Gas Processors Association – Europe

promoting technical and operational excellence throughout the European Gas Industry

Spring Conference 2011
May 25th to 27th

Copenhagen

Impurities in Gas Processing
– How to remove what you don't want!

Venue: Copenhagen Marriott Hotel
Kalvebod Brygge 5, DK 1560 Copenhagen

Impurities in Gas Processing – How to remove what you don't want!

GPA Europe has presented many papers that have dealt with the technologies and experience for the removal of the main contaminants from natural gas and the technologies for removal of the main acid gas components, CO_2 and H_2S, and those associated with dehydration; these topics have been given a lot of exposure in the past few years.

At the Copenhagen Conference, GPA Europe plans to shift the emphasis and will present a selection of interesting papers focusing on the removal of impurities and contaminants from natural gas. Such materials can interfere significantly with the effective performance of the gas process and down-stream process units, even when present in trace quantities, and their removal can be an extremely challenging task. The contaminants can cause blockages, corrosion, process failure, catalyst poisoning as well as reduced performance.

Presenters will address these issues and demonstrate solutions to the challenges to providing delegates with an insight into the most effective experiences.

In addition and in line with traditional practice, GPA Europe is pleased to be able to offer a Knowledge Session presented by Costain Energy & Process on the subject of nitrogen removal from Natural Gas. As new sources of gas are developed, many are being found with a high content of inert nitrogen. Its removal is critical to maintain product quality and minimise transportation costs. Costain will present their experience and the background of the efficient removal of nitrogen from Natural Gas

Schedule:

25th May 18:00 - 20:00 Registration & Welcome Reception

26th May 09:00 – 17:00 Technical Meeting
19:00 – 20:00 Cocktail Reception
20:00 – 23:00 Conference Dinner

27th May 09:00 – 13:00 Knowledge Session –
Nitrogen removal from Natural Gas
presented by Costain Energy & Process

GPA EUROPE - SPRING CONFERENCE - PROGRAMME

Thursday 26th May 2011 – Morning

09:00	**Morning Session: Moderator – Justin Hearn, BASF SE**
09:15	**The Key to a Successful Membrane Project- the Right Pre-treatment System** ***Ankur Jariwala & Rick Peters, Cameron Process Systems, Houston*** Membranes are gaining wider industry acceptance for bulk removal of CO_2 from natural gas streams. Efficient operation of membrane system is sometimes critical for several onshore and offshore production units. However, membranes can be susceptible to loss of performance and damage from variety of components in the gas stream, including heavy hydrocarbons, glycol, corrosion inhibitors, iron sulphate type solid particulates and other contaminants. In addition, mercury and excess amount of H_2S removal must often be incorporated into membrane system designs. This paper discusses the appropriate pre-treatment system requirements for membranes, and how to design pre-treatment processes in order to address the common inlet gas impurities and contaminants that may compromise membrane performance.
09:45	**Improve Hydrocarbon Condensate Dehydration Performance – Diagnostics and Solutions** ***Olivier Trifilieff, Thomas H. Wines, Fabrice Daire, Pall Europe*** The dehydration of liquid hydrocarbon condensates collected from natural gas is an important process that requires careful evaluation of separation technology to increase reliability and effectiveness. The operation of the condensate stabiliser can be affected by salt water and fine corrosion particles leading to deposits and corrosion in the re-boiler and off spec final products. The formation of stable emulsions can also lead to water carryover into export pipelines causing corrosion problems. Recent field diagnostic tests carried-out in the Middle East and North Africa region are presented indicating that high levels of contamination pass through existing separation equipment. An evaluation of the current separation technologies is provided for knock out vessels, mist pads and electrostatic desalters. Improved separation technology using high efficiency polymeric liquid-liquid coalescers is introduced including design considerations specific to the processing of unstabilised condensate and commercial case histories.
10:15	**Iron Sulphide from Carbon Steel Pipelines** ***Marion Seiersten, Arne Dugstad, Martin Foss and Jon Kvarekvål, Institute for Energy Technology, Kjeller, Norway*** Corrosion of multiphase carbon steel pipelines leads to noticeable iron concentration in the water or water with hydrate inhibitor arriving to the process plant. Depending on the CO2 and H2S levels in the gas and the pH of the aqueous phase, the iron can be dissolved or in the form of iron sulphide and carbonate particles. If not precipitated in the pipeline, solid particles may form in the separation process when the acid gas components evolve from the aqueous phase. The presentation discusses the conditions for forming iron sulphide at the expense of iron carbonate. The solubility of iron sulphide is much lower than the solubility of iron carbonate. The supersaturation during decompression may thus be higher. The result is a high nucleation rate. Combined with a relative slow growth rate, it results in small iron sulphide particles (~1 µm) which are challenging to remove and which may stabilise emulsions and interfere with the gas/liquid or liquid/liquid separation process. These phenomena will be discussed based on laboratory experiments.
10:45	**Coffee Break**
11:15	**Mercury Removal from Gaseous And Liquid Hydrocarbons** ***Neil Eckersley, UOP LLC, Des Plaines, IL, USA (Presnted by Bruno De Jonckheere, UOP NV, Antwerp, Belgium)*** Mercury is present in many of the world's oil & gas fields and its removal and capture is important for a number of reasons: Process plants with brazed aluminium heat exchangers are susceptible to corrosive attack by mercury, Product streams eg. naphtha are less valuable to producers when "distressed" by mercury, Many refinery & petrochemical catalysts are poisoned by mercury, Mercury is toxic and should be removed on health and safety grounds. In supplying purification solutions to the oil & gas processing industry, UOP has developed a number of approaches for removing mercury using non-regenerative metal oxide and metal sulfide technology in both gas and liquid phase streams. A comparison of mercury removal processes is described and several commercial case histories are presented. The plant specific drivers leading to the adoption of these technologies are discussed and the efficacy of each approach is critically assessed. The accurate measurement of various mercury species in process streams is key in determining the selection of the most appropriate purification technology. A number of analytical techniques are available to measure mercury down to ppb levels and it is important for process plant operators to consider how mercury is measured in order to remove mercury to ultra low levels. The latest proven analytical methods for the measurement are reviewed and discussed.
11:45	**The Impact of Mercury on Gas Processing Plants and its Removal** ***Vince Alma-Row, Johnson Matthey*** Mercury is a naturally occurring constituent in oil and gas reservoirs. When those reservoirs are exploited any mercury present will partition out in all the fluid phases (liquid hydrocarbon, gas and water) and travel throughout the production chain and processing equipment. The mercury will be adsorbed on all metal surfaces and will also be widely distributed in all of the process unit operations. This paper explores mercury contamination from the reservoir, to the well head and through a typical gas processing facility and how the mercury interacts with the plant metallurgy and can be released to the environment. We will also evaluate a solution to minimise Hg contamination of process assets including an introduction to a new solution to mercury in the aqueous streams
12:15	**Moderator's Closing Remarks**
12:30	**Networking Lunch**

Thursday 26th May 2011 – Afternoon

	Afternoon Session: Moderator – Simon Crawley-Bovey, Cameron Systems
14:00	**Adsorbent Solutions for Removal of Mercaptans and other Sulphur Compounds.** ***H. Secker & V. Zafirakis, Grace GmbH & Co. KG*** Natural gas plant operators have to process feeds containing increasing levels of contaminants, due to a reduction in quality of available natural gas fields over the years. In addition, gas suppliers are receiving tighter specifications on end products from their customers. Sulphur compounds such as mercaptans, COS and sulphides cause particular issues for the gas processor. Molecular Sieves can provide a solution for sulphur compound removal from natural gas and NGLs, either as a stand alone package, or as a polishing unit within a combination of gas treating processes. Molecular Sieves are the solution if very low outlet specifications have to be met.
14:30	**Do catalysts provide the only practical route for the ultra-purification of hydrocarbons?** ***Matthew Humphrys, Matthey-Johnson*** The gas processing industry is well endowed with processes for the bulk removal of the acid gases CO_2 and H_2S. The most widely used rely on wash processes that involve weak bases or physical solvents chosen to allow regeneration by heat or depressurisation. However, these do not allow complete removal of these acid gases or of other undesirable species that may be present such as organic sulphur compounds, organometallic compounds, O_2, Hg and COS. Fixed bed adsorbents are effective for the removal of water and will adsorb higher molecular weight compounds but their capacity is limited and frequent regeneration is needed and they may adsorb undesirable species such as radon. Membranes and activated carbon have been proposed but have processing problems. There is a growing requirement for the ultra-purification of gases within the chemical and electronic industries. This can only be achieved by the use of chemical rather than physical reactions. These may be carried out with a single fixed bed absorbent or may require a two-stage process in which the impurity is converted to a more reactive compound (or compounds) before removal. This may involve the use of precious metal catalysts, as is the case in so-called Catox technology for oxygen removal or the more conventional catalytic systems used in the production of carbon fibres and aerosol grade propellants.
15:00	**A Unique Syngas Cleanup Scheme** ***Gary J. Nagl, Merichem*** Syngas produced from the gasification of coal has become an acceptable means of producing feedstocks for Coal-To-Chemical plants in regions such as China where coal is abundant and inexpensive while petroleum and natural gas are relatively scarce. A common characteristic of these plants is that they are all relatively small compared to the more familiar integrated gasification combined cycle (IGCC) facilities; consequently, the gas treatment train differs somewhat from the larger IGCC facilities. Merichem was requested by a Chinese client, who was planning to install a coal-to chemical facility to produce acetic acid, to develop a processing scheme, which would produce a syngas having a total sulfur content (COS, CS_2 and H_2S) and a hydrogen cyanide content of less than 0.1 ppm. Another stipulation was that a zinc oxide system could not be included in the design. This paper describes a unique processing scheme utilizing a combination of multi-stage hydrolysis and liquid redox to achieve the stated goals.
15:30	**Coffee Break**
16:00	**Micromachined Gas Chromatography Benefits Gas Plants** ***Les Alberts, SEALA Services*** Gas analysis provides insight on plant performance by identifying components of interest but most gas plants operate without online analysis or have only hydrogen sulfide analyzers. The natural gas matrix can include helium, argon, oxygen, carbon dioxide, hydrogen sulfide, trace sulfur species, hydrogen, methane, ethane, propane and heavier hydrocarbons. Both trace and higher concentration components can be troublesome for operations. Troubleshooting typically involves taking samples for analysis away from the plant that prolongs identifying root cause of operation issues. Operators rely on interpretation of smaller sample sets to identify the root cause and those sample sets may not be representative. For example the presence of oxygen is usually first identified during routine glycol or amine analysis as degradation components. Oxygen ingress may be continuous or intermittent such as from a vapor recovery system. Another example is identifying the presence of different sulfur species and ability to meet the total sulfur specification that is not normally measured. Developments in the portable gas chromatograph (GC) provide the opportunity for analyzing wide range of components at rates fast enough to replicate online analysis. A number of applications related to oxygen, carbon dioxide, hydrogen sulfide and trace sulfurs will be presented to show the micro-machined gas chromatography capability, performance and benefit for gas treating.
16:30	**Nitrogen Removal on LNG plant – Select the optimum scheme** ***Christian Bladenet, Craig Cook, Sylvain Vovard, Technip*** Nitrogen is found in natural gas at levels that often exceed the commonly accepted LNG specification of 1%mol. It thus needs to be removed as part of the liquefaction process. The most usual way to remove N_2 in LNG plant is by flash, downstream of the MCHE. An advanced scheme, successfully marketed by Technip, and in operation in many recent LNG plants produces LNG with an N_2 content that can be below 0.1% while increasing the production of LNG. However, in some instances, this solution is not sufficient and the fractionation of the N_2 and methane must also be considered: - In gas turbine driven plants the N2 content in the fuel gas must meet the limits fixed by the gas turbine manufacturer. Furthermore, fuel gas with reduced N_2 content is less prone to sudden Wobbe Index variations that can result in a gas turbine trip. In electrically driven LNG plants, when fuel gas consumption is low, the purified methane can be recycled or directly reliquefied without N_2 build up. This paper will present options for the removal of nitrogen from natural gas, among them Technip's patented scheme which allows the production of high purity liquid and gaseous nitrogen , and give some directions for selection of the optimum scheme with respect to greenhouse gas emissions, plant efficiency, operations and maintenance.
17:00	**Moderator's Closing Remarks**
17:15	**Close**

The GPA reserves the right to alter the timings of the papers presented or to substitute alternative papers should circumstances so dictate.

Thursday 26th May 2011 – Evening

19:00 Pre-Dinner Cocktail Reception

20:00 Networking Dinner

Friday 27th May 2011 – Morning

09:00	**Knowledge Session - Rejection of Nitrogen from Natural Gas, Costain**
0900 to 1300	Costain Energy & Process are acknowledged as world experts in the design and supply of processing pants for the removal of nitrogen from Natural Gas. The Knowledge Session will adopt the common practice of GPA Europe conferences and provide an oversight of the technology used to process gas and discuss the issues and problems that have to be overcome to achieve an efficient and effective facility capable of processing the gases expected. Costain will hold a knowledge session based on its long experience in providing technology and process plants for nitrogen rejection from natural gas, including: - Specifications driving the need for nitrogen rejection. - Advantages and disadvantages of available nitrogen rejection technologies. - Particular advantages of cryogenic distillation, the only economical choice for large-scale facilities and for the production of a reject nitrogen stream suitable for venting to atmosphere with minimal methane losses. - Process fundamentals and the key design considerations in flow sheet selection. - Gas pre-treatment requirements. - Nitrogen rejection plant equipment. - Economies of scale and potential constraints on plant capacity and design, such as machinery selection. - Flexibility to integrate NGL recovery in the nitrogen rejection plant design and the advantages this can bring. - Nitrogen rejection considerations for handling nitrogen breakthrough from injection of nitrogen to improve recovery from oil and gas condensate fields. - Potential options for nitrogen rejection in LNG plants, driven by the need to both limit nitrogen in LNG and to manage LNG flash gas volume and composition. The various aspects covered in the knowledge session will be illustrated by practical examples from Costain's experience and operational nitrogen rejection facilities.

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Registration Form for Copenhagen 25th, 26th and 27th May 2011.

Title Mr / Mrs / Miss / Ms / Prof / Dr

Full Name _____

Job Title _____

Company _____

Address _____

_____

_____

Telephone _____ Fax _____

E-mail _____

I am a member of the GPA Europe YES / NO

I wish to attend the Technical Meeting (26th) YES / NO

I will attend the conference Dinner (26th) YES / NO

I will attend the Knowledge Session (27th) YES / NO

Please tick selected package - see separate sheet for package details and prices

☐ Package 1 ï All Functions

☐ Package 2 ï Late Arrival

☐ Package 3 ï Early Departure

☐ Package 4 - Technical Meeting Only

☐ Package 5 - Knowledge Session Only

☐ Smoking Room Requested

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Registration Form – Package Details
Technical Meeting - Copenhagen, 25th to 27th May, 2011

PACKAGE	GPA Member	Non-Member
1 - ALL FUNCTIONS Two nights in Hotel, Wednesday and Thursday Welcome Reception and Conference Dinner Technical Meeting Networking Lunch Knowledge Session (free to members) Coffee Breaks **Single** **Double**	**£ 900 / € 1,080** **£ 1,000 / € 1,200**	**£ 1,000 / € 1,200** **£ 1,100 / € 1,320**
2 – LATE ARRIVAL As 1 but Thursday night only in Hotel, No attendance at Welcome Reception	**£ 660 / € 790**	**£ 760 / € 912**
3 – EARLY DEPARTURE As 1 but Wednesday night only in Hotel. No Conference Dinner and no Knowledge Session	**£ 590 / € 710**	**£ 690/ € 828**
4 – TECHNICAL MEETING ONLY (26th May) Conference, Lunch and Coffee Breaks only No other Activities	**£ 350 / € 400**	**£ 450 / € 540**
5 – KNOWLEDGE SESSION ONLY (27th May) No other Activities	**FREE**	**£ 100 / € 120**

Please return the completed form to:

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132 Chantry Road, Disley, Stockport, Cheshire, SK12 2DN, UK
Tel: + 44 (0) 1252 625 542 Fax: + 44 (0) 1252 786 260
email: admin@gpaeurope.com / www.gpaeurope.com

Registration details as provided by you are retained on a computer system for which reasons the Association has registered in accordance with the UK Data Protection Act.

Cancellation Policy: If you cancel, a £75 administration fee will be charged plus the cost of the hotel room.

Insurance: It is the responsibility of each person to provide for their own travel / personal accident insurance. GPA Europe will not be held responsible for any accident / injury incurred during the duration of the conference

GPA Europe cannot accept any bank charges on money transfers.