001 |
| D12-30 | 9150-00-179-5144 | 150-300-003 |
| D12-50 | 9150-00-179-5143 | 150-300-006 |
| D12-100 | 9150-00-179-5142 | 150-300-002 |
| D12-300 | 9150-00-179-5141 | 150-300-004 |
| D19-0 | 9150-00-179-5137 | 150-300-008 |
| D19 set | 9150-01-355-1178 | 150-300-018 |

METALLO-ORGANIC STANDARDS (CONT'D)

D-Series Standards

| ppm | D3 | D12 | D19 |
|-----------|-------------|-------------|-------------|
| | 200 g | 200 g | 100 g |
| 0 (Blank) | 150-300-030 | 150-300-030 | 150-300-008 |
| 5 | - | 150-300-005 | 150-300-013 |
| 10 | - | 150-300-001 | 150-300-009 |
| 30 | - | 150-300-003 | 150-300-011 |
| 50 | - | 150-300-006 | 150-300-014 |
| 100 | 150-300-019 | 150-300-002 | 150-300-010 |
| 300 | - | 150-300-004 | 150-300-012 |
| 500 | - | - | 150-300-015 |
| 700 | - | - | 150-300-016 |
| 900 | - | - | 150-300-017 |

* Custom ppm preparations available.

D3: B, Mo, Zn **D12:** Ag, Al, Cr, Cu, Fe, Mg, Na, Ni, Pb, Si, Sn, Ti

D19: Ag, Al, B, Ba, Cd, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, Pb, Si, Sn, Ti, V, Zn

Blank oil for D-Series: 150-300-008

D19 Set

| Product | Catalogue # |
|---------|-------------|
| D19 set | 150-300-018 |

The D19 set comprises the following concentrations and quantities:

| ppm | Quantity | D19 (100 g) |
|-----------|----------|-------------|
| 0 (Blank) | 4 | 150-300-008 |
| 5 | 1 | 150-300-013 |
| 10 | 1 | 150-300-009 |
| 30 | 1 | 150-300-011 |
| 50 | 1 | 150-300-014 |
| 100 | 3 | 150-300-010 |
| 300 | 2 | 150-300-012 |
| 500 | 1 | 150-300-015 |
| 700 | 1 | 150-300-016 |
| 900 | 1 | 150-300-017 |



METALLO-ORGANIC STANDARDS (CONT'D)

Custom Blends of D-Series Standards

If you require a combination or concentration of elements that we do not routinely stock, custom blends are available.

We can make:

- Any combination of elements listed previously as custom concentrations
- Single-element standards at custom concentrations
- D3, D12, and D19 blends at custom concentrations
- Additions to D3, D12, and D-19 blends

Size: Available in 100 g or 200 g

Available elements: Ag, Al, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, In, K, La, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Si, Sn, Sr, Ti, V, W, Y, Zn

Used Oil - Certified Reference Material - *EnviroMAT™*

EnviroMAT™ Certified Reference Materials (CRM) can be an invaluable component of any laboratory quality control program. Consensus certification removes any chance of analytical bias. Used as a method performance Quality Control standard and / or QC in oil analysis by ICP-OES and AA.



- Each CRM is certified through a round-robin study employing specific methods of analysis:
 - Independant verification from multiple laboratories
- Includes Certificate of Analysis listing consensus values, confidence and tolerance intervals, and instructions for use:
 - Complete documentation for audit purposes

| EnviroMAT™ Standards | Symbol | Quantity | Catalogue # |
|-----------------------------|---------------|-----------------|--------------------|
| Oil, used | HU-1 | 125 ml | 140-025-041 |

BIODIESEL STANDARDS



Biodiesel is a clean burning alternative fuel, produced from domestic, renewable resources, such as virgin soybean and rapeseed (canola) oils. Biodiesel contains no petroleum, but it can be blended at any concentration with petroleum diesel to create a biodiesel blend. Blends of biodiesel and pure unblended biodiesel can be used in modern diesel engines with no modification required.

SCP SCIENCE-CONOSTAN offers a new line of biodiesel standards for the analysis of metals and sulfur in biodiesel fuel. Manufactured in accordance to ASTM methods D7039, D6751, D5453 and EN14214 for ICP and XRF analysis. Each Standard is supplied a Certificate of Analysis.

Metals in Biodiesel

SCP SCIENCE-CONOSTAN offers multi-element standards for Ca, K, Mg, Na and P in B100 Biodiesel. Blank standard is also available. Manufactured in accordance to methods D4951, EN14531, EN14017, EN14108 and EN14109 for ICP analysis. Single element, multi element and custom multi element in biodiesel standards are available upon request.

| METALS IN BIODIESEL | 100% BIODIESEL (B100) BDM5 (100 g) | 100% BIODIESEL (B100) BDM2A (100 g) | 100% BIODIESEL (B100) BDM2B (100 g) |
|---------------------|------------------------------------|-------------------------------------|-------------------------------------|
| Elements | Ca, K, Mg, Na, P | K, Na | Ca, Mg |
| ppm | Catalogue # | Catalogue # | Catalogue # |
| 0 (Blank) | 150-441-000 | 150-441-000 | 150-441-000 |
| 2.5 | 150-441-005 | 150-441-030 | 150-441-065 |
| 5 | 150-441-010 | 150-441-035 | 150-441-070 |
| 10 | 150-441-015 | 150-441-040 | 150-441-075 |
| 15 | 150-441-020 | 150-441-045 | 150-441-080 |
| 20 | 150-441-025 | 150-441-050 | 150-441-085 |
| 25 | - | 150-441-055 | 150-441-090 |
| 50 | - | 150-441-060 | 150-441-095 |

BIODIESEL STANDARDS (CONT'D)

Sulfur in Biodiesel

CONOSTAN offers sulfur in biodiesel standards in 5% (B5) and 20% (B20) biodiesel blends. Blank standard is also available. Manufactured in accordance to ASTM methods D7039, D6751, D5453 and EN14214 for ICP and XRF analysis. Custom blended biodiesel standards are available upon request.

| SULFUR IN BIODIESEL | 5% BIODIESEL (B5) SULFUR (100 g) | 20% BIODIESEL (B20) SULFUR (100 g) | 100% BIODIESEL (B100) SULFUR (100 g) |
|---------------------|----------------------------------|------------------------------------|--------------------------------------|
| ppm | Catalogue # | Catalogue # | Catalogue # |
| 0 (Blank) | 150-440-000 | 150-440-050 | 150-440-100 |
| 5 | 150-440-005 | 150-440-055 | 150-440-105 |
| 10 | 150-440-010 | 150-440-060 | 150-440-110 |
| 15 | 150-440-015 | 150-440-065 | 150-440-115 |
| 30 | 150-440-020 | 150-440-070 | 150-440-120 |
| 50 | 150-440-025 | 150-440-075 | 150-440-125 |
| 75 | 150-440-030 | 150-440-080 | 150-440-130 |
| 100 | 150-440-035 | 150-440-085 | 150-440-135 |
| 200 | 150-440-040 | 150-440-090 | 150-440-140 |
| 500 | 150-440-045 | 150-440-095 | 150-440-145 |



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METALS IN OIL STANDARDS



Metals in Crude Oil

Metals in Crude Oil for use in accordance with ASTM D5708 and D5863.
Complete with a Certificate of Analysis.

Complete Set 150-451-060

| Iron, ppm | Nickel, ppm | Vanadium, ppm | Catalogue # (100 ml) |
|-----------|-------------|---------------|----------------------|
| 1 | 2 | 2 | 150-451-000 |
| 300 | 10 | 500 | 150-451-005 |
| 500 | 100 | 25 | 150-451-010 |
| 100 | 80 | 250 | 150-451-015 |
| 200 | 40 | 100 | 150-451-020 |
| 400 | 5 | 400 | 150-451-025 |
| 1 | 60 | 300 | 150-451-030 |
| 500 | 2 | 200 | 150-451-035 |
| 100 | 100 | 2 | 150-451-040 |
| 300 | 50 | 250 | 150-451-045 |
| 200 | 20 | 500 | 150-451-050 |
| 50 | 100 | 50 | 150-451-055 |

Metals in Residual Oil

Metals in Residual Oil for use in accordance with ASTM D5708 and D5863.
Complete with a Certificate of Analysis.

Complete Set 150-421-060

| Iron, ppm | Nickel, ppm | Vanadium, ppm | Catalogue # (100 ml) |
|-----------|-------------|---------------|----------------------|
| 1 | 2 | 2 | 150-421-000 |
| 300 | 10 | 500 | 150-421-005 |
| 500 | 100 | 25 | 150-421-010 |
| 100 | 80 | 250 | 150-421-015 |
| 200 | 40 | 100 | 150-421-020 |
| 400 | 5 | 400 | 150-421-025 |
| 1 | 60 | 300 | 150-421-030 |
| 500 | 2 | 200 | 150-421-035 |
| 100 | 100 | 2 | 150-421-040 |
| 300 | 50 | 250 | 150-421-045 |
| 200 | 20 | 500 | 150-421-050 |
| 50 | 100 | 50 | 150-421-055 |

MISCELLANEOUS PRODUCTS FOR METALLO-ORGANIC ANALYSIS

Base & Blank Standards

Typical Base & Blank Oil Properties

| | 20 cSt | 75 cSt |
|--|----------------------|--------------------------|
| Specific Gravity (25°C/25°C) | 0.84–0.86 | 0.86–0.89 |
| Viscosity: 40°C 100°C | 14–18 cSt 3–4 cSt | 65–72 cSt 8.1–8.7 cSt |
| Pour Point | –7°C (+20°F) | –15°C (+5°F) |
| Flash Point (minimum) | 175°C (345°F) | 215°C (420°F) |
| Trace Metals | <0.10 ppm | <0.15 ppm |

Base Oils

Base oils are used for blending calibration standards for spectrometric analysis of metals in oil. Typical properties are tabled above. Note that these oils are not certified.

| Size | 20 cSt | 75 cSt |
|----------------------|-------------|-------------|
| 500 ml | 150-020-004 | 150-075-005 |
| 3.78 L (1 gallon) | 150-020-003 | 150-075-004 |

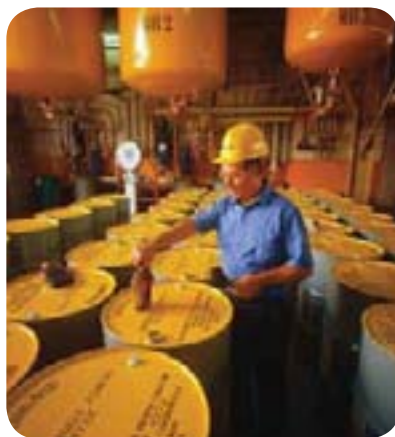
Blank Oils

Blank oils are supplied with a Certificate of Analysis including actual elemental concentration useful for blank subtraction in ICP-AES/MS. Physical properties are noted above.

| Size | 20 cSt | 75 cSt |
|----------------------|-------------|-------------|
| 100 g | 150-020-002 | 150-075-003 |
| 400 g | 150-020-001 | 150-075-002 |
| 3.78 L (1 gallon) | 150-020-005 | 150-075-006 |

Stabilizer

| Size | Catalogue # |
|------|-------------|
| 50 g | 150-010-001 |



PREMISOLV ICP SOLVENT

PremiSolv is a zero-odor alternative to kerosene or xylene for use as a diluent or zero-point standard in ICP/DCP analysis of metals in oil and other organic fluids.

PremiSolv Features:

- Extremely low odor – for a safer, more comfortable working environment
- Extremely low toxicity – compared with kerosene or xylene
- Extremely low metal content – comes with a certificate of analysis listing the concentrations of 34 different metals including sulfur
- Non-hazardous – for shipping and disposal



| Size | Catalogue # |
|--------------------|-------------|
| 3.78 L (1 gallon) | 150-700-003 |
| 18.9 L (5 gallons) | 150-700-002 |

**WANT TO SEE
THE DIFFERENCE YOURSELF?**
Ask for a free 400 ml sample.
Cat. No. 150-700-000

CHLORINE IN OIL STANDARDS

The chlorine product line is designed for calibration of XRF, ICP, and other analytical techniques. Stocked concentrations are shown in the table below.

Custom concentrations are available.

Chlorine Standards (size: 100 g)

| ppm | Catalogue # |
|------------------|-------------|
| 0 (Blank) | 150-200-008 |
| 10 | 150-200-001 |
| 100 | 150-200-002 |
| 500 | 150-200-005 |
| 1000 | 150-200-003 |
| 5000 | 150-200-006 |
| 10000 | 150-200-004 |
| 50000 | 150-200-007 |



SULFUR IN OIL STANDARDS

CONOSTAN offers an expanding line of Sulfur standards that today encompasses several matrices described below and on the following pages.

The quality of many petroleum products are related to the amount of sulfur present. In fuels, the amount of sulfur is related to its performance characteristics and vehicle emission levels. Levels of sulfur in petroleum and petroleum products are regulated through federal, state and local agencies.



Sulfur in Isooctane

Sulfur in Isooctane by UV Fluorescence

| ppm | Description | Catalogue # |
|--|---|-------------|
| 0, 0.5, 1.0, 2.5, 5.0, 7.5, 10 | For very low Sulfur level, set of 7 x 10 ml vials. Complete with a Certificate of Analysis. | 150-430-010 |
| 0, 5.0, 10, 25, 50, 100, 250 | For low Sulfur level, set of 7 x 10 ml vials. Complete with a Certificate of Analysis. | 150-430-020 |
| 0, 50, 100, 250, 500, 750, 1000 | For high Sulfur level, set of 7 x 10 ml vials. Complete with a Certificate of Analysis. | 150-430-030 |

Sulfur in Isooctane

Sulfur in Isooctane by X-Ray Fluorescence

| ppm | Catalogue # (60 ml) |
|------------------|---------------------|
| 0 (Blank) | 150-430-101 |
| 50 | 150-430-102 |
| 100 | 150-430-103 |
| 250 | 150-430-104 |
| 500 | 150-430-105 |
| 750 | 150-430-106 |
| 1000 | 150-430-107 |
| Set of 7 | 150-430-100 |



SULFUR IN OIL STANDARDS (CONT'D)

Sulfur in Residual Oil

| ppm | Catalogue # (50 ml) | Catalogue # (100 ml) |
|-------|---------------------|----------------------|
| 2500 | 150-420-100 | 150-420-005 |
| 3500 | 150-420-105 | 150-420-010 |
| 5000 | 150-420-110 | 150-420-015 |
| 7500 | 150-420-120 | 150-420-020 |
| 10000 | 150-420-125 | 150-420-025 |
| 15000 | 150-420-130 | 150-420-030 |
| 20000 | 150-420-135 | 150-420-035 |
| 25000 | 150-420-140 | 150-420-040 |
| 30000 | 150-420-145 | 150-420-045 |
| 35000 | 150-420-150 | 150-420-050 |
| 40000 | 150-420-155 | 150-420-055 |
| 50000 | 150-420-160 | 150-420-060 |

Sulfur in Crude Oil

We have 10 standards from 500 to 50000 ppm. Sulfur in Crude Oil is in accordance with Method ASTM D2622 and D4294. Complete with a Certificate of Analysis.

| ppm | Catalogue # (100 ml) |
|--------|----------------------|
| 500 | 150-450-000 |
| 1,000 | 150-450-005 |
| 1,500 | 150-450-020 |
| 2,500 | 150-450-010 |
| 5,000 | 150-450-015 |
| 10,000 | 150-450-025 |
| 20,000 | 150-450-030 |
| 30,000 | 150-450-035 |
| 40,000 | 150-450-040 |
| 50,000 | 150-450-045 |



SULFUR IN OIL STANDARDS (CONT'D)

Sulfur Standards in Mineral Oil and Diesel Fuel (100 g)

Sulfur in Mineral Oil

The sulfur in oil product line is designed for calibration of XRF, ICP, and other analytical instruments according to various ASTM methods (such as D2622, D3246, D4294, D5453, D6334, and D6443). Stocked concentrations are shown in the table below.

Sulfur in Diesel Fuel

Our line of sulfur in diesel fuel is specially engineered to have an elevated flash point, making it suitable for shipping as a non-hazardous product. Stocked concentrations are shown in the table below.

Custom Concentrations

For concentrations not listed in the table below, custom concentrations are available in both mineral oil and diesel fuel. Contact us for further information.

| ppm | In Mineral Oil (100 g) | In Diesel Fuel (100 g) |
|-----------|------------------------|------------------------|
| 0 (Blank) | 150-400-025 | 150-410-012 |
| 5 | CB2-000-018 | 150-410-008 |
| 10 | 150-400-001 | 150-410-001 |
| 25 | 150-400-009 | 150-410-013 |
| 50 | 150-400-018 | 150-410-009 |
| 100 | 150-400-002 | 150-410-002 |
| 250 | 150-400-010 | CB2-000-023 |
| 500 | 150-400-019 | 150-410-010 |
| 750 | 150-400-023 | 150-410-018 |
| 1000 | 150-400-003 | 150-410-003 |
| 2500 | 150-400-011 | CB2-000-024 |
| 5000 | 150-400-020 | 150-410-011 |
| 7500 | 150-400-024 | 150-410-021 |
| 10000 | 150-400-004 | 150-410-004 |
| 15000 | 150-400-005 | 150-410-006 |
| 20000 | 150-400-008 | 150-410-007 |
| 25000 | 150-400-012 | CB2-000-028 |
| 30000 | 150-400-014 | 150-410-022 |
| 40000 | 150-400-016 | 150-410-023 |
| 50000 | 150-400-021 | 150-410-024 |

* Custom ppm preparations available

** A Certificate of Analysis reporting concentration and density are included with each standard

VISCOSITY STANDARDS

The same product reliability and stability that our customers trust in metallo-organic standards are now available in General Purpose Viscosity standards. These certified, mineral oil based, viscosity standards were developed for calibration and verification of all types of viscometers, such as glass capillary viscometers.

All standards are traceable to National Standards in accordance to ASTM & IP methods. Each standard carries a two year stability guarantee. The determination of kinematic and dynamic viscosity were made in accordance with ASTM D445/446 and ISO 3104/3105, ISO/IEC 17025 and are traceable to the NIST (National Institute of Standards and Technology).



See detailed

Certificate of Analysis

on page 30



| VOLUME | | | | | |
|---------------------|-------------|-------------|-------------|-------------|-------------|
| Viscosity Standards | 125 ml | 500 ml | 1 Litre | 4 Litre | 20 Litre |
| S3 | 150-600-351 | 150-600-352 | 150-600-353 | 150-600-354 | 150-600-355 |
| S6 | 150-600-141 | 150-600-142 | 150-600-143 | 150-600-144 | 150-600-145 |
| N4 | 150-600-441 | 150-600-442 | 150-600-443 | 150-600-444 | 150-600-445 |
| N10 | 150-600-181 | 150-600-182 | 150-600-183 | 150-600-184 | 150-600-185 |
| S20 | 150-600-221 | 150-600-222 | 150-600-223 | 150-600-224 | 150-600-225 |
| N35 | 150-600-261 | 150-600-262 | 150-600-263 | 150-600-264 | 150-600-265 |
| N44 | 150-600-461 | 150-600-462 | 150-600-463 | 150-600-464 | 150-600-465 |
| S60 | 150-600-301 | 150-600-302 | 150-600-303 | 150-600-304 | 150-600-305 |
| N100 | 150-600-341 | 150-600-342 | 150-600-343 | 150-600-344 | 150-600-345 |
| S200 | 150-600-231 | 150-600-232 | 150-600-233 | 150-600-234 | 150-600-235 |
| N350 | 150-600-361 | 150-600-362 | 150-600-363 | 150-600-364 | 150-600-365 |
| N415 | 150-600-471 | 150-600-472 | 150-600-473 | 150-600-474 | 150-600-475 |
| S600 | 150-600-241 | 150-600-242 | 150-600-243 | 150-600-244 | 150-600-245 |
| N1000 | 150-600-371 | 150-600-372 | 150-600-373 | 150-600-374 | 150-600-375 |
| S2000 | 150-600-381 | 150-600-382 | 150-600-383 | 150-600-384 | 150-600-385 |
| N4000 | 150-600-391 | 150-600-392 | 150-600-393 | 150-600-394 | 150-600-395 |
| S8000 | 150-600-401 | 150-600-402 | 150-600-403 | 150-600-404 | 150-600-405 |
| N15000 | 150-600-411 | 150-600-412 | 150-600-413 | 150-600-414 | 150-600-415 |
| S30000 | 150-600-421 | 150-600-422 | 150-600-423 | 150-600-424 | 150-600-425 |

VISCOSITY STANDARDS (CONT'D)

| KINEMATIC VISCOSITY IN MM ² /S (CENTISTOKES) | | | | | | | | | | Saybolt Viscosity |
|---|---------------|---------------|-------------------|----------------|----------------|----------------|----------------|-------------------|-----------------|-------------------|
| | 20°C/ 68°F | 25°C/ 77°F | 37.78°C/ 100°F | 40°C/ 104°F | 50°C/ 122°F | 60°C/ 140°F | 80°C/ 176°F | 98.89°C/ 210°F | 100°C/ 212°F | 37°C/ 100°F |
| S3 | 4.5 | 4.0 | 3.0 | 2.8 | 2.4 | 2.0 | 1.5 | 1.2 | 1.2 | |
| S6 | 10 | 8.8 | 6.0 | 5.7 | 4.5 | 3.6 | 2.5 | 1.9 | 1.9 | |
| N4 | 6.7 | 5.8 | 4.2 | 4.0 | 3.2 | 2.6 | 1.9 | 1.5 | 1.4 | |
| N10 | 21 | 17 | 11 | 10 | 7.5 | 5.8 | 3.7 | 2.7 | 2.6 | |
| S20 | 46 | 35 | 20 | 18 | 13 | 9.0 | 5.6 | 3.6 | 3.5 | 87 |
| N35 | 90 | 67 | 36 | 32 | 21 | 15 | 8.4 | 5.4 | 5.3 | 167 |
| N44 | 110 | 86 | 48 | 44 | 30 | 21 | 12 | 7.6 | 7.4 | 220 |
| S60 | 160 | 119 | 60 | 54 | 35 | 26 | 12 | 7.7 | 7.5 | 281 |
| N100 | 318 | 228 | 110 | 97 | 60 | 39 | 20 | 11 | 11 | 509 |
| S200 | 715 | 487 | 206 | 180 | 103 | 64 | 30 | 17 | 16 | 954 |
| N350 | 1400 | 940 | 370 | 330 | 180 | 110 | 46 | 24 | 23 | 1730 |
| N415 | 1900 | 1200 | 480 | 410 | 220 | 130 | 55 | 29 | 28 | 2200 |
| S600 | 2400 | 1600 | 600 | 520 | 280 | 160 | 66 | 34 | 32 | |
| N1000 | 5100 | 3300 | 1200 | 1000 | 520 | 290 | 110 | 52 | 50 | |
| S2000 | 8200 | 5200 | 1900 | 1600 | 780 | 400 | 150 | 70 | 68 | |
| N4000 | 18000 | 11000 | 3900 | 3300 | 1600 | 840 | 280 | 123 | 117 | |
| S8000 | 37000 | 23000 | 7900 | 6700 | 3200 | 1600 | 520 | 210 | 200 | |
| N15000 | 64000 | 40000 | 13000 | 11000 | 5300 | 2700 | 850 | 340 | 320 | |
| S30000 | | 80000 | 28000 | 23000 | 11000 | 5800 | 1700 | 670 | 640 | |



All calibrations and tests are based on a master viscometer procedure located in ASTM D2162 and the National Institute of Standards and Technology (NIST) value of 1.0016 mPa.s (centipoise) for water at 20°C (68°F). Custom standards are available. Please contact us for more information.



VISCOSITY STANDARDS (CONT'D)

| DYNAMIC VISCOSITY IN MPA.S (CENTIPOISE) | | | | | | | | | | Saybolt Viscosity |
|---|-----------------|-----------------|---------------------|------------------|------------------|------------------|------------------|---------------------|-------------------|----------------------|
| | 20 °C/ 68 °F | 25 °C/ 77 °F | 37.78 °C/ 100 °F | 40 °C/ 104 °F | 50 °C/ 122 °F | 60 °C/ 140 °F | 80 °C/ 176 °F | 98.89 °C/ 210 °F | 100 °C/ 212 °F | 37 °C/ 100 °F |
| S3 | 3.7 | 3.3 | 2.4 | 2.3 | 1.9 | 1.6 | 1.2 | 0.9 | 0.9 | |
| S6 | 8.7 | 7.3 | 5.0 | 4.7 | 3.6 | 2.9 | 2.0 | 1.5 | 1.4 | |
| N4 | 5.6 | 4.8 | 3.4 | 3.2 | 2.6 | 2.1 | 1.5 | 1.1 | 1.1 | |
| N10 | 18 | 14 | 9.0 | 8.4 | 6.2 | 4.7 | 3.0 | 2.1 | 2.1 | |
| S20 | 40 | 30 | 17 | 15 | 11 | 7.6 | 4.7 | 2.9 | 2.9 | 87 |
| N35 | 78 | 59 | 31 | 28 | 18 | 13 | 7.0 | 4.4 | 4.3 | 167 |
| N44 | 91 | 71 | 39 | 36 | 24 | 17 | 9.4 | 6.0 | 5.8 | 220 |
| S60 | 138 | 102 | 52 | 46 | 30 | 22 | 9.9 | 6.3 | 6.1 | 281 |
| N100 | 276 | 197 | 94 | 83 | 51 | 33 | 16 | 9.4 | 9.1 | 509 |
| S200 | 613 | 416 | 174 | 152 | 87 | 54 | 24 | 15 | 13 | 954 |
| N350 | 1200 | 810 | 320 | 280 | 150 | 92 | 38 | 20 | 19 | 1730 |
| N415 | 1600 | 1100 | 410 | 350 | 190 | 110 | 45 | 23 | 23 | 2200 |
| S600 | 2100 | 1400 | 510 | 440 | 240 | 140 | 55 | 28 | 26 | |
| N1000 | 4400 | 2800 | 1000 | 940 | 440 | 240 | 92 | 43 | 41 | |
| S2000 | 7200 | 4500 | 1600 | 1400 | 670 | 340 | 130 | 58 | 56 | |
| N4000 | 16000 | 9700 | 3400 | 2900 | 1400 | 720 | 240 | 100 | 98 | |
| S8000 | 33000 | 20000 | 6900 | 5900 | 2800 | 1400 | 440 | 180 | 170 | |
| N15000 | 57000 | 36000 | 11000 | 9700 | 4700 | 2400 | 730 | 290 | 270 | |
| S30000 | | 72000 | 25000 | 20000 | 9700 | 5100 | 1500 | 570 | 550 | |



VISCOSITY STANDARDS (CONT'D)

DENSITY IN G/ML IN ACCORDANCE WITH ASTM D7042

| | 20 °C/ 68 °F | 25 °C/ 77 °F | 37.78 °C/ 100 °F | 40 °C/ 104 °F | 50 °C/ 122 °F | 60 °C/ 140 °F | 80 °C/ 176 °F | 98.89 °C/ 210 °F | 100 °C/ 212 °F |
|---------------|-----------------|-----------------|---------------------|------------------|------------------|------------------|------------------|---------------------|-------------------|
| S3 | 0.833 | 0.830 | 0.821 | 0.820 | 0.813 | 0.806 | 0.792 | 0.779 | 0.778 |
| S6 | 0.831 | 0.828 | 0.819 | 0.818 | 0.811 | 0.805 | 0.791 | 0.779 | 0.778 |
| N4 | 0.834 | 0.831 | 0.822 | 0.820 | 0.814 | 0.807 | 0.793 | 0.780 | 0.780 |
| N10 | 0.842 | 0.839 | 0.831 | 0.829 | 0.823 | 0.816 | 0.804 | 0.791 | 0.791 |
| S20 | 0.871 | 0.868 | 0.860 | 0.859 | 0.852 | 0.846 | 0.833 | 0.821 | 0.820 |
| N35 | 0.872 | 0.869 | 0.861 | 0.860 | 0.853 | 0.847 | 0.834 | 0.823 | 0.822 |
| N44 | 0.828 | 0.825 | 0.817 | 0.816 | 0.809 | 0.803 | 0.791 | 0.779 | 0.779 |
| S60 | 0.863 | 0.860 | 0.852 | 0.851 | 0.845 | 0.839 | 0.826 | 0.815 | 0.814 |
| N100 | 0.867 | 0.864 | 0.857 | 0.855 | 0.849 | 0.843 | 0.831 | 0.820 | 0.819 |
| S200 | 0.858 | 0.855 | 0.847 | 0.846 | 0.840 | 0.834 | 0.822 | 0.910 | 0.810 |
| N350 | 0.863 | 0.860 | 0.852 | 0.851 | 0.845 | 0.839 | 0.827 | 0.816 | 0.815 |
| N415 | 0.865 | 0.862 | 0.854 | 0.853 | 0.847 | 0.841 | 0.830 | 0.819 | 0.818 |
| S600 | 0.866 | 0.864 | 0.856 | 0.855 | 0.849 | 0.843 | 0.832 | 0.820 | 0.820 |
| N1000 | 0.872 | 0.869 | 0.862 | 0.860 | 0.855 | 0.849 | 0.837 | 0.826 | 0.826 |
| S2000 | 0.876 | 0.873 | 0.865 | 0.864 | 0.858 | 0.853 | 0.841 | 0.831 | 0.830 |
| N4000 | 0.882 | 0.879 | 0.872 | 0.871 | 0.865 | 0.860 | 0.849 | 0.838 | 0.838 |
| S8000 | 0.888 | 0.885 | 0.878 | 0.877 | 0.872 | 0.866 | 0.855 | 0.845 | 0.845 |
| N15000 | 0.893 | 0.891 | 0.884 | 0.883 | 0.877 | 0.872 | 0.861 | 0.851 | 0.851 |
| S30000 | | 0.896 | 0.889 | 0.888 | 0.883 | 0.877 | 0.867 | 0.857 | 0.857 |



FLASH POINT STANDARDS

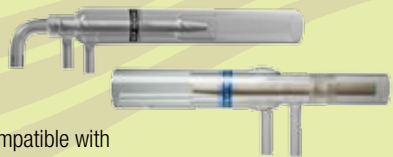
Flash Point Standards for use in accordance with ASTM D93. Complete with a detailed Certificate of Analysis. Contact your local Sales Representative for volume discounts.

| ASTM D 93 Nominal Flash Point (°C) | Catalogue # (80 ml) | Catalogue # (250 ml) |
|------------------------------------|---------------------|----------------------|
| 53 | 150-900-000 | 150-900-050 |
| 69 | 150-900-005 | 150-900-055 |
| 81 | 150-900-010 | 150-900-060 |
| 104 | 150-900-015 | 150-900-065 |
| 112 | 150-900-020 | 150-900-070 |
| 116 | 150-900-025 | 150-900-075 |
| 134 | 150-900-030 | 150-900-080 |
| 186 | 150-900-035 | 150-900-085 |
| 231 | 150-900-040 | 150-900-090 |
| 260 | 150-900-110 | 150-900-115 |



TORCHES WITH FIXED ALUMINA INJECTOR

A 99.6% alumina injector is fused into a torch body offering a longer torch life. These models are compatible with Agilent®, Spectro® EOP and PerkinElmer®. Patent pending.



PARTISTAN - PARTICLE COUNTER STANDARDS

PartiStan particle standards are designed for calibration and verification of automatic particle counters.

Product History

In 1999, a new calibration procedure (ISO 11171) for automatic particle counters was introduced, rendering previous procedures (i.e. ISO 4402) obsolete. With the new procedure, primary calibration requires NIST SRM 2806 - a suspension of 3.3 mg/L of ISO medium test dust in super-clean hydraulic fluid.

CONOSTAN offers a secondary standard for the cost-effective calibration and verification of automatic particle counters. PartiStan secondary standards are compliant with ISO 11171 and directly traceable to NIST SRM 2806.



| Description | Size | Catalogue # |
|---|-------------------|-------------|
| PartiStan 2806 | 400 ml | 150-701-001 |
| PartiStan resolution standard | 400 ml | 150-701-002 |
| PartiStan SCF (super-clean fluid) | 400 ml | 150-701-003 |
| PartiStan SCF (super-clean fluid) | 3.78 L (1 gallon) | 150-701-004 |
| PartiStan UFTD (ultra-fine test-dust suspension in SCF) | 400 ml | 150-701-005 |

FTIR STANDARDS

Our FTIR operational test standard is a petroleum oil-based fluid that looks and handles like routinely tested used-oil samples. It is designed for validating FTIR instrument performance in order to ensure repeatability and reproducibility.

| Description | Size | Catalogue # |
|--------------------------------|-------|-------------|
| FTIR operational test standard | 100 g | 150-702-001 |

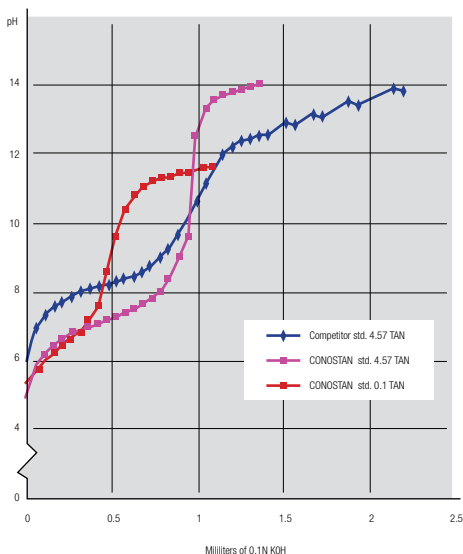
For initial setup, we include a disk containing the analytical methods necessary to perform tests with information specific to your instrument:

- DigiLab (Varian®) – available
- PerkinElmer® – not yet available (contact the manufacturer)
- Thermo Nicolet® – not yet available (contact the manufacturer)

TOTAL ACID NUMBER (TAN) STANDARDS

The titration curves for every concentration of the CONOSTAN family of TAN standards have more prominent inflection points and a wider difference between the starting pH and final pH during the titration, in comparison with other suppliers. At minimum concentration for TAN standards, the pH change in the titration curve is now greater than even the highest concentrations of competitive standards. Because the inflection point is more prominent, CONOSTAN TAN standards offer uncertainties of less than 1% of stated concentration providing customers the opportunity for better calibration of their titrator and TAN titration method.

Comparison of Titration Curves



| Description | Size | Catalogue # |
|-----------------|------|-------------|
| 0.05 mg/g KOH * | 75 g | 150-800-005 |
| 0.1 mg/g KOH * | 75 g | 150-800-011 |
| 0.5 mg/g KOH * | 75 g | 150-800-051 |
| 1.0 mg/g KOH * | 75 g | 150-800-101 |
| 1.5 mg/g KOH | 75 g | 150-800-151 |
| 2.0 mg/g KOH | 75 g | 150-800-205 |
| 2.5 mg/g KOH | 75 g | 150-800-255 |
| 3.0 mg/g KOH | 75 g | 150-800-305 |
| 4.5 mg/g KOH | 75 g | 150-800-455 |

* Available in packs of 3.

TOTAL BASE NUMBER (TBN) STANDARDS

Each CONOSTAN TBN standard is formulated to provide a strong leveraging influence on the titration curve creating dramatic and easy to determine inflection points. Concentration uncertainties for TBN are less than 1%.

| Description | Size | Catalogue # |
|---------------|------|-------------|
| 1.0 mg/g KOH | 75 g | 150-801-011 |
| 3.0 mg/g KOH | 75 g | 150-801-031 |
| 6.0 mg/g KOH | 75 g | 150-801-065 |
| 10.0 mg/g KOH | 75 g | 150-801-105 |
| 15.0 mg/g KOH | 75 g | 150-801-155 |
| 30.0 mg/g KOH | 75 g | 150-801-305 |
| 40.0 mg/g KOH | 75 g | 150-801-405 |
| 70.0 mg/g KOH | 75 g | 150-801-705 |



CUSTOM MULTI-ELEMENT STANDARDS ORDER ONLINE

SCP SCIENCE / CONOSTAN ISO 9001 Manufacturing Division can prepare custom multi-element calibration standards to exact specifications. Indicate the desired elements and their concentrations, together with the desired matrix, and we will recommend a mix stability with a minimum of 12 months. A Certificate of Analysis, reporting the actual values and not simply the calculated values, accompanies each standard.

REQUEST A CUSTOM QUOTE ONLINE NOW.

WWW.SCPSCIENCE.COM

CUSTOM QUOTATION REQUEST FORM FOR METALLO-ORGANIC STANDARDS

Complete this form to receive a quotation for your specific oil-based standard.
Photocopy for use with multiple requests.

Contact Information

Name: _____

Company: _____

Mailing address: _____

City: _____ State/Province: _____

Country: _____ Zip/Postal code: _____

Telephone: _____ Fax: _____

E-mail: _____ Account number: _____

Please indicate the concentration (ppm) required for each element:

| Elements | ppm | Elements | ppm | Elements | ppm |
|----------|-----|----------|-----|----------|-----|
| Ag | | Fe | | Pb | |
| Al | | Hg | | Sb | |
| As | | In | | Sc | |
| B | | K | | Se | |
| Ba | | La | | Si | |
| Be | | Li | | Sn | |
| Bi | | Mg | | Sr | |
| Ca | | Mn | | Ti | |
| Cd | | Mo | | V | |
| Co | | Na | | W | |
| Cr | | Ni | | Y | |
| Cu | | P | | Zn | |

Size (g): _____ Rate of use (L/year): _____

Special requirements: _____ Custom name: _____

Application: _____

Base Oil: 20 cSt 75 cSt 245 cSt

Fax this form to:

USA/Canada 1(800) 253-5549

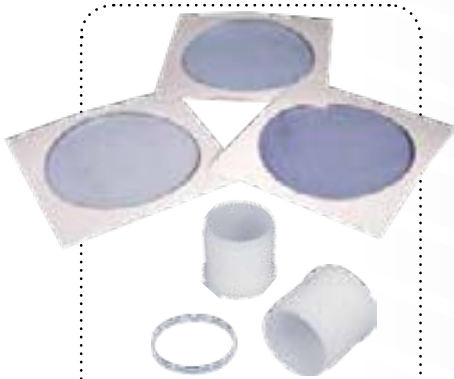
Outside North America +1 (514) 457-4499

E-mail sales@scpscience.com

Products & Supplies for the Oil Analysis Laboratory

ICP AES/MS Supplies

- Torches, spray chambers and nebulizers
- Flared and Non-Flared Peristaltic pump tubing
- Skimmer and Samples Cones



XRF Supplies

- Sample cells
- XRF thin film (Mylar®, Prolene®, Kapton®, etc.)



DigiPREP MS

• A 48 positions block digestion system is perfect for all digestions up to 180°C. The Teflon-coated graphite block is specially designed to resist aggressive corrosion attack and is guaranteed for long life. It's non-metallic construction ensures that no cross-contamination occurs from the digestion system to samples. **DigiPREP MS** operates with a KeyPad or Color Touch Screen Controller to: program set-point temperature; set timer and shut down system; activate audible alarm; and display actual block and sample temperature. The Touch Screen Controller also offers the possibility to store up to 12 multi-step user programs.



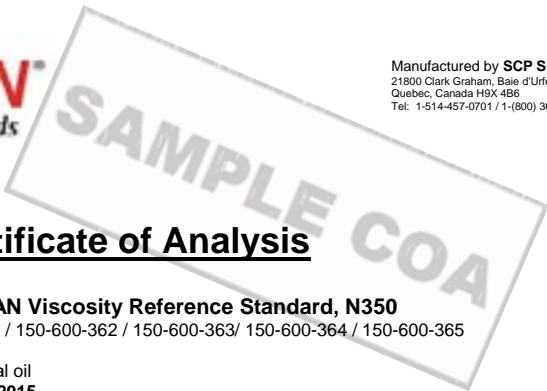
NovaWAVE Automated Microwave Digestion System

- *NovaWAVE* delivers a dramatic improvement in sample throughput and speed of digestion plus a major reduction in labor and human intervention compared to any other digestion system. The instrument incorporates a tunnel system employing 12 dynamically operating micro cavities to process 12 samples simultaneously. Other features include individual sample temperature control and monitoring; seamless microwave power control with no duty cycle; built-in EPA and DIN methods; and USB/Ethernet port connectivity for data processing and storage.

- *MinWAVE* microwave digestion system and controller is a top-loading, compact, microwave digestion system consisting of a Touch Screen Controller and up to 4 digestion inter-connecting modules. Each module is able to digest up to 6 samples simultaneously. 6 IR sensors, located on the side walls, monitor each sample temperature. A single magnetron is located below the floor. With its unique design, microwave energy is evenly distributed throughout the digestion chamber to provide reproducible results sample to sample. Ideal for environmental, agricultural, petroleum, geological and biological samples.



Sample Preparation Systems



Certificate of Analysis

1.0 DESCRIPTION: **CONOSTAN Viscosity Reference Standard, N350**
 Catalogue Number: 150-600-361 / 150-600-362 / 150-600-363/ 150-600-364 / 150-600-365
 Lot Number: **1015**
 Matrix: White mineral oil
 Expiration Date: **September 2015**

2.0 CERTIFIED VALUES AND ASSOCIATED UNCERTAINTY:

| Temperature | | Kinematic Viscosity mm ² /s (cSt) | Dynamic Viscosity mPa-s (cP) | Density (g/ml) | Saybolt Viscosity (SUS) |
|-------------|--------|---|---------------------------------|-------------------|----------------------------|
| °C | °F | | | | |
| 20.00 | 68.00 | 1345 | 1160 | 0.8622 | |
| 25.00 | 77.00 | 888.8 | 763.5 | 0.8591 | |
| 37.78 | 100.00 | 350.5 | 298.5 | 0.8516 | 1624 |
| 40.00 | 104.00 | 303.1 | 257.7 | 0.8502 | |
| 50.00 | 122.00 | 166.3 | 140.4 | 0.8444 | |
| 60.00 | 140.00 | 99.09 | 83.09 | 0.8385 | |
| 80.00 | 176.00 | 42.27 | 34.94 | 0.8266 | |
| 98.89 | 210.00 | 22.54 | 18.38 | 0.8153 | 109.4 |
| 100.00 | 212.00 | 21.82 | 17.78 | 0.8147 | |

***Expanded Uncertainty**

| Viscosity Range | Kinematic Viscosity mm ² /s (cSt) | Dynamic Viscosity mPa-s (cP) |
|-----------------|---|---------------------------------|
| 0.3 to 10 | ±0.12% | ±0.12% |
| 10 to 100 | ±0.17% | ±0.17% |
| 100 to 1000 | ±0.21% | ±0.21% |
| 1000 to 6000 | ±0.22% | ±0.22% |

Method of analysis and traceability:

This viscosity standard has been prepared according to ASTM methods D445, D446 and corresponding ISO methods 3104 and 3105. Kinematic viscosities have been determined using Master Viscometers calibrated according to ASTM method D2162 and based on the established kinematic viscosity of 1.0034mm²/s for distilled water at 20.00°C per ISO/TR3666. Conversion of Kinematic to Saybolt viscosity has been calculated according to ASTM method D2161. Density has been determined according to ASTM method D7042. Thermometers used for temperature measurements are NIST traceable.

* The uncertainty of the certified values have been calculated from applicable uncertainty contributors (u). The combined uncertainty ($u_c = \sqrt{\sum u_i^2}$) has been multiplied by a coverage factor (k) of 2 to provide a 95% confidence interval.

3.0 REFERENCE VALUES: None

4.0 APPROVAL AND DATE OF CERTIFICATION:

Certification Approval:

Certification Date: Alketa Mixha, Conostan Production Manager
September 16, 2013

Certificate of Analysis

SAMPLE COA

1.0 DESCRIPTION: **CONOSTAN Multi-Element Standard**
S-21:10 ppm
Catalogue Number: **150-021-002 / 150-021-018**
Lot Number: **21426010**
Matrix: **Base Oil 75 cSt**
Expiration Date: **12 months from date of shipment (see bottle for date of shipment)**

2.0 CERTIFIED VALUES AND ASSOCIATED UNCERTAINTY:

Certified Concentrations, ppm ($\mu\text{g/g}$):

| | | | | | | | |
|----|------------------|----|------------------|----|------------------|----|------------------|
| Ag | 10.00 \pm 0.04 | Al | 10.00 \pm 0.04 | B | 10.00 \pm 0.02 | Ba | 10.00 \pm 0.01 |
| Ca | 10.00 \pm 0.04 | Cd | 10.00 \pm 0.05 | Cr | 10.00 \pm 0.05 | Cu | 10.00 \pm 0.02 |
| Fe | 10.00 \pm 0.05 | Mg | 10.00 \pm 0.04 | Mn | 10.00 \pm 0.02 | Mo | 10.00 \pm 0.01 |
| Na | 10.00 \pm 0.03 | Ni | 10.00 \pm 0.04 | P | 10.00 \pm 0.05 | Pb | 10.00 \pm 0.08 |
| Si | 10.00 \pm 0.02 | Sn | 10.00 \pm 0.06 | Ti | 10.00 \pm 0.03 | V | 10.00 \pm 0.04 |
| Zn | 10.00 \pm 0.06 | | | | | | |

Method of analysis and traceability:

This standard was prepared by weight measurements originating from assayed element Concentrates. A precursor blend was verified by atomic emission or absorption spectroscopy. Element concentrations for this standard are based on the Concentrate assay* values and were prepared to within the uncertainty values listed above at the 95% Confidence Interval, as determined by weight measurements of blend components conducted on balances calibrated and verified with NIST traceable weights.

*Each element Concentrate was assayed by classical wet chemical methods. Precision of assay measurement is ± 0.5 percent maximum, but typically ± 0.3 percent, or less. Assay accuracy is within one percent of measured value, but typically much less, as determined by co-measurement of, and traceability to, NIST Standards, or Certified Analytical Reagent Grade Chemicals, if no suitable NIST standards exists.

3.0 REFERENCE VALUES:

None

4.0 APPROVAL AND DATE OF CERTIFICATION:

Certification Date: January 15, 2014

Certification Approval:

Alketa Mixha, Chemist
Conostan Production Manager

www.conostan.com

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