

Raman Spectroscopy Use with Gas Samples

Raman spectroscopy can be used to analyze gases with a high concentration of molecules to deliver accurate results regarding mixture formation.

Raman spectroscopy can be used to collect spectra from a variety of sample forms, and this includes gases. As long as the sample in question contains true molecular bonding, Raman can be utilized in order to find out important information regarding its chemical structure.¹ Though it's often difficult to use standard Raman spectroscopy equipment to analyze gases with a very low concentration of molecules, those that possess a high concentration can be studied with typical Raman instrumentation.

Using Raman to study gases has proved to be largely beneficial, as the precise peaks within the gas spectra, particularly in natural gas, has helped scientists identify the singular compounds present within the sample.² While infrared absorption spectroscopy has also been used to examine gas, its reliance upon molecular dipoles prevents the recognition of gases like molecular oxygen, hydrogen, and nitrogen.³ Raman spectroscopy, however, can pick up on each of these and reflect the findings in the spectra.

The oil and gas industry is an extremely promising area for Raman spectroscopy, as it has often made use of mass spectroscopy to uncover the chemical composition of various compounds.⁴ Hydraulic fracturing is key to the harvesting of oil and gas. However, this means of understanding oil and natural gas components has its limitations. Oftentimes, this method of analysis is not conducive to identifying each and every gas present within a compound, and sometimes the equipment is not able to withstand certain environments due to the inherent sensitivity of the instruments.⁵ Raman spectroscopy is a progressive, durable alternative, allowing scientists to collect an accurate reading of the gas mixtures in a relatively speedy way.





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Educational Raman

References

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