

Identifying Methane through Raman Spectroscopy

1. How does it Work?

- It studies the interaction between light and the chemical bonds, giving a spectrum whose peaks help in inferring data.
- The inferences from the spectrum are taken by searching the Raman spectral libraries.
- Each peak corresponds to different frequencies of vibrations.
- The spectrometer consists of three main components: the light source, optics, and a detector.
- Measurement of gases might require the incorporation of lasers.

2. Why Raman works?

- Gives a unique fingerprint of each compound by analysing the peaks in the spectrum.
- Suitable for a simple in-situ microscopic analysis. It doesn't require complex tools for a microscopic analysis. It is a non-contact and non-destructive technique.
- Simultaneous multi-gas detection is a possibility (<https://ieeexplore.ieee.org/document/8882694>). Given how it studies the peaks in the spectra, it is able to differentiate and identify the presence of various compounds
- Superior to normal gas chromatography based techniques.
- GC requires an inert gas carrier and is an expensive tool.
- In Raman, No sample preconditioning is required. This makes the rover more compact and doesn't take up additional space in the spectrometer.
- Saves time by performing rapid qualitative and quantitative analysis.