The development of a system for the analysis of hydrogen isotopes in methane

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Methane is the third most important greenhouse gas after water vapour and CO_2, and contributes ~20% to the total radiative forcing from all of the long-lived greenhouse gases. It has a global warming potential of 34 compared to CO_2 over a 100-year period, and 72 over a 20-year period. The concentration of CH_4 in the atmosphere has risen significantly since the industrial revolution. Understanding the sources and sinks of methane, via the precise measurement of the stable isotopes of both C and H of CH_4 in the atmosphere, is of crucial importance in understanding, and mitigating the effects of, a rapidly changing climate. Furthermore, the isotopic signature of CH_4 allows differentiation of biological and geological sources and the elucidation of methanogenic and methanotrophic pathways.

In order to accurately measure the stable isotopes of both C and H of with high precision, modifications to the Sercon Cryoprep have been made and a new product has been developed. Here we introduce the Sercon CryoGas, which is optimised for the analysis of CO_2, N_2O and CH_4 at both atmospheric concentrations and in more concentrated samples. Data from a variety of sample sizes, concentrations and vial type will be shown to reflect the versatility and flexibility of the system.