

CALL FOR EXPRESSIONS OF INTEREST FOR PRECISION IODINE VALUE ANALYSER

CSIR-Central Scientific Instruments Organisation (CSIO), a constituent unit of Council of Scientific & Industrial Research (CSIR), is a premier national laboratory dedicated to research, design and development of scientific and industrial instruments.

CSIO has developed **Precision iodine value analyser (PIVA)** for the quality estimation of six commonly used edible oils (sunflower, soybean, mustard, ricebran, palm & coconut). Software and process of analysis using this device has been secured through IPR. Oil and ghee quality is typically measured by saponification value, degree of unsaturation (iodine value), peroxide value, p-anisidine value, and free fatty acids. The iodine value, indicating the degree of unsaturation, decreases over time due to fatty acid oxidation and serves as an important indicator of physical properties and potential adulteration. Traditional titration methods (Hubl, Hanus, Rosenmund-Kuhnenn, Wij's) used to determine the iodine value involve hazardous chemicals, fragile setups, and skilled labor, making them costly and impractical for field use.

CSIO desires to shortlist manufacturers in different regions of the country having capability for manufacturing, installation, and deployment of this device. Expression of Interest (Eoi) is invited from the parties willing to manufacture, obtain certification and market the device under the license of CSIO. The interested parties should have capabilities/experience in fabrication and integration of mechanical & electronic/electrical systems. The design and know-how alongwith licensing of associated intellectual property such as patents, design or software copyright etc. will be provided to the selected party after signing Transfer of Technology (ToT) Agreement/Non-Disclosure Agreement (NDA).

Scope of work:

- Fabrication of the device as per the design provided by CSIO
- Translation of developed device into marketable product
- Operation and instruction manual with drawings and test certificates
- After-sale services for the device

Features & Specifications:

- As per attached brochure

Interested parties may provide the following information in response to this EOI:

- Audited balance sheet of three immediate past preceding years', including profit and loss account and the Annual Report
- Reference list of engineering supplies of fabrication and services during the past two /three years
- Details of the fabrication facilities (mechanical/electronic/electrical etc.) available including area and tooling list along with photographs
- List of quality certifications / accreditations that are currently valid, with copies of such certificates
- A notarized Affidavit confirming that the party has not been banned or blacklisted at any time for supplies to government agencies

Interested parties are requested to apply with all the required documents through email to eoι.csio@csio.res.in latest by 5th June 2024.

This Eoi is not intended to form the basis of any decision to purchase / finalize contract and it does not constitute an offer or invitation or solicitation of an offer to purchase.

प्रिसिजन आयोडीन वैल्यू एनालाइजर (पीआईवीए) की रुचि की अभिव्यक्ति के लिए आमंत्रण

सीएसआईआर-केंद्रीय वैज्ञानिक उपकरण संगठन (सीएसआईओ) चंडीगढ़, वैज्ञानिक और औद्योगिक अनुसंधान परिषद (सीएसआईआर) की एक घटक इकाई है, जो वैज्ञानिक और औद्योगिक उपकरणों के अनुसंधान, डिजाइन और विकास के लिए समर्पित एक प्रमुख राष्ट्रीय प्रयोगशाला है।

सीएसआईओ ने छह सामान्यतः उपयोग किए जाने वाले खाद्य तेलों (सूरजमुखी, सोयाबीन, सरसों, चावल की भूसी, पाम और नारियल) की गुणवत्ता का आकलन करने के लिए **प्रिसिजन आयोडीन वैल्यू एनालाइजर** (पीआईवीए) विकसित किया है। इस डिवाइस का उपयोग कर विश्लेषण की प्रक्रिया और सॉफ्टवेयर को बौद्धिक संपदा अधिकारों (आईपीआर) के माध्यम से सुरक्षित किया गया है। तेल और घी की गुणवत्ता का सामान्यतः मापन सैपोनिफिकेशन वैल्यू, असंतृप्तता की डिग्री (आयोडीन वैल्यू), पेरोक्साइड वैल्यू, पी-एनिसिडीन वैल्यू और मुक्त फैटी एसिड्स के आधार पर किया जाता है। आयोडीन वैल्यू, जो असंतृप्तता की डिग्री को दर्शाती है, समय के साथ फैटी एसिड ऑक्सीकरण के कारण घटती है और भौतिक गुणों और संभावित मिलावट के एक महत्वपूर्ण संकेतक के रूप में कार्य करती है। आयोडीन वैल्यू निर्धारित करने के लिए पारंपरिक टाइट्रेशन विधियाँ (हबल, हनुस, रोसेनमुंड-कुन्हेन, विज़) खतरनाक रसायनों, नाजुक सेटअप और कुशल श्रम का उपयोग करती हैं, जिससे ये महंगी और क्षेत्रीय उपयोग के लिए अव्यावहारिक हो जाती हैं।

सीएसआईओ, चंडीगढ़, देश के विभिन्न क्षेत्रों में, सीएसआईओ के लाइसेंस के तहत इस उपकरण के निर्माण, कार्यान्वयन और स्थापित करने की क्षमता रखने वाले निर्माताओं को शॉर्टलिस्ट करने के उद्देश्य से इच्छुक पक्षों से रुचि की अभिव्यक्ति (ईओआई) आमंत्रित करना चाहता है। इच्छुक पार्टियों के पासमैकेनिकल और इलेक्ट्रॉनिक / इलेक्ट्रिकल सिस्टम के निर्माण और एकीकरण में क्षमता / अनुभव होना चाहिए। प्रौद्योगिकी हस्तांतरण (TOT) समझौते/गैर-प्रकटीकरण समझौते (NDA) पर हस्ताक्षर करने के बाद चयनित पार्टी को संबंधित बौद्धिक संपदा जैसे पेटेंट, डिजाइनअथवासॉफ्टवेयर कॉपीराइट आदि के लाइसेंस के साथ-साथ डिजाइन संबंधित जानकारी प्रदान की जाएगी।

अनुमानित कार्य:

- सीएसआईओ द्वारा उपलब्ध कराए गए डिजाइन के अनुसार डिवाइस का निर्माण
- विकसित उपकरण का विपणन योग्य उत्पाद में रूपांतर
- संचालन और अनुदेश मैन्युअल चित्र और परीक्षण प्रमाणपत्र सहित तैयार करने
- डिवाइस के लिए बिक्री के बाद सेवाएं

विशेषताएं और विनिर्देश:

- संलग्न विवरणिका के अनुसार।

इच्छुक पार्टियां ईओआई के जवाब में निम्नलिखित जानकारी प्रदान कर सकती हैं:

- लाभ और हानि खाते और वार्षिक रिपोर्ट सहित पिछले तीन तत्काल वर्षों की लेखा परीक्षित बैलेंस शीट।
- पिछले दो/तीन वर्षों के दौरान निर्माण और इंजीनियरिंग सेवाओं की आपूर्ति की संदर्भ सूची।
- उपलब्ध क्षेत्र सहित निर्माण सुविधाओं और टूलिंग सूची का विवरण, तस्वीरों सहित।
- जो वर्तमान में मान्य हैं, ऐसे गुणवत्ता प्रमाणपत्रों/मान्यताओं की सूची प्रमाणपत्रों की प्रतियों सहित।
- एक नोटरीकृत हलफनामा, जो पार्टी को सरकारी एजेंसियों को आपूर्ति करने के लिए किसी भी समय प्रतिबंधित या काली सूची में नहीं डाला गया होकर पुष्टि करता हो।

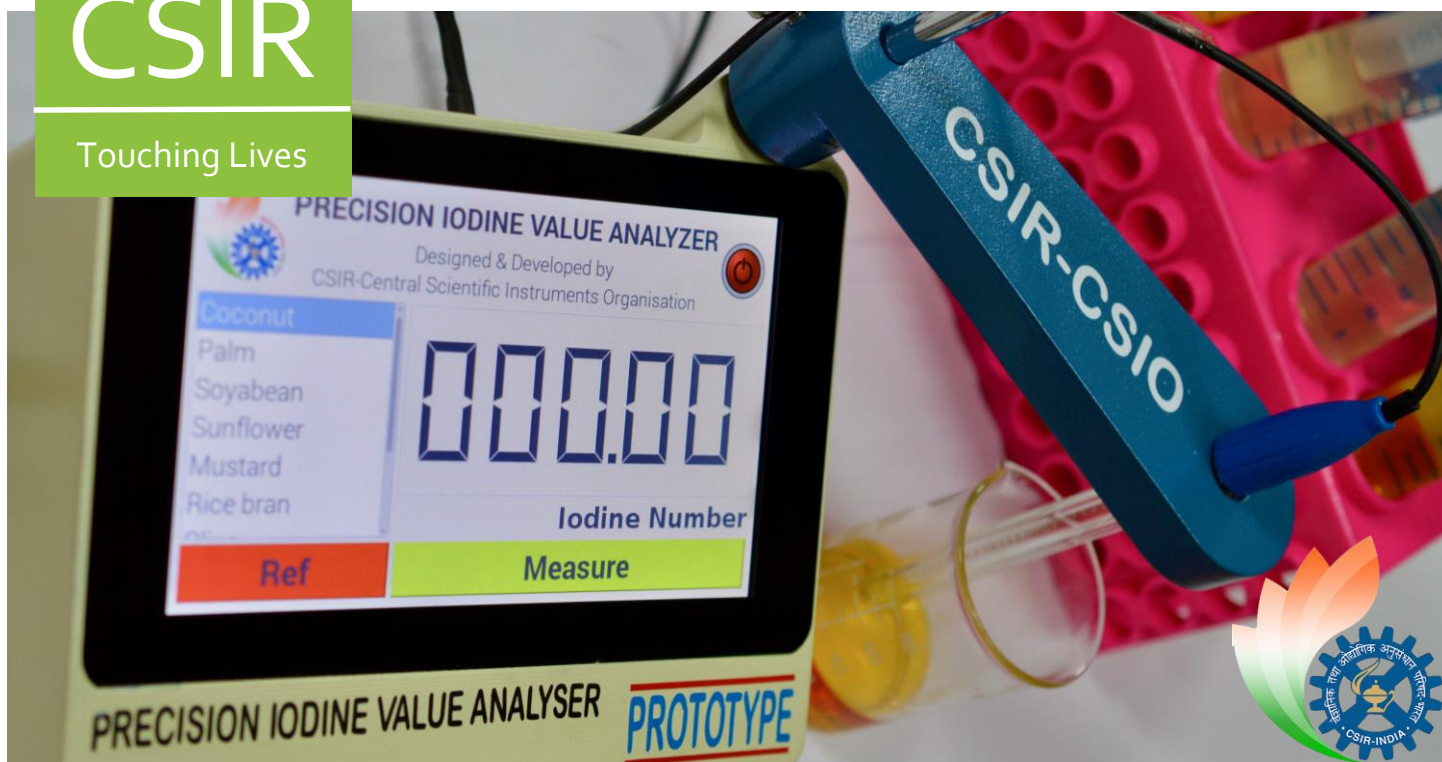
इच्छुक पार्टियों से अनुरोध है कि वे सभी आवश्यक दस्तावेजों के साथ ईमेल के माध्यम से eoi.csio@csio.res.in पर 5 जून, 2024।

इस EOI का उद्देश्य किसी खरीद / अनुबंध को अंतिम रूप देने के किसी भी निर्णय का आधार बनाना नहीं है और यह किसी खरीद की पेशकश के लिए प्रस्ताव या आमंत्रण या अनुरोध का अनुमोदन नहीं करता है।

CSIR

Touching Lives

PRECISION IODINE VALUE ANALYSER



A rapid analysis instrument for the analysis of degree of unsaturation (Iodine Value) in vegetable oils and fats. Say goodbye to titration and toxic fumes. Surprise yourself with lowest cost of analysis per sample. One solution from process control to point of sale.

PIVA CSIR-CSIO

Salient Features

- No Titration
- Rapid Analysis
- Minimal Safety Requirement
- Precise and Accurate
- Low Cost of Analysis
- Low Maintenance
- Low Operations Cost
- Easy Sample Preparation
- Easy Operation
- Portable and Ergonomic
- Customizable to any Oil Type
- Unique Software Lock

What is Iodine Value?

The **iodine value** is a measure of the unsaturation of fats and oils and is expressed in terms of the number of centigrams of iodine absorbed per gram of test sample (% iodine absorbed).

How it is measured conventionally?

The oil/fat sample taken in carbon-tetrachloride is treated with a known excess of iodine monochloride solution in glacial acetic (Wijs solution). The excess of iodine monochloride is treated with potassium iodide and the liberated iodine estimated usually by manual titration or automatic titrators with sodium thiosulfate solution. Various variants of this method are also used.

What are the limitations of these methods?

These methods are time consuming. Typically it takes 45 to 60 minutes to analyse a sample. These methods use toxic chemicals such as glacial acetic acid, iodine monochloride, mercuricacetate, chloroform and carbon-tetrachloride. These methods require special safety apparatus and skilled personnel to perform the tests. According to industry feedback the cost of analysis per sample ranges from Rs. 1500 to Rs. 3000.

How is PIVA unique?

PIVA uses a special reagent and machine intelligence techniques to accurately predict the iodine value by monitoring the reaction kinetics using an ORP electrode (Patent Pending). The analysis time per sample is 3 minutes and the analysis cost per sample is Rs. 50. The minuscule amount of reagent used minimizes the toxicity threat to the user. Unlike the conventional

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Specifications

Measurement Range

0 to 200 iodine number

Analysis time

3 minutes

Accuracy

+/- 1 iodine number

Precision

+/- 1 iodine number

Resolution

0.01 iodine number

Sensor Type

ORP electrode

Display

7" colour touch panel

Operating Voltage

5 volts DC

Weight

500 grams

solvent can be reclaimed hence making it a green method.

Who are the potential users?

Potential users are Oil extraction units, Quality Control & Assurance Labs, Food Regulatory Authorities, Soaps & Cosmetics, Bakeries, Meat industry, Paint Industry, Charcoal Industry, Biodiesel Industry, Ghee and Butter.

Can PIVA be used for adulteration check in edible oils and fats?

According to the news reports and industry feedback, either cheap oils (e.g Palm Oil) are mixed with costly ones or colour altering substances are mixed in cheap oils to change the appearance. This in turn alters the iodine value of the oil. Our experiments confirm that any adulteration above 10% can be detected by PIVA, provided, the adulterant and adulterated oils have different iodine numbers. Therefore, any sample not falling within the standard prescribed range of iodine value maybe adulterated or spoiled. In short, iodine value may be used as a rough indicator for determining samples acceptability. The use of iodine value for adulteration check is not reported or practiced due to the fact that the conventional tests are cumbersome and cannot be done in field. We hope that PIVA may prove to be a useful instrument due to its portability and ease of use.

What are the acceptable ranges of Iodine Value for various oils?

In the Gazette notification of India, Number 399 dated 13th October 2017 detailed quality parameters of some edible oils have been notified. Further, the FSSAI order dated 2nd August 2012 mentions the acceptable ranges of iodine value of various edible oils. Following are the acceptable ranges of iodine values (Wij's method) of some common edible oils:

Virgin Coconut oil : 4.0 to 11.0

Mustard oil : 105.0 to 126.0

Palm oil : 45.0 to 56.0

Sunflower oil : 118.0 to 141.0

Soyabean oil : 120.0 to 141.0

Olive oil : 75.0 to 94.0

Groundnut oil : 85.0 to 99.0

Rice Bran oil: 90.0 to 105.0

How samples are tested using PIVA?

Samples can be tested in three simple steps

Step 1:

Weigh oil sample as prescribed for the variety of the oil to be tested

Add chemical A (25 ml) and shake for 5 seconds

Step 2:

Add chemical B (capsule or 500 mg) and shake for 30 seconds

Add chemical C (25 ml) and shake for 5 seconds

Step 3:

Select oil type from the menu

Press measure button

Iodine value is displayed on LCD

How do I calibrate PIVA ?

The instruments performance can be checked by testing the iodine value of analytical grade oleic acid. It is also recommended to take a reference reading in order to account for the degradation of the electrode with time.

Can PIVA test any variety of oil ?

Currently, PIVA has been calibrated and tested for Coconut, Sunflower, Mustard, Palm, Rice Bran, Soyabean, Groundnut and Olive oils. It has been also tested for Ghee. The calibrations can be further customized as per any specific oil type.

What is the Accuracy and Precision of PIVA ?

The instrument has been tested against standard Wij's method and the attainable Accuracy and Repeatability is +/- 1 iodine number under prescribed operating conditions. However, readings are subject to manual errors in sampling and operation.

