ACHIEVE HIGH ACCURACY ON THE HIGH SEAS

Stephen B. Harrison, principal at Nexant, Germany, explains the importance of process gas chromatograph accuracy and how to maintain it in all conditions

LNG tanks at Shanghai Yangshan port

The monthly value of Asia's LNG imports is regularly more than US$10 billion. With such vast sums of money changing hands daily, the importance of accurate measurement of the LNG quality for invoicing is clear. The analysers used in this application are process gas chromatographs (GC's) which measure the heating value of the LNG as it is transferred from the ocean-going tankers to the land-based terminals. These instruments are located on-board ships. So, they must tolerate vibration and be able to operate in a wide range of ambient temperatures.

Steve Lakey, global product manager for GC Products at ABB in the US puts the problem into context: "This is not the highly controlled laboratory environment of bench-mounted GC's, it's the high seas. Our NGC 8200 series of process gas chromatographs can withstand ambient temperatures from -18ºC to +55ºC. That's certainly compatible with the intensity of the Australian climate, where LNG is produced for export to Asian markets. Furthermore, with Class 1, Division 1 explosion-proof rating, they are suitable for LNG tanker and FLNG applications.

When it comes to accuracy, modern process GC's can match many of their laboratory-based cousins. Lakey continued: "The requirement for a Class A device is an accuracy of plus or minus 0.5%. The accuracy of the NGC 8200 is 0.1% and therefore surpasses these requirements by a factor of 5. Measurement accuracy is a big deal – every penny counts when trading these precious natural resources."

A major boost to the trade of LNG between Australia and Asia took place in December 2018 with the start-up of the Prelude floating liquified natural gas (FLNG) facility. With LNG demand growth in China projected to continue at 20% for the next few years, this additional capacity will quickly be absorbed. Prelude processes gas from the Browse Basin. When natural gas rises from the ocean bed, the desirable methane is laden with heavier hydrocarbons, carbon dioxide, moisture and hydrogen sulphide.

An ABB NGC 8206 gas chromatograph on a gas pipeline in Louisiana

A primary function of the FLNG facility is to separate and liquefy the hydrocarbons into LNG, natural gas liquids (NGL) and condensate. However, before this can take place the 'sour' gas stream must be made 'sweet' by the removal of acid gases. The gas must also be dried, since moisture would freeze in the gas liquefaction equipment and cause blockages. Process GC's are also used on the FLNG vessel for process control applications related to gas drying and sweetening.

To maintain their accuracy, these offshore process GC's must be calibrated in the same way that land based devices are. However, the transportation of calibration gas cylinders to these offshore applications is an expensive logistical challenge. So, the longer the shelf-life that is associated with the calibration gas mixture, the greater its utility and value. One of the advantages of the recently introduced ISO17034:2016 accreditation for reference materials is that it guarantees the stability and homogeneity of certified calibration gas mixtures over their defined shelf-life.

Coregas gas cylinders. The company has made the successful transition from the Guide 34 to ISO17034:2016

To achieve this accreditation, the reference material producer must demonstrate that their products and manufacturing processes comply to the most stringent requirements. Coregas, at its specialty gases production facility in Yennora, near Sydney, overcame this hurdle in 2018. Executive general manager, Alan Watkins, explains what this means for his team: "Our lab has been ISO Guide 34 accredited for many years by the National Association of Testing Authorities, Australia (NATA) and we have been one of Australia's leading producers of accredited specialty gas mixtures in recent decades.

"The successful transition from the Guide 34 to ISO17034:2016 means that we can continue to occupy our position at the top of the metrological pyramid in the Asia-Pacific region and ensure that the companies trading LNG can do so knowing that their billing will be fair and internationally harmonised."

In addition to calibration gas mixtures, gas chromatographs need a carrier gas and, if the instrument is fitted with an FID detector, they also need hydrogen and air. For land-based GC's, cylinder gas supplies are practical. However, on the ocean, generation of these instrumentation gases in-situ is desirable to minimise cylinder logistics costs.

Heinz P. Schmidlin, sales & marketing manager at the Gas Generator Division of VICI AG International confirms the point: "The simple choice that analytical instrumentation users have is either to make or buy their high purity instrumentation gases. Whether it's a bench-top generator for the laboratory or a rack-mounted unit for process control applications, we offer instrumentation engineers and scientists the ability to be more independent, whether they are on the high seas or in a city-centre contract laboratory, on dry land."

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