

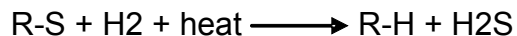


Total Sulphur Measurement Technical Note

November 2007

The lead acetate tape method can be employed to measure total sulphur in addition to H₂S. In this method, a sample stream is mixed with hydrogen and passed through a furnace at 1000°C. All sulphur bearing compounds will be converted to H₂S while any hydrocarbons heavier than methane will be cracked to methane.

This type of reaction is called hydrogenation. The H₂S formed in the hydrogenation reaction can then be measured with the lead acetate tape method to obtain a total sulphur concentration.



For hydrocarbon streams heavier than methane a large excess of hydrogen must be used to ensure that the hydrocarbons are completely converted and that all sulphur bearing compounds are reduced to H₂S. The flow of hydrogen vs sample is dictated by the concentration of heavier hydrocarbons in the sample. Pipeline quality natural gas can generally use a flowrate of 2.0 for sample (83.63 cc/m) and 2.0 for hydrogen (185.96 cc/m) while the presence of heavier hydrocarbons requires a flow of 1.0 (25.98 cc/m) for sample and 3.0 (324.08 cc/m) for hydrogen. An indication that a higher flow of hydrogen is required is the formation of carbon compounds in the reaction tube (referred to as coking).

UHP grade hydrogen is recommended. Poorer grades of hydrogen may contain sulphur compounds and/or oxygen which would impair the total sulphur measurement. One bottle of hydrogen will last approximately 30 days. It is normal for the user to have a least two bottles on site with dual regulators or a change over regulator set.

Tariff Limits

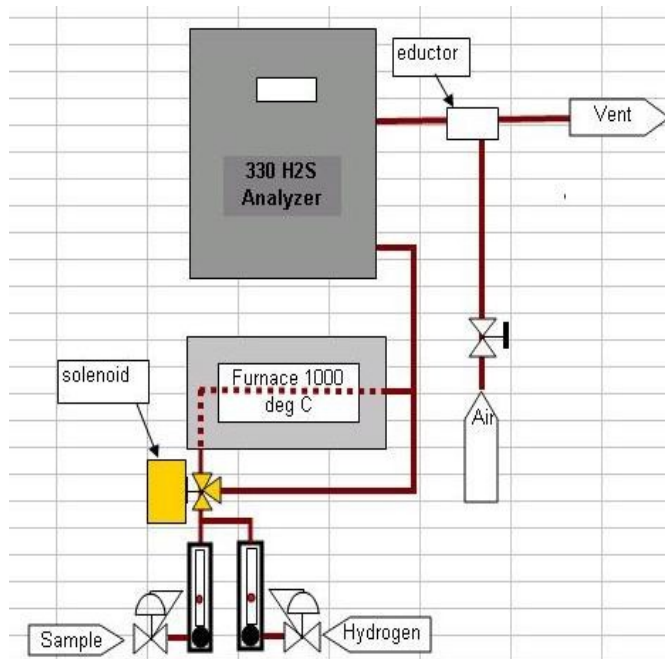
Common tariff limits in North America for H₂S in natural gas are:

ppm	mg/m ³	grains
16	23	1
4.2	6	.26

Common tariff limits in North America for Total Sulphur in natural gas are:

ppm	mg/m ³	grains
80	115	5.03

Typical Total Sulphur Analyzer



Envent Engineering Ltd now offers a low hydrogen consumption option. This option significantly reduces the hydrogen required to operate a total sulphur analyzer.

Advantages:

- Lower hydrogen consumption
- Improved accuracy at low H₂S concentrations
- Lower cost of operation

Disadvantages:

- Slightly higher initial cost
- Longer purge time required between H₂S and Total Sulphur streams