

From Biogas samplings to post-accident response

Atmos'fair

Lyon | Audrey PIECHOCKI | 21/09/22



History



▪ Background

- In 2018, SGS was contacted by a turbine manufacturer whose aim was to implement a simple and quick method for biogas sampling and analysis in order to achieve objective controls to prevent motor breakages. Siloxanes analysis capability was a crucial point.

▪ Adopted sampling method





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▪ Advantages

Depressurized, conservative, inert, reusable, simple to use.

▪ Drawbacks

Not tested for more than 2 months prior to sampling
Not suitable for all parameters → bag



History



▪ Adopted analytical technique

GC/MS, GC/FID and GC/TCD or gas burning then IC for the anions on bags

In emergency cases, results can be issued within 6 hours for most of the parameters (18 hours for anions)

▪ Initial analytical scope

- Permanent gases
- Mercaptans
- Siloxanes
- Hydrocarbons
- Anions
- Ammonia



Extension to other environments

- **Biomethane, Syngas and other combustion gases**

This simple and reliable sampling method was proposed to biomethane plants and to gas distributors

One constraint: bottles do not withstand high pressures. So, we developed a system in collaboration with a client of us in order to expand gases and to control flow rate.

- **Enhanced analytical scope**

Additional parameters

- T VOCs
- Ammonia on filters
- Mercury



Extension to other environments

- **Industrial test gases**

We received various requests to analyze combustion gases (from destruction tests in test chambers) or chemical reaction gases

- **Barriers**

Pumps and conventional sampling media are not suitable in this type of situation.

Parameters cannot all be analyzed on the bottle as a sampling media.



A laboratory sample preparation step after the sampling was added for parameters trapped in bags

- **New analytical scope**

Almost all gaseous compounds



Lubrizol accident



- **St Etienne du Rouvray Laboratory and field agency were asked for samplings and analyses in emergency:**

- By institutionals for water and plant foodstuffs
- By nearby local communities and plants for the deposits (soot, asbestos) and for air

- **Barriers**

For air,

- Impossible for field teams to perform samplings in requested response time
- Sampling standard methods are too complicated to be followed by laypersons
- Specific sampling media sometimes have to be prepared several days in advance



Need for adaptation



Lubrizol accident



▪ Inputs

- Samplings should be achievable by field non-professional staff
- Sampling media have to be available in quantity. They should moreover be as versatile as possible
- Sampling media should be conservative
- Results have to be available very quickly



Use of depressurized bottle supplemented with a bag for anions



Development of VOC screening analysis on bottles



SGS, member of network

- Territory SGS mapping



➤ Chiefly for water, foodstuff, fallouts, lichens, soils and mud



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▪ For Air

- Air samplings are often to be performed nearby the accident area
- Standard sampling media are often perishable and sometimes require an incompressible preparation time
- Calibrated and ready at any time pumps are necessary in every field agency
- Sampling times add up



SGS, member of network

- So, it was decided to let the staff working on the accident site perform the first intention samplings
 - Sampling media have to be as simple as possible to use, the most versatile possible and the sampling time should be the as short as possible
 - Sampling media must be available at any time on site
 - ➔ Tests were performed to increase the bottle shelf life to one year before sampling
 - Analytical TATs must be ultra short for priority parameters



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- Site monitoring during the further weeks after an accident in order to control residual emissions



- Monitoring far from the accident



And then? (development prospects)

- Develop more and more analysis possibilities on bottles
- For compounds only trapable on conventional sampling media, try and reach the lowest LOQs possible



Thanks

Questions?

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