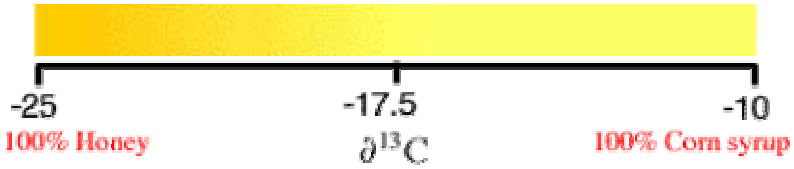
Food Analysis - Detection of Adulterated Honey

Honey, from nectar which honey bees have collected from flowering plants is a precious commodity and one, which commands a high price. Consequently, honey adulteration whereby cheap sugar syrups (HFCS) have been added has become a widespread problem. The purity of honey is monitored by a range of analytical tests to detect whether cheap sugar "thickeners" have been added. However, one low cost sweetener, HFCS, is difficult to detect using conventional chromatographic tests and the AOAC advises that the abundances of $^{13}C/^{12}C$ should be measured in order to detect the addition of HFCS to honey. The $^{13}C/^{12}C$ ratio is a measure of the natural abundance of the stable isotopes of carbon and the ratio reflects the photosynthetic cycle by which the carbon becomes fixed within the plant. Bees harvest nectar from plants, which are almost exclusively C3 plants. These yield carbon isotope values which average -25.3 ‰ while C4 plants (such as corn syrup) are significantly heavier at around -10 ‰.



If a pure honey has been adulterated with corn syrup, the isotope ratio will fall some way between the two values and hence adulteration will have been proved (AOAC official method 978.17). Stable carbon isotope analysis is a quick, affordable, quantitative method to determine this sort of fraud.

Honey STRA Analysis £20 per sample
Large number discounts available

Addition of sugars which allow only small changes in the stable isotopic composition of the honey may also be detected by determining the isotopic composition of the protein in the honey. This has a $d^{13}C$ value that is only 1 per mil heavier than the honey itself, so by measuring the isotopic composition of the honey and that of the associated protein, we can tell whether or not the suspect sample may have been "extended". This additional test is only required if the honey isotope value ended up in the "grey" area covered by some of the heavier (more positive) honeys.