

H₂S Analyser FAQ's

1. Does this instrument have an approved test method?

Yes, it has two; IP 570 "Determination of hydrogen sulfide in fuel oils – Rapid liquid phase extraction method", and also ASTM D7621 "Standard Test Method for Determination of Hydrogen Sulfide in Fuel Oils by Rapid Liquid Phase Extraction".

2. Are any test methods in planned specification revisions?

Yes, IP 570 has been selected as the test method for the measurement of H₂S in residual and distillate marine fuels in ISO 8217:2010. This is the latest edition of the international standard for marine fuels and specifies a 2 mg/kg limit of H₂S in the liquid phase.

3. I currently use Drager tubes, why do I need this new H₂S Analyser?

This H₂S Analyser is unique because it measures the amount of H₂S in the liquid fuel. This is a basic reference and clearly defines any potential safety risk. Drager tubes measure the vapours which are only transitory and are affected by temperature, storage, viscosity, and vapour space above the fuel.

4. What is the principle of operation?

A sample of Marine Fuel is diluted in a proprietary diluent to maximise solubility and optimise release of the entrained H₂S whilst being heated at 60°C. Sample is purged through with air at a fixed flow rate, the liberated H₂S passes over a proprietary specialised H₂S sensitive sensor.

The advanced technology sensor detects the H₂S and the electrical output (mV) is measured and integrated. The resulting value is compared against a calibrated reference and the H₂S content is reported as mg/kg.

Total measurement time from sample introduction to measurement result is 15 minutes.

5. Is IP 570 better than IP 399?

Yes, it has better precision, is faster and can be carried out by non-specialist operators.

6. When should a laboratory invest in this technology?

As soon as possible. The new IP 570 H₂S method using the SetaAnalytics Analyser is now part of the ISO 8217:2010 fuel specification, and therefore there will be very early demands for measurements by this new method.

The need to check Marine Residual Fuel Oils for H₂S content is critical regarding safety issues for handling and moving the product; potential corrosive issues to distribution hardware, such as piping, tankage and ship compartments; and to identify user problems with engine pumps being corroded with potential to cause ship operability issues including engine breakdown.

7. How does it differ from current testing?

Refinery or QC lab based testing typically involves the use of various test methods. Some tests are in accordance with IP 399, or in-house methods, which attempt to measure H₂S in bunker fuels; feedstock components for fuel blending prior to loading; and bunkering fuel for use or storage.

The IP 399 method requires technicians with wet chemistry analytical experience and involves setting up test reagents in advance of measurement, this typically requires half a day in advance to ensure chemicals are correctly made up to meet the stringent IP 399 requirements.

The procedure and testing of a sample by IP 399 can take approximately 2 to 3 hours. Determinations are especially difficult at the lower levels below 10ppm where measurements are critical and can have a significant impact on cargo movement, release and use on board ship.

The SetaAnalytics H₂S analyser, using advanced integrated sensor technology, takes away any operator subjectiveness and give reliable, fast and precise measurements of H₂S - both at the sub 1ppm range and up to levels of 250mg/kg with the appropriate dilution prior to measurement.

8. Why should we purchase a SetaAnalytics H₂S Analyser rather than send samples to a lab?

Local analysis provides a more cost effective method of measuring your sample. It allows the rapid identification of H₂S levels in samples without the down time of waiting for results from an outside lab. This avoids high demurrage charges for ships waiting to load with the fuel cargo; and ships off jetty waiting to tie up and load/unload product.

H₂S measurements need to be made rapidly after sampling if result integrity is to be maintained. The Analyser can be located and operated close to the sampling point thus ensuring a correct and quick result

The instrument is paramount from a safety standpoint in avoiding operators being exposed to handling a potentially hazardous cargo/blend. If remediation of the H₂S is required it can be identified and applied quickly to the cargo/batch.

9. How long does it take to carry out a measurement?

15 minutes

10. How much sample is required?

The actual test just requires a 5ml test portion.

11. What does the instrument measure?

It measures H₂S in the liquid phase of the fuel. The liberated H₂S is measured by the calibrated sensor and the result is calculated and reported as mg/kg.

Each measurement is stored in the instrument's memory and recorded with sample ID, time and date. Data is presented in accordance with the IP test method IP 570. An additional analytical software option allows the sensor response and H₂S liberation to be viewed graphically enabling a better understanding of the H₂S release from the sample - this can be of use to monitor the effectiveness of additive H₂S remediation to reduce H₂S.

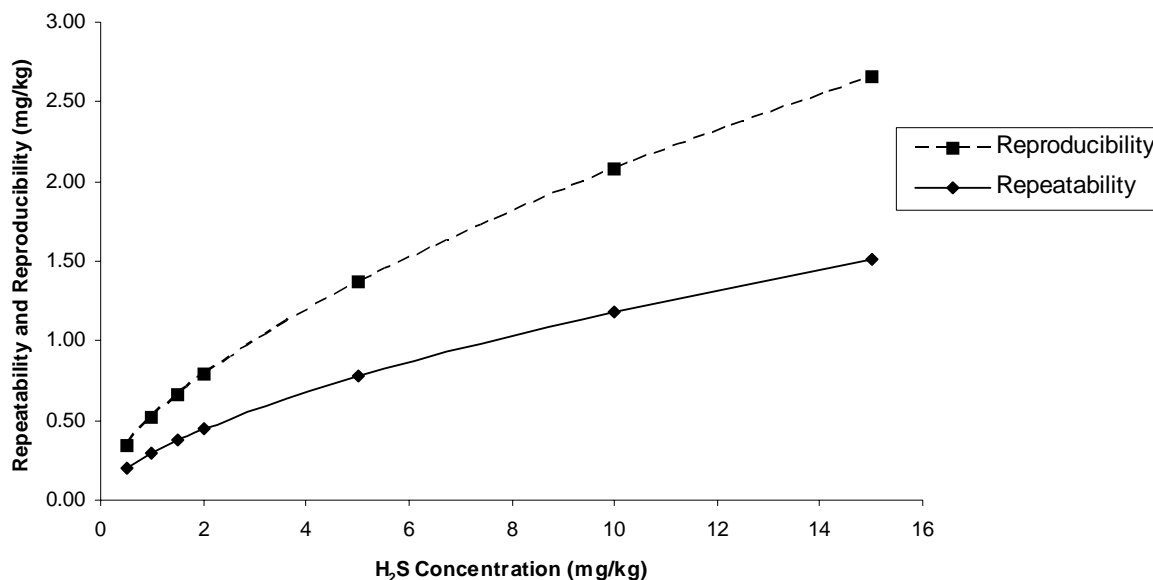
12. What type of Petroleum materials can the H₂S analyser measure?

The instrument is designed to follow the IP 570 method to determine H₂S in Marine Residual Fuels and can be used to monitor refinery feedstock components prior to Marine Fuel Blending. It can also be used to analyse other distillates such as Aviation Turbine Fuels (JET A/A-1), Heating Oil, Gas Oil, Marine and Road Diesel, and also Kerosene.

13. What formal methods/precision exists for the H₂S Analyser?

IP 570 is the new published method (available online from the Energy Institute) which includes precision for fuel oils such as Marine Fuels and feedstocks. It is also available as ASTM D7621 which covers the same scope. The graph below illustrates the published precision from the instrument.

**Repeatability and Reproducibility vs H₂S Concentration
IP 570**



14. What is the maximum product heated temperature that the H₂S analyser can measure?

According to IP 570 the default is fixed at 60°C. Please contact SetaAnalytics if you require advice regarding alternative temperature ranges to meet specific sample needs.

15. What is the maximum viscosity of petroleum product/feed I can run through the H₂S Analyser?

Viscosities of up to 3000 mm²/s at 50°C can be easily accommodated. For higher viscosities please contact SetaAnalytics for further information.

16. Who are the primary users?

- ✓ Refineries and Fuel Blending Locations
- ✓ Tank Storage Terminals
- ✓ Marine Fuel Suppliers
- ✓ Bunker Fuel
- ✓ Barge Suppliers
- ✓ Inspection Test Laboratories

17. Can the H₂S Analyser be used to monitor H₂S scrubbers?

The current instrument is not specifically designed for this application but please contact SetaAnalytics if you would like to discuss this further.

18. Can the H₂S Analyser be used to measure H₂S in flue gases?

The instrument is not designed for use with gas analysis in its current configuration. Please discuss your application with SetaAnalytics.

19. Can crude oils be tested?

This is not recommended at this time. The analyser is designed for use with fuel oils. For further information on applications for crude oils contact SetaAnalytics.

20. Is the H₂S analyser or IP 399 best for measuring very low levels of H₂S?

The H₂S analyser is suitable for measuring lower levels of H₂S than IP 399. The lower limit as defined by the pooled limit of quantitation is 2.8mg/kg for IP 399, and just 0.4mg/kg for the analyser. The H₂S analyser is also more precise, with better repeatability and reproducibility than IP 399.

NOTE: A Crude Oil Questionnaire is available which should be completed by any company wishing to consider the H₂S Analyser for this application; the information will allow us to advise product suitability.