



CONOSTAN® - OIL ANALYSIS STANDARDS

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.

The CONOSTAN® brand history dates back almost 50 years to the rise to prominence of AAS and ICP-OES as analytical techniques for analysis of metals in oil. To fill the void with regards to reliable Calibration Standards, the CONOSTAN® research

and development team created the chemistry for producing reliable Element-in-Oil Standards. These standards were then eagerly adopted by laboratories world-wide, the US Department of Defense, and even used by NIST for SRM-1085b.

Since that time CONOSTAN® has developed a wide range of products for oil testing focussing on the needs of the petrochemical and lubricant manufacturing industries as well as lubricant condition monitoring.

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METALLO-ORGANIC STANDARDS

CONOSTAN® is the world leader in the manufacture of Metallo-Organic Standards and is considered the quality benchmark in the industry. These standards are a must for a wide variety of industrial and research laboratory applications due to their superior accuracy, precision, stability and fitness for use.



SPECIFICATIONS

Features

Accuracy and Precision

Assayed by ISO 17025 approved methods and prepared in accordance with ISO Guide 34, CONOSTAN® Single Element Standards typically provide the user with under 0.5% relative uncertainty.

Stability

Manufactured primarily using tried-and-true sulfonate chemistry, with commonality of organic base molecule, CONOSTAN® Metallo-Organic Standards have proven themselves to be the premier market product in this respect.

Fitness for use

Whatever the analysis method and however the sample is prepared, CONOSTAN® Metallo-Organic Standards are right for the application. Available in a wide variety of matrices, the standards are stable and miscible in virtually any non-polar oil or solvent.

METALLO-ORGANIC STANDARDS

SINGLE ELEMENT STANDARDS

Features

38 elements available in 20 cSt mineral oil

1000 and 5000 ppm concentrations stocked (some exceptions - see below)

50 g format

ISO 17025 compliant Certificate of Analysis stating

- Certified concentration value
- Uncertainty
- Expiry date

Shelf life: 12 months from date of shipment

Stabilizer and Certified Blank oils available for dilution and analysis. See page 221

Whether looking to calibrate for a single element or to prepare your own multi-element standard, **CONOSTAN®** offers a complete range of Single-Element Standards.

| Element | 1000 ppm 50 g | 5000 ppm 50 g | Element | 1000 ppm 50 g | 5000 ppm 50 g |
|---------|--------------------------|------------------|---------|--------------------------|------------------|
| Ag | 150-100-475 | 150-500-475 | Mg | 150-100-125 | 150-500-125 |
| Al | 150-100-135 | 150-500-135 | Mn | 150-100-255 | 150-500-255 |
| As | 150-101-331 [‡] | --- | Mo | 150-100-425 | 150-500-425 |
| B | 150-100-055 | 150-500-055 | Na | 150-100-115 | 150-500-115 |
| Ba | 150-100-565 | 150-500-565 | Ni | 150-100-285 | 150-500-285 |
| Be | 150-100-045 | 150-500-045 | P | 150-100-155 | 150-500-155 |
| Bi | 150-100-835 | 150-500-835 | Pb | 150-100-825 | 150-500-825 |
| Ca | 150-100-205 | 150-500-205 | Sb | 150-100-515 | 150-500-515 |
| Ce | 150-100-585 | 150-500-585 | Sc | 150-500-215* | --- |
| Cd | 150-100-485 | 150-500-485 | Se | 150-101-341 [‡] | --- |
| Co | 150-100-275 | 150-500-275 | Si | 150-100-145 | 150-500-145 |
| Cr | 150-100-245 | 150-500-245 | Sn | 150-100-505 | 150-500-505 |
| Cu | 150-100-295 | 150-500-295 | Sr | 150-100-385 | 150-500-385 |
| Fe | 150-100-265 | 150-500-265 | Ti | 150-100-225 | 150-500-225 |
| Hg | 150-101-801 [‡] | --- | V | 150-100-235 | 150-500-235 |
| In | 150-100-495 | 150-500-495 | W | 150-100-745 | 150-500-745 |
| K | 150-100-195 | 150-500-195 | Y | 150-100-395 | 150-500-395 |
| La | 150-100-575 | 150-500-575 | Zn | 150-100-305 | 150-500-305 |
| Li | 150-100-035 | 150-500-035 | Zr | 150-100-405 | 150-500-405 |

For Blank Oil See Page 221

‡ - 100 ppm

* - 2000 ppm

METALLO-ORGANIC STANDARDS

CUSTOM BLENDS

Features

All 38 elements available, combinable at the concentration of your choice

Available in a wide variety of matrices

Available in 100 g, 200 g and 400 g bottles

Shelf life: 12 months from date of shipment

Inquire about custom volumes of stocked products

Find yourself repeatedly preparing the same blends of Single-Element Standards for your calibration curve or QC standard?

Think about ordering a **CONOSTAN®** custom blend!

Shorter preparation time can lead to greater throughput.

Eliminate sources of uncertainty due to preparation error, rely instead on the accompanying ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date.

AM-SPECIAL STANDARDS

CONOSTAN® Additive Metal Special is multi-element standard designed for the lubricants industry.

Features

Stocked at different concentrations of the following elements: Ba, Ca, Mg, P, Zn in 75 cSt mineral oil

ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date

Available in 100 g, 200 g and 400 g formats

Custom concentrations and element additions are available, example: AM-Special + B

Stabilizer and Certified Blank oils available for analysis. See page 221

| ppm | 100 g | 200 g | 400 g |
|------|--------------|-------------|-------------|
| 0 | See Page 221 | | |
| 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 |
| 2500 | 150-250-007 | 150-250-018 | --- |
| 3000 | 150-250-009 | 150-250-020 | --- |
| 5000 | 150-250-011 | 150-250-024 | 150-250-003 |
| 7000 | 150-250-013 | 150-250-025 | --- |

METALLO-ORGANIC STANDARDS

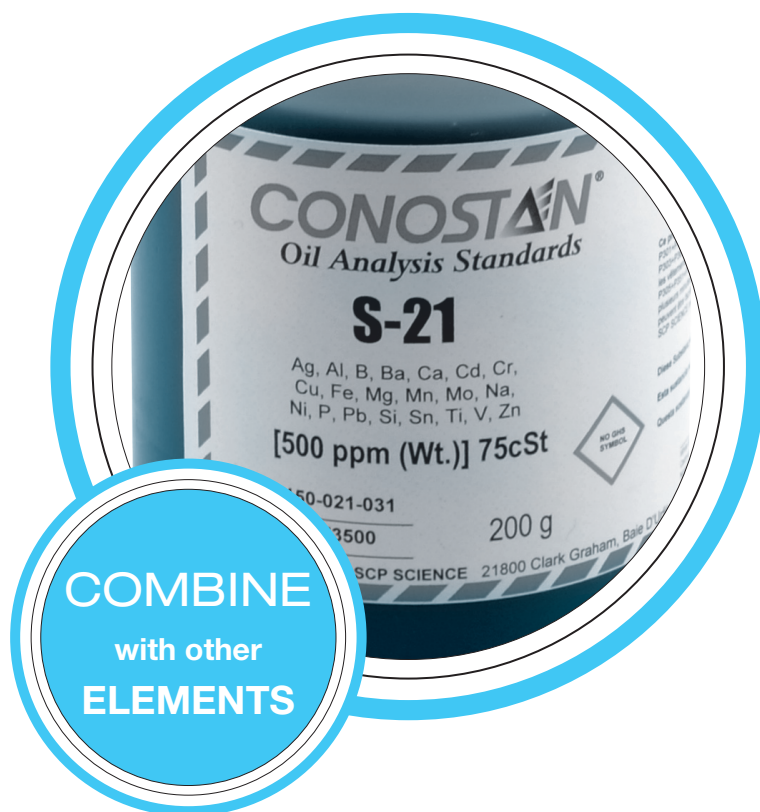
S-21 AND S-12 STANDARDS

Features

- 21 or 12 element blends in 75 cSt mineral oil
- Range of stocked concentrations
- ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date
- Available in 100 g and 200 g formats

Concentrations and custom element additions are available, example: S-21+K

Stabilizer and certified blank oils available for dilution and analysis. See page 221



For over 30 years CONOSTAN® S-21 has been the *gold standard* for the testing of metals in oil.

Initially designed for Lubricant Condition Monitoring, S-21 and S-12 are Multi-Element Standards, stocked at a range of concentrations designed to suit a wide range of calibration needs.

| ppm | S-21 | |
|-------|--------------|-------------|
| | 100 g | 200 g |
| Blank | See Page 221 | |
| 10 | 150-021-002 | 150-021-018 |
| 30 | 150-021-008 | 150-021-027 |
| 50 | 150-021-010 | 150-021-030 |
| 100 | 150-021-003 | 150-021-019 |
| 300 | 150-021-009 | 150-021-028 |
| 500 | 150-021-011 | 150-021-031 |
| 900 | 150-021-015 | 150-021-035 |

| ppm | S-12 | |
|-------|--------------|-------------|
| | 100 g | 200 g |
| Blank | See Page 221 | |
| 10 | 150-012-001 | 150-012-009 |
| 30 | 150-012-004 | 150-012-012 |
| 50 | 150-012-006 | 150-012-014 |
| 100 | 150-012-002 | 150-012-010 |
| 300 | 150-012-005 | 150-012-013 |
| 500 | 150-012-007 | 150-012-015 |
| 900 | 150-012-008 | 150-012-016 |

| Element | Ag | Al | B | Ba | Ca | Cd | Cr | Cu | Fe | Mg | Mn | Mo | Na | Ni | P | Pb | Si | Sn | Ti | V | Zn |
|---------|----|----|---|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|---|----|
| S-21 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| S-12 | • | • | | | | | • | • | • | • | | | • | • | | • | • | • | • | | |

S-21 CERTIFICATE OF ANALYSIS

CONOSTAN[®]
Oil Analysis Standards

Manufactured by SCP SCIENCE
21800 Clark Graham, Baie d'Urfe
Quebec, Canada H9X 4B6
Tel: 1-514-457-0701 / 1-(800) 361-6820

Certificate of Analysis

1.0 DESCRIPTION: **CONOSTAN Multi-Element Standard
S-21:100 ppm**
Catalogue Number: **150-021-003 / 150-021-019**
Lot Number: **21505100**
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 (µg/g):

| | | | | | | | |
|----|------------|----|------------|----|------------|----|------------|
| Ag | 100.0±0.31 | Al | 100.0±0.40 | B | 100.0±0.17 | Ba | 100.0±0.10 |
| Ca | 100.0±0.50 | Cd | 100.0±0.43 | Cr | 100.0±0.43 | Cu | 100.0±0.19 |
| Fe | 100.0±0.56 | Mg | 100.0±0.24 | Mn | 100.0±0.19 | Mo | 100.0±0.11 |
| Na | 100.0±0.29 | Ni | 100.0±0.38 | P | 100.0±0.43 | Pb | 100.0±0.75 |
| Si | 100.0±0.37 | Sn | 100.0±0.55 | Ti | 100.0±1.08 | V | 100.0±0.35 |
| Zn | 100.0±0.19 | | | | | | |

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: March 12, 2015

Certification Approval:



Alketa Mixha
Conostan Production Manager



METALLO-ORGANIC STANDARDS

BIODIESEL STANDARDS

Features

ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date

Available in a 100 g format

Custom element additions are available

Stabilizer and certified blank oils available for dilution and analysis. See page 221

CONOSTAN® offers a line of Multi-Element, Metallo-Organic Standards in biodiesel. Designed and manufactured primarily for use in ICP-OES and XRF analysis, blends of naturally occurring elements are offered in several combinations and concentrations.

| METALS IN BIODIESEL | 100% BIODIESEL (B100) BDM5 (100 g) | 100% BIODIESEL (B100) BDM2A (100 g) | 100% BIODIESEL (B100) BDM2B (100 g) |
|---------------------|------------------------------------|-------------------------------------|-------------------------------------|
| Elements (ppm) | Ca, K, Mg, Na, P | K, Na | Ca, Mg |
| 0 (Blank) | 150-441-000 | 150-441-000 | 150-441-000 |
| 2.5 | 151-441-005 | 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 |

METALLO-ORGANIC STANDARDS

CRUDE AND RESIDUAL OIL STANDARDS

Searching for standards to analyze Iron, Nickel or Vanadium in Crude or Residual oil?

Look no further!

CONOSTAN® offers a complete line of varied concentrations of these elements, designed for analysis by AAS, ICP-OES or XRF.

Features

ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date

Available in a 100 ml format

Custom element additions are available

RESIDUAL OIL

| Iron, ppm | Nickel, ppm | Vanadium, ppm | Catalog No. (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 |
| Complete Set | | | 150-421-060 |

CRUDE OIL

| Iron, ppm | Nickel, ppm | Vanadium, ppm | Catalog No. (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 |
| Complete Set | | | 150-451-060 |

METALLO-ORGANIC STANDARDS

D-SERIES STANDARDS

Features

ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date

JOAP Approved

Available in a 200 g format for D3 & D12 and 100 g for D19

Stabilizer and certified blank oils available for dilution and analysis

Custom preparations available.

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, the CONOSTAN® research team set to work in developing a reliable standard. The result was CONOSTAN®'s uniquely superior sulfonate chemistry which was adopted by the Department of Defense for its D-Series Standards.

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

Now available in Original and MIL-DTL-85694-compliant (JOAP) formulations! Returning CONOSTAN® D Series users should select from the CONOSTAN® original line of standards, while JOAP participants can now choose from our MIL-DTL-85694-compliant line.

| Element | Ag | Al | B | Ba | Cd | Cr | Cu | Fe | Mg | Mn | Mo | Na | Ni | Pb | Si | Sn | Ti | V | Zn |
|---------|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|
| D3 | | | • | | | | | | | | • | | | | | | | | • |
| D12 | • | • | | | | • | • | • | • | | | • | • | • | • | • | • | | |
| D19 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

| CONOSTAN® Product | Concentration (ppm) | Format | Cross Reference # with Dept. of Defense NSN | MIL-DTL-85694 | CONOSTAN® Original |
|-------------------|---------------------|--------|---|---------------|--------------------|
| D19-0 | 0 | 100 g | 9150-00-179-5137 | 150-301-008 | 150-300-008 |
| D3-100 | 100 | 100 g | 9150-01-283-0249 | 150-301-019 | 150-300-019 |

| CONOSTAN® Product | Concentration (ppm) | Format | Cross Reference # with Dept. of Defense NSN | MIL-DTL-85694 | CONOSTAN® Original |
|-------------------|---------------------|--------|---|---------------|--------------------|
| D19-0 | 0 | 100 g | 9150-00-179-5137 | 150-301-008 | 150-300-008 |
| D12-5 | 5 | 100 g | 9150-01-307-3343 | 150-301-005 | 150-300-005 |
| D12-10 | 10 | 100 g | 9150-00-179-5145 | 150-301-001 | 150-300-001 |
| D12-30 | 30 | 100 g | 9150-00-179-5144 | 150-301-003 | 150-300-003 |
| D12-50 | 50 | 100 g | 9150-00-179-5143 | 150-301-006 | 150-300-006 |
| D12-100 | 100 | 100 g | 9150-00-179-5142 | 150-301-002 | 150-300-002 |
| D12-300 | 300 | 100 g | 9150-00-179-5141 | 150-301-004 | 150-300-004 |

METALLO-ORGANIC STANDARDS

D-SERIES STANDARDS

| CONOSTAN® Product | Concentration (ppm) | Format | MIL-DTL-85694 | CONOSTAN® Original | D-19 Set Quantity / JOAP # 150-301-018* Orig. #150-300-018 / NSN 9150-01-355-1178 |
|-------------------|---------------------|--------|---------------|--------------------|--|
| D19-0 | 0 | 100 g | 150-301-008 | 150-300-008 | 4 |
| D19-5 | 5 | 100 g | 150-301-013* | 150-300-013 | 1 |
| D19-10 | 10 | 100 g | 150-301-009* | 150-300-009 | 1 |
| D19-30 | 30 | 100 g | 150-301-011* | 150-300-011 | 1 |
| D19-50 | 50 | 100 g | 150-301-014* | 150-300-014 | 1 |
| D19-100 | 100 | 100 g | 150-301-010* | 150-300-010 | 3 |
| D19-300 | 300 | 100 g | 150-301-012* | 150-300-012 | 2 |
| D19-500 | 500 | 100 g | 150-301-015* | 150-300-015 | 1 |
| D19-700 | 700 | 100 g | 150-301-016* | 150-300-016 | 1 |
| D19-900 | 900 | 100 g | 150-301-017* | 150-300-017 | 1 |

* Coming December 2015

ROTATING DISK ELECTRODE (RDE) SPECTROSCOPY - ELECTRODES

Introducing **CONOSTAN®** graphite electrodes for RDE Spectrometers, made from the highest purity graphite and machined precisely to very tight tolerances. Conveniently packaged and competitively priced, just choose the right electrodes for your instrument.

| Description | Designed for | Cross Reference No. | Catalog No. |
|---------------------------------------|--------------------------------|---------------------|-------------|
| D2 Rotating Disk (100) | Baird, MOA, GNR | 9100001 | 070-070-001 |
| D2 Rotating Disk, angled (500) | Spectroil M | MR9019 | 070-070-002 |
| D2 Rotating Disk (500) | Spectroil M | M97008 | 070-070-003 |
| D2 Rotating Disk, High Porosity (500) | RFS | | 070-070-101 |
| Graphite Rods, .242" x 4" (100) | General | | 070-071-001 |
| Graphite Rods, .242" x 6" (100) | Spectroil M Baird, MOA, GNR | M97009 9100002 | 070-071-002 |
| Graphite Rods, .242" x 12" (100) | General | | 070-071-003 |

Reference
Electrode

AC Arc

Rotating
Electrode

METALLO-ORGANIC STANDARDS

BLANK OILS, SOLVENTS, STABILIZER AND INTERNAL STANDARDS

SPECIFICATIONS



| | 20 cSt | 75 cSt | PremiSolv™ |
|----------------------------------|-----------------|-----------------|-----------------|
| Specific Gravity (25 °C / 77 °F) | 0.84–0.86 | 0.86–0.89 | 0.82–0.83 |
| Viscosity: 40 °C | 14–18 cSt | 65–72 cSt | 2–3 cSt |
| 100 °C | 3–4 cSt | 8.1–8.7 cSt | --- |
| Pour Point | -7 °C (+20 °F) | -15 °C (+5 °F) | -40 °C (-40 °F) |
| Flash Point (minimum) | 175 °C (345 °F) | 215 °C (420 °F) | 99 °C (210 °F) |
| Trace Metals | <0.10 ppm | <0.15 ppm | <0.10 ppm |

Blank Oils

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

| Format | 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 |

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 for metal content.

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

Stabilizer

CONOSTAN® Single and Multi-Element Standards are stable for at least one year. When preparing intermediate or working standards at low concentrations, or when using particularly aggressive solvents, CONOSTAN® stabilizer can help to ensure consistent results. The stabilizer is effective for both single and multi-element blends of CONOSTAN® Standards in hydrocarbon oil.

| Format | Catalog No. |
|--------|-------------|
| 50 g | 150-010-001 |

METALLO-ORGANIC STANDARDS

BLANK OILS, SOLVENTS, STABILIZER AND INTERNAL STANDARDS

Internal Standards

Internal Standards are often used in ICP-OES in order to compensate for, and minimize, the impact of instrument-related variability.

Cobalt is the element of choice for many end-users and therefore **CONOSTAN®** is proud to offer a 3% Cobalt Standard for this purpose.

COBALT 3%

| Format | Catalog No. |
|--------|-------------|
| 100 g | 150-502-001 |
| 200 g | 150-502-002 |
| 400 g | 150-502-003 |

PremiSolv™

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

Format

Catalog No.

| Format | Catalog No. |
|--------------------|-------------|
| 3.78 L (1 gallon) | 150-700-003 |
| 18.5 L (5 gallons) | 150-700-002 |

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



**WOULD YOU LIKE TO COMPARE?
ASK FOR A FREE 400 ml SAMPLE
CAT. #150-700-000**
CONTACT OUR SALES DEPARTMENT
FOR MORE INFORMATION SALES@SCPSCIENCE.COM



METALLO-ORGANIC STANDARDS

CONOSTAN®
Oil Analysis Standards

Manufactured by SCP SCIENCE
21800 Clark Graham, Baie d'Urfé
Quebec, Canada H9X 4B6
Tel: 1-514-457-0701 / 1-(800) 361-6820

Certificate of Analysis

1.0 DESCRIPTION: **CONOSTAN Premisolv™ ICP Solvent**
Catalogue Number: 150-700-000 / 150-700-001 / 150-700-002 / 150-700-003
Lot Number: 64
Matrix: N/A
Expiration Date: 12 months from date of shipment

2.0 CERTIFIED VALUES AND ASSOCIATED UNCERTAINTY:

Trace Element Concentrations, ppm (µg/g) :

| | | | | | | | |
|----|-------|----|-------|----|-------|----|-------|
| Ag | <0.01 | Al | <0.01 | B | <0.01 | Ba | <0.01 |
| Be | <0.01 | Bi | <0.01 | Ca | <0.01 | Cd | <0.01 |
| Co | <0.01 | Cr | <0.01 | Cu | <0.01 | Fe | <0.01 |
| In | <0.05 | K | <0.05 | La | <0.03 | Li | <0.01 |
| Mg | <0.01 | Mn | <0.01 | Mo | <0.03 | Na | <0.05 |
| Ni | <0.01 | P | <0.02 | Pb | <0.10 | S* | <1 |
| Sb | <0.02 | Sc | <0.01 | Si | <0.01 | Sn | <0.1 |
| Sr | <0.01 | Ti | <0.01 | V | <0.01 | W | <0.1 |
| Y | <0.01 | Zn | <0.01 | | | | |

Method of analysis and traceability:

Trace element values were determined by atomic emission spectroscopy and are traceable to the applicable NIST 31 series Standard Reference Materials.

*Sulfur value was determined by ASTM D5453 with standards traceable to NIST SRM 1616a.

3.0 REFERENCE VALUES:

None

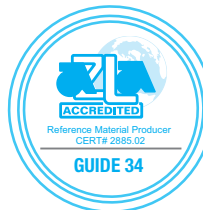
4.0 APPROVAL AND DATE OF CERTIFICATION:

Certification Date: March 31, 2015

Certification Approval:



Alketa Mixha
Conostan Production Manager



SULFUR STANDARDS

Sulfur is a contaminant found in petroleum products including crude oils, fuels and lubricants. For certain products, sulfur content is regulated for emissions, while in others it inhibits performance. In almost all cases, it requires precise monitoring.

For this purpose, **CONOSTAN**® offers a complete range of Sulfur Standards in a wide variety of matrices, at the concentrations you need, designed for analysis using ICP-OES, XRF and UV-F.



Features

Available in Crude oil, Residual oil, Isooctane, Mineral oil, Diesel, and now Biodiesel

ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date

Available in a variety of formats, as noted

Custom concentrations are available

Certified Blanks available for analysis

SULFUR STANDARDS IN BIODIESEL

CONOSTAN® offers Sulfur in Biodiesel Standards in 5% (B5), 20% (B20) and 100% (B100) biodiesel blends. A blank standard is also available. Manufactured in accordance with 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 | Catalog No. | Catalog No. | Catalog No. |
| 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 |

SULFUR STANDARDS

SULFUR IN CRUDE OIL

Designed primarily for XFR applications, **CONOSTAN®** offers a line of 10 Sulfur in Crude Oil Standards

| ppm | Catalog No. (100 ml) |
|--------|----------------------|
| 500 | 150-450-100 |
| 1000 | 150-450-105 |
| 1500 | 150-450-120 |
| 2500 | 150-450-110 |
| 5000 | 150-450-115 |
| 10,000 | 150-450-125 |
| 20,000 | 150-450-130 |
| 30,000 | 150-450-135 |
| 40,000 | 150-450-140 |
| 50,000 | 150-450-145 |

SULFUR IN DIESEL FUEL

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, custom concentrations are available. Contact us for more information.

| ppm | In Diesel Fuel (100 g) | ppm | In Diesel Fuel (100 g) |
|-----------|------------------------|--------|------------------------|
| 0 (Blank) | 150-410-012 | 5000 | 150-410-011 |
| 5 | 150-410-008 | 7500 | 150-410-021 |
| 10 | 150-410-001 | 10,000 | 150-410-004 |
| 25 | 150-410-013 | 15,000 | 150-410-006 |
| 50 | 150-410-009 | 20,000 | 150-410-007 |
| 100 | 150-410-002 | 30,000 | 150-410-022 |
| 500 | 150-410-010 | 40,000 | 150-410-023 |
| 750 | 150-410-018 | 50,000 | 150-410-024 |
| 1000 | 150-410-003 | | |

SULFUR IN ISOCTANE BY UV-F

Designed for the Petroleum industry, **CONOSTAN®** Isooctane Standards are available in concentrations and formats chosen to meet the needs of your specific application.

| Concentrations (ppm) | Description | Catalog No. (set of 7 x 10 ml vials) |
|---------------------------------|-----------------------|--------------------------------------|
| 0, 0.5, 1.0, 2.5, 5.0, 7.5, 10 | Very Low Sulfur level | 150-430-010 |
| 0, 5.0, 10, 25, 50, 100, 250 | Low Sulfur level | 150-430-020 |
| 0, 50, 100, 250, 500, 750, 1000 | High Sulfur level | 150-430-030 |

SULFUR IN ISOCTANE BY XRF

| Concentration (ppm) | Catalog No. (60 ml) |
|---------------------|---------------------|
| 0 (Blank) | 150-430-101 |
| 5 | 150-430-108 |
| 10 | 150-430-109 |
| 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 STANDARDS

SULFUR IN MINERAL OIL

Sulfur in Mineral Oil. This product line is designed for the calibration of XRF, ICP, and other analytical instruments according to various ASTM methods (such as D2622, D3246, D4294, D5453, D6334, and D6443).

Custom Concentrations. For concentrations not listed in the table, custom concentrations are available. Contact us for more information.

| ppm | In Mineral Oil (100 g) | ppm | In Mineral Oil (100 g) |
|-----------|------------------------|--------|------------------------|
| 0 (Blank) | 150-400-025 | 5000 | 150-400-020 |
| 10 | 150-400-001 | 7500 | 150-400-024 |
| 25 | 150-400-009 | 10,000 | 150-400-004 |
| 50 | 150-400-018 | 15000 | 150-400-005 |
| 100 | 150-400-002 | 20,000 | 150-400-008 |
| 250 | 150-400-010 | 25,000 | 150-400-012 |
| 500 | 150-400-019 | 30,000 | 150-400-014 |
| 750 | 150-400-023 | 40,000 | 150-400-016 |
| 1000 | 150-400-003 | 50,000 | 150-400-021 |

SULFUR IN RESIDUAL OIL

Residual Oil, a by-product of crude oil distillation, is often referred to as Fuel Oil (n° 5, n° 6, Bunker B or Bunker C) and serves as the fuel for many marine engines and industrial furnaces.

CONOSTAN® offers a wide range of standards in a true residual oil-based matrix to ensure performance in XRF and other applications.



| ppm | Catalog No. (50 ml) | Catalog No. (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 |
| 10,000 | 150-420-125 | 150-420-025 |
| 15,000 | 150-420-130 | 150-420-030 |
| 20,000 | 150-420-135 | 150-420-035 |
| 25,000 | 150-420-140 | 150-420-040 |
| 30,000 | 150-420-145 | 150-420-045 |
| 35,000 | 150-420-150 | 150-420-050 |
| 40,000 | 150-420-155 | 150-420-055 |
| 50,000 | 150-420-160 | 150-420-060 |

Residual Oil CERTIFICATE OF ANALYSIS

CONOSTAN[®]
Oil Analysis Standards

Manufactured by SCP SCIENCE
21800 Clark Graham, Baie d'Urfe
Quebec, Canada H9X 4B6
Tel: 1-514-457-0701 / 1-(800) 361-6820

Certificate of Analysis

1.0 DESCRIPTION: CONOSTAN Single Element Standard, 0.25% Sulfur in Residual Oil

Catalogue Number: 150-420-005 / 150-420-100
Lot Number: 2.5K1415R
Matrix: Residual Oil Base Material
Expiration Date: 12 months from date of shipment
(see bottle for date of shipment)

2.0 CERTIFIED VALUES AND ASSOCIATED UNCERTAINTY:

Certified Concentration: **2500 ppm ± 23ppm (µg/g)**
(0.25% ± 0.0023%)

Method of analysis and traceability:

This standard was prepared by weight measurements originating from a quantitatively certified element Concentrate and an assayed residual oil matrix*. Element concentration for this standard is based on the Concentrate certified value as well as the matrix assay, and was prepared to within the uncertainty value 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.

* The matrix was assayed using Ultraviolet Fluorescence instrumental analysis (per ASTM D5453) and results are traceable to NIST SRM 1819a. The quantified concentrate was verified per ASTM D5453 on equipment which was calibrated using NIST 1819a reference material

3.0 REFERENCE VALUES:

None

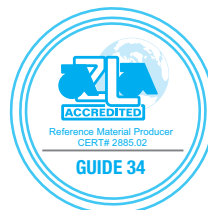
4.0 APPROVAL AND DATE OF CERTIFICATION:

Certification Date: April 07th, 2015

Certification Approval:



Alketa Mixha
Conostan Production Manager



CHLORINE STANDARDS

Monitoring the chlorine content is important in various oils and oil products:

- In crude oils, chlorine is often naturally occurring, and may bias the sulfur measurement during crude oil blending or cause damage in the refining process.
- The balance of sulfur and chlorine is also critical for cutting fluid efficiency and lubricity to avoid damage to cutting tools and machined parts.
- Waste oil recycling as lubricant or fuel also requires accurate chlorine analysis.
- For these purposes, **CONOSTAN®** provides Chlorine Standards in mineral oil, 100 g, at various concentrations. Chlorine can also be combined with Sulfur to create a custom blend.

Features

- ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date
- Available in a 100 g format
- Custom element additions are available

| ppm | Catalog No. (100 g) |
|-----------|---------------------|
| 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 |
| 10,000 | 150-200-004 |
| 50,000 | 150-200-007 |



Manufactured by SCP SCIENCE
21800 Clark Graham, Base of Lake
Quebec, Canada H9X 4B8
Tel: 1-514-457-0701 / 1-(800) 361-6820

Certificate of Analysis

1.0 DESCRIPTION: CONOSTAN Single Element Standard, 0.1% Chlorine
 Catalogue Number: 150-200-003
 Lot Number: 1005013
 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 Concentration: 1000 ppm ± 3 ppm (µg/g)

Method of analysis and traceability: This standard was prepared by weight measurements originating from assayed element Concentrates. Element concentration for this standard is based on the Concentrate assay value and was prepared to within the uncertainty value 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 Standard exists.

3.0 REFERENCE VALUES:
None

4.0 APPROVAL AND DATE OF CERTIFICATION:
 Certification Date: April 08, 2014
 Certification Approval:

Alketa Mixha
Conostan Production Manager



LUBRICANT CONDITION MONITORING STANDARDS

For decades, **CONOSTAN®** has served the lubricant condition monitoring industry with our line of premier Metallo-Organic Standards. **CONOSTAN®** now offers an expanding line of Lubricant Condition Monitoring Standards

| Products | Page |
|-------------|------|
| FTIR | 229 |
| Flash Point | 229 |
| PartiStan™ | 230 |
| Viscosity | 232 |
| TAN and TBN | 235 |

| ASTM D 93 Nominal Flash Point (°C) | Catalog No. (80 ml) | Catalog No. (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 |
| 205 | 150-900-100 | 150-900-105 |
| 231 | 150-900-040 | 150-900-090 |
| 260 | 150-900-110 | 150-900-115 |

| Description | Size | Catalog No. |
|--------------------------------|-------|-------------|
| FTIR Operational Test Standard | 100 g | 150-702-001 |

FLASH POINT STANDARDS

Flash Point Standards for use in accordance with ASTM D93. Complete with a detailed Certificate of Analysis.

| Features |
|--|
| ISO 17025 compliant Certificate of Analysis stating certified concentration value, uncertainty and expiry date |
| Available in a 80 ml and 250 ml formats |

FTIR STANDARD

Our FTIR operational test standard is a petroleum oil-based fluid that looks and handles like routinely tested used-oil samples. Unique for its long-term stability, it is designed for validating FTIR instrument performance over time to ensure repeatability and reproducibility.

LUBRICANT CONDITION MONITORING STANDARDS

PartiStan™ - Automatic Particle Counter Standards

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, recently updated (2010) procedure, secondary calibration requires a fluid traceable to NIST SRM 2806 - a suspension of 3.3 mg/L of ISO medium test dust in super-clean hydraulic fluid.

CONOSTAN® offers a full range of cost-effective products for the periodic calibration and verification of automatic particle counters, as per Clause 6 and Annexes A through E of ISO 11171. PartiStan™ secondary standards are compliant with ISO 11171 and directly traceable to NIST SRM 2806.

| Product | Description | Size | Catalog No. |
|--|---|----------------------|-------------|
| PartiStan™ 2806 Calibration Fluid | Designed for secondary calibrations of automatic particle counters (APCs) as per ISO 11171. PartiStan™ 2806 Calibration Fluid is a secondary calibration fluid traceable to NIST SRM 2806b. Shelf Life: Minimum of 12, up to 24 months from date of shipment | 400 ml | 150-701-001 |
| PartiStan™ Resolution Standard | Bottle contains 10 µm (nominal size) latex spheres dispersed in hydraulic fluid. Designed for automatic particle counter (APC) resolution verification as per ISO 11171, annex D. Shelf life: 90 days from date of shipment | 400 ml | 150-701-002 |
| PartiStan™ SCF (Super Clean Fluid) | PartiStan™ Super Clean Fluid is MIL-H-5606 Hydraulic Fluid (the base material for other PartiStan™ Standards) that is prepared to be free of particulate using a proprietary method. Complete with a Certificate of Analysis stating particle counts, this fluid is ideal as a blank or for dilution of "dirty" samples that would otherwise saturate an APC detector. | 400 ml | 150-701-003 |
| PartiStan™ SCF (Super Clean Fluid) | PartiStan™ Super Clean Fluid is MIL-H-5606 Hydraulic Fluid (as found in other PartiStan™ Standards) that is prepared to be free of particulate using a proprietary method. Complete with a Certificate of Analysis stating particle counts, this fluid is ideal as a blank or for dilution of "dirty" samples that would otherwise saturate an APC detector. | 3.78 L (1 gallon) | 150-701-004 |
| PartiStan™ UFTD (ultra-fine test-dust suspension in SCF) | Designed for verification of automatic particle counters (APCs), PartiStan™ UFTD Standard (100 mg/L dispersion of NIST 8632 dust) is ideal for Annexes A, B, C and E of the ISO 11171 standard. Supplied with a Certificate of Analysis providing certified values and uncertainty. Shelf life: Minimum of 12, up to 24 months from date of shipment | 400 ml | 150-701-005 |
| PartiStan™ Resolution Fluid | Kit of three 400 ml bottles, each containing latex spheres of a different size, dispersed in hydraulic fluid. Designed for automatic particle counter (APC) resolution verification as per ISO 11171, Annex D. The nominal sizes are: 10 µm, 40 µm, 70 µm. Shelf life: 90 days from date of shipment | 3 x 400 ml | 150-701-006 |

PartiStan™ CERTIFICATE OF ANALYSIS

CONOSTAN®
Oil Analysis Standards

Manufactured by SCP SCIENCE
21800 Clark Graham, Baie d'Urfe
Quebec, Canada H9X 4B6
Tel: 1-514-457-0701 / 1-(800) 361-6820

Certificate of Analysis

1.0 DESCRIPTION: CONOSTAN PartiStan™ SCF – Super Clean Fluid
Catalogue Number: 150-701-004
Lot Number: **86**
Matrix: MIL-H-5606 Hydraulic Fluid
Expiration Date: **May, 2017**

2.0 CERTIFIED VALUES AND ASSOCIATED UNCERTAINTY:

| Size >um (c) | Average Mean Particle Concentration (Particles/mL) |
|--------------|--|
| 4 | 7.4 |
| 5 | 2.2 |
| 6 | 0.9 |
| 7 | 0.5 |
| 8 | 0.2 |
| 10 | 0.1 |
| 12 | 0.1 |
| 14 | 0.0 |

Method of analysis and traceability:

Particle size distribution obtained using an automatic particle counter calibrated per ISO standard 11171. Method used in determining particle counts conforms to NFPA/T2.9.11 R1-1999, without Aerosol OT. Counts are an average from 40 samples taken during filling of the bottles.

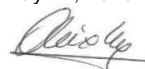
3.0 REFERENCE VALUES:

None

4.0 APPROVAL AND DATE OF CERTIFICATION:

Certification Date: May 22, 2015

Certification Approval:



Alketa Mixha
Conostan Production Manager

LUBRICANT CONDITION MONITORING STANDARDS

VISCOSITY STANDARDS

The product reliability and stability that our customers trust in Metallo-Organic Standards are now available in General Purpose Viscosity Standards. These ISO 17025 certified, mineral oil based, Viscosity Standards were developed for calibration and verification of all types of viscometers.

All standards are traceable to NIST and manufactured in accordance with ISO Guide 34 at our A2LA accredited facility, and come complete with a Certificate of Analysis stating kinematic, dynamic and Saybolt viscosities as well as density at 9 different temperatures. Each standard carries a two year stability guarantee. See the following tables for details regarding typical product properties.

Custom viscosities are available.



| 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 |
| N15,000 | 150-600-411 | 150-600-412 | 150-600-413 | 150-600-414 | 150-600-415 |
| S30,000 | 150-600-421 | 150-600-422 | 150-600-423 | 150-600-424 | 150-600-425 |

Lubricant Condition Monitoring Standards

VISCOSITY STANDARDS

| KINEMATIC VISCOSITY IN MM2/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 | --- |
| N15,000 | 64000 | 40000 | 13000 | 11000 | 5300 | 2700 | 850 | 340 | 320 | --- |
| S30,000 | --- | 80000 | 28000 | 23000 | 11000 | 5800 | 1700 | 670 | 640 | --- |

*Typical values only, individual lots may vary slightly

| 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 | --- |
| N15,000 | 57000 | 36000 | 11000 | 9700 | 4700 | 2400 | 730 | 290 | 270 | --- |
| S30,000 | --- | 72000 | 25000 | 20000 | 9700 | 5100 | 1500 | 570 | 550 | --- |

Viscosity Standards

CERTIFICATE OF ANALYSIS

CONOSTAN[®]
Oil Analysis Standards

Manufactured by **SCP SCIENCE**
21800 Clark Graham, Baie d'Urfe
Quebec, Canada H9X 4B6
Tel: 1-514-457-0701 / 1-(800) 361-6820

Certificate of Analysis

1.0 DESCRIPTION: CONOSTAN Viscosity Reference Standard, N4000
 Catalogue Number: 150-600-391 / 150-600-392 / 150-600-393/ 150-600-394 / 150-600-395
 Lot Number: **1216**
 Matrix: White mineral oil
 Expiration Date: **October 2016**

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 | 19346 | 17098 | 0.8838 | |
| 25.00 | 77.00 | 12285 | 10822 | 0.8809 | |
| 37.78 | 100.00 | 4262 | 3725 | 0.8738 | N/A |
| 40.00 | 104.00 | 3606 | 3147 | 0.8726 | |
| 50.00 | 122.00 | 1765 | 1531 | 0.8671 | |
| 60.00 | 140.00 | 925.6 | 797.5 | 0.8617 | |
| 80.00 | 176.00 | 310.2 | 263.9 | 0.8505 | |
| 98.89 | 210.00 | 134.3 | 112.8 | 0.8399 | 626 |
| 100.00 | 212.00 | 128.6 | 107.9 | 0.8392 | |

*Expanded Uncertainty (%) at Temperatures :

| Viscosity Range mm ² / s (cSt) | <=40 °C | >40 °C |
|--|---------|--------|
| < 10 | ±0.28 | ±0.27 |
| 10 to 100 | ±0.32 | ±0.28 |
| 100 to 1000 | ±0.37 | ±0.31 |
| 1000 to 10000 | ±0.36 | ±0.30 |
| 10000 to 100000 | ±0.46 | ±0.39 |

Method of analysis and traceability:

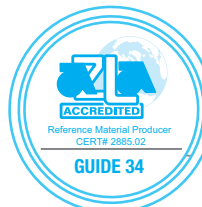
This viscosity standard has been prepared according to ASTM methods D445, D446 and corresponding ISO methods 3104 and 3105. Kinematic viscosities have been determined using Master Viscometers calibrated according to ASTM method D2162 and based on the established kinematic viscosity of 1.0034mm²/s for 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:

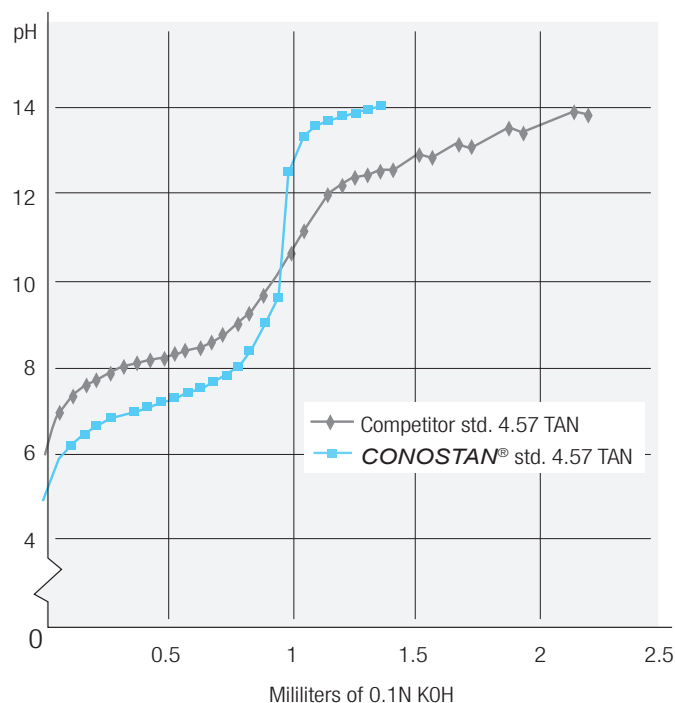
Certification Approval: Alketa Mixha, Conostan Production Manager
 Certification Date: October 9, 2014



LUBRICANT CONDITION MONITORING STANDARDS

TOTAL ACID NUMBER (TAN) STANDARDS

Comparison of Titration Curves



With the **CONOSTAN**® family of TAN Standards, titration curves have more prominent inflection points and higher pH differentials than with other brands. This provides a lower uncertainty when calibrating titrators.

| Description | Size | Catalog No. |
|---------------|------|-------------|
| 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 |

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 | Catalog No. |
|---------------|------|-------------|
| 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 |

TAN Standards

CERTIFICATE OF ANALYSIS



Certificate of Analysis

1.0 DESCRIPTION: CONOSTAN Acid Number Standard, (4.5 mg KOH/g)

Catalogue Number: 150-800-455
 Lot Number: 0450100
 Matrix: White Mineral Oil
 Expiration Date: October, 2015

2.0 CERTIFIED VALUES AND ASSOCIATED UNCERTAINTY:

Certified Concentration: 4.43 mg KOH/g (+/-2%)

Calibration Temperature: 22 +/-3°C

Method of analysis and traceability: This standard has been tested by potentiometric titration in accordance with ASTM D 664 and it is traceable to NIST 84L.

* 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.

Additional notes:

According to the ASTM D664 method, the titrant addition should be 0.05ml and 0.01ml at the region of the inflexion point. In order to obtain better accuracy and precision working with this standard, we recommend the use of burettes with a minimum graduation of 0.005ml or less. If not possible, use of a titrant with a concentration of less than 0.1N is recommended for more accurate results.

A time of 30 to 60 seconds between two additions of titrant is recommended in order to obtain stable potential values and to get a smooth titration curve.

By using this approach the repeatability and reproducibility of our standards is within 1-2%.

3.0 REFERENCE VALUES:

None.

4.0 APPROVAL AND DATE OF CERTIFICATION:

Certification Approval: Alketa Mixha, Conostan Production Manager

Certification Date: April 14, 2014

