



OIL & GAS

FORENSIC CHEMISTRY CONSULTANCY

The identification of materials and contaminants is invaluable in investigating pipeline, plant or system problems. DNV GL can identify the nature and cause of materials degradation or failure, system contamination and corrosion and provide advice based upon the findings.

Capabilities

DNV GL has the capability to analyse and identify solid, liquid and gaseous substances, including complex mixtures and components present in trace amounts. We routinely provide full interpretation of results together with recommendations to mitigate the impact or resolve technical problems. In addition to our chemists, we have in-house specialists in metallurgy, materials, corrosion, coatings, non-destructive testing, welding, mechanical and process engineering to solve multidisciplinary problems.

DNV GL has specialist knowledge across the entire gas chain from well to burner tip and is able to perform a wide range of analyses and prepare technical reports on the findings, as well as reviewing third-party reports and providing expert witness statements for litigation. Areas of investigation include, but are not limited to:

- Component failure due to material degradation, contamination, corrosion, structural defects, sabotage, incidents including fire and explosion
- System blockage (components, filters, valves)
- Implications of pollution incidents and chemical spillage on assets
- Chemical resistance of materials, pipelines and coatings
- Paint and surface coating disbondment and blistering
- Corrosion and its causes.

Tools include:

- Gas chromatography-mass spectrometry
- Fourier transform infrared spectroscopy
- Scanning electron microscopy
- Energy dispersive X-ray microanalysis
- Powder X-ray diffraction
- Thermogravimetric analysis
- Differential scanning calorimetry
- Wet chemistry/classical techniques
- Thermophysical properties calculation (GasVLe)
- Statistical analysis of data.

Identification of solids

Contaminants associated with system malfunctions, including solids, dusts and fibres, even microscopic particles including plastics and rubbers, corrosion products, metals and minerals, can be identified, as well as the products of chemical reactions. Polymers (such as rubbers and plastics) can be identified and their chemical resistance or degradation investigated. Analysis can provide vital clues as to the cause of failure or other issues on plants and in pipelines and can support their resolution.



Identification of liquids

Liquids such as distillate, natural gas condensate, compressor oil, water, glycol, anaerobic sealant and mixtures thereof can be identified. Liquids present in soils can be analysed and the effects of these on buried assets, such as polyethylene pipelines, assessed. Chemical analysis can provide information to trace the source of contamination, determine factors involved in its occurrence and prevent or mitigate reoccurrence.

Identification of gases

Trace components within natural gas, as well as added odorant concentrations, can be identified to characterise and differentiate natural gases and biogases. Identification of substances such as siloxanes can thus be made and their potential effects on health & safety or equipment such as heat exchangers and turbines investigated.

DNV GL has developed an offline method for quantifying elemental sulfur concentration in natural gas. Together with thermophysical properties calculation, using GasVLe, this can be used to assess the risk, or mitigate the effect of elemental sulfur deposition in valves, regulators and other process equipment.