

# Application Data Sheet

## No. 192

### System Gas Chromatograph

### Trace AsH<sub>3</sub>, PH<sub>3</sub>, COS, H<sub>2</sub>S analysis System, GCMS-QP2020 NX with GSV

This method is developed to determine trace Arsine (AsH<sub>3</sub>), Phosphine (PH<sub>3</sub>), Carbonyl Sulfide (COS), Hydrogen Sulfide (H<sub>2</sub>S) in Propylene using a Gas Chromatograph (GC) along with Mass Spectrometer (MS) detector. Determination of these contaminants in propylene is important to improve productivity for the polymerization of propylene by preventing degradation of catalyst used. The MS was used with high sensitivity shielded Electron Ionization (EI) source and the quadrupole was set in Selected Ion Monitoring (SIM) mode to achieve better sensitivity and selectivity. The working range of each component is shown in Table -1. The system uses 6-port Gas Sampling Valve (GSV) and Q-bond capillary column for simultaneous determination of AsH<sub>3</sub>, PH<sub>3</sub>, COS and H<sub>2</sub>S. The sample is introduced through GSV into 1 ml sample loop which is completely Sulfinert® treated parts to achieve inert sample path.

The concentrations of targeted contaminants in sample are determined against multi-point external standard calibration curve for respective component that represents the area of each selected ion versus its concentration, analyzed under identical conditions. The final analysis time is approximately 35 minutes and the software used was GCMSsolution version 4.50 or later.

#### Analyzer Information

##### System Configuration:

- Sulfinert GSV valve and flow path.
- Q-bond capillary column
- MS detector equipped with EI source.

##### Sample Information:

AsH<sub>3</sub>, PH<sub>3</sub>, COS and H<sub>2</sub>S

##### Methods met:

In-House

\* The reference methods targeting the same compounds are UOP1022 and UOP1023.

#### Concentration Range:

Table-1.

No.	Name of Compound	Working Range	
		Low Conc.	High Conc.
1	AsH <sub>3</sub>	2.5 mol-ppb	100 mol-ppb
2	PH <sub>3</sub>	5 mol-ppb	100 mol-ppb
3	COS	1 mol-ppb	100 mol-ppb
4	H <sub>2</sub> S	50 mol-ppb	500 mol-ppb

Detection limits may vary depending on the sample. Please contact us for more consultation.

#### System Features

- Good Separation and simultaneous analysis of Arsine, Phosphine, Carbonyl Sulfide and Hydrogen Sulfide at ppb levels.
- No co-elution/Interference of propylene peak with any of the contaminants.
- Analysis time is about 35 mins.

Typical Chromatograms

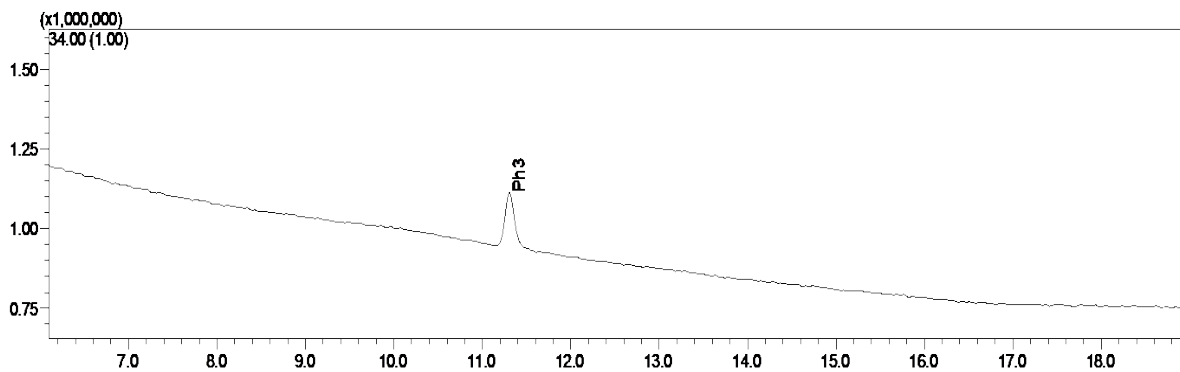


Fig. 1 Selective Ion Mass chromatogram for Phosphine (Ph<sub>3</sub>)

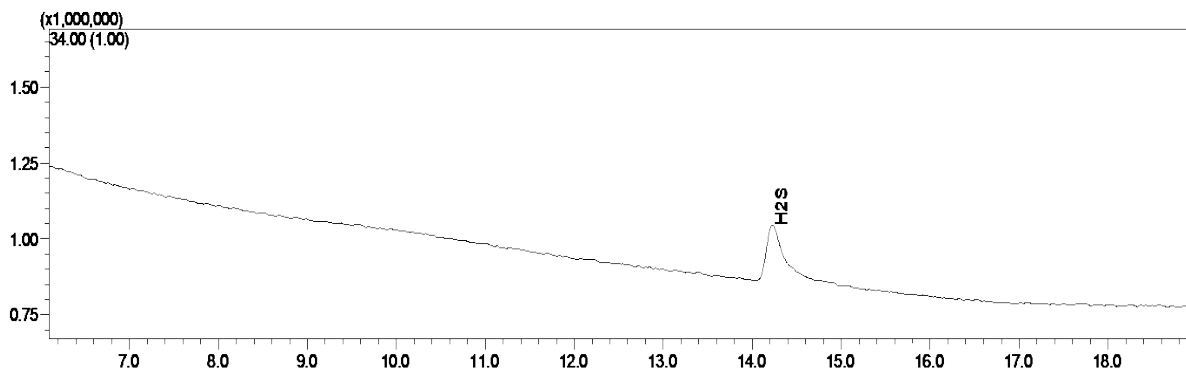


Fig. 2 Selective Ion Mass chromatogram for Hydrogen Sulfide (H<sub>2</sub>S)

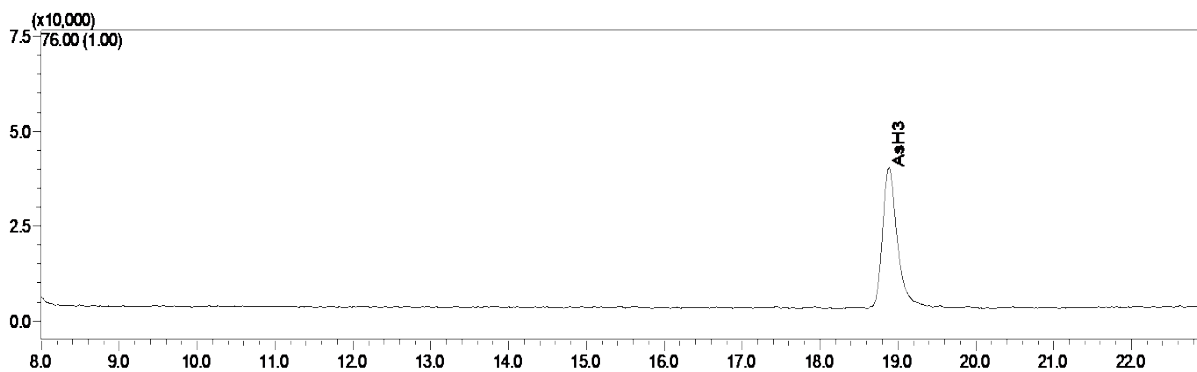


Fig. 3 Selective Ion Mass chromatogram for Arsine (AsH<sub>3</sub>)

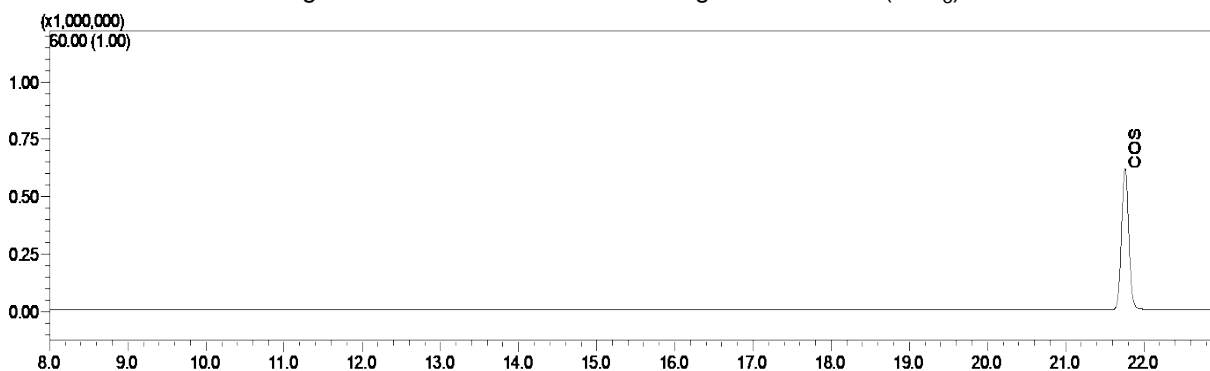


Fig. 4 Selective Ion Mass chromatogram for Carbonyl sulfide (COS)

First Edition: January 2021

