

# How Sweet is it? Saccharide Identification in Honey

Honey has been acknowledged for its medicinal and healing qualities for some time. Its ubiquity of the sticky golden yellow liquid spans time and continents. The substance has been used for treatments of skin disease, cancer, heart diseases, neurological degeneration, and wound healing and is considered anti-inflammatory and antimicrobial! These attributes have been attributed to the minor constituents found within, consisting of phenolics, flavonoids, flavones, and flavonols.<sup>2</sup> Honey production, owing to the fact that bees are needed to produce the sticky sweet substance, lends the product to a high market price. As such, it is a prime target for adulteration with refined sugars in order to make the supply last longer or to create larger profits.<sup>3</sup> The defilement leads to a degradation of the product's shelf stability as well as a decrease in the overall health benefits. Likewise, the complexity of natural honey does not lend itself well to a reproducible scientific signature, as each batch of honey made is dependent on the particular flowers that were used by the bees. Since no two flowers are the same, a different chemical profile of honey is created. One thing that does stay relatively constant is the ratio of the carbohydrates found in honey. The fructose, glucose, and sucrose share a ~1.2:1:0.1 ratio.<sup>4</sup> Large deviations from this ratio give scientists an idea that the honey has been debased.

The major carbohydrate profile was explored on a Hamilton cation exchange HPLC column, HC-75 Pb<sup>2+</sup> form utilizing only DI water as a mobile phase. Local honey found around northern Nevada showed limited deviation from the carbohydrate ratio and the corresponding analysis of these gave correlation to the expected carbohydrate ratio.

- 1) S. Hussein, K. Yusoff, S. Makpol, Y. Yosof, *Molecules* 16 (9) 2011, 6378 – 6395.
- 2) Karabagias, I.K., Dimitriou, E., Kontakos, S. et al. *Eur Food Res Technol* 242, 2016, 1201–1210.
- 3) S. Bogdanov, P. Martin, *Mitt. Lebensm Hyg.* 93, 2002, 232-254.
- 4) H.I. Aljohar, H.M. Maher, J. Albaqami, M. Al-Mehaizie, R. Orfali, R. Orfali, S. Alrubia. *Saudi Pharm. J.* 26, 2018, 932 – 942.

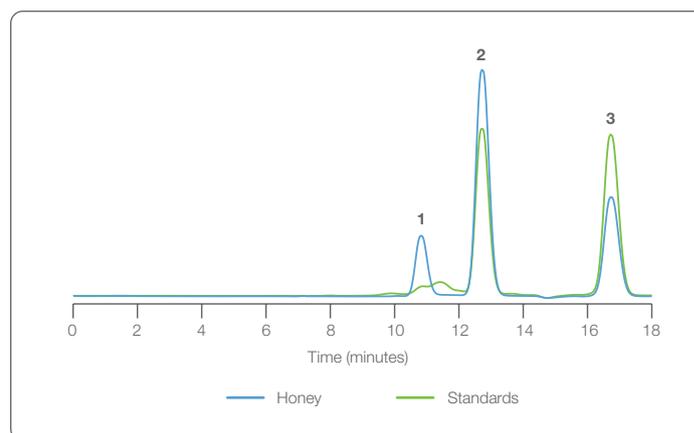
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## Column Information

|                  |                                     |
|------------------|-------------------------------------|
| Packing Material | HC-75 (Pb <sup>2+</sup> Form), 9 µm |
| P/N              | 79438                               |

## Chromatographic Conditions

|                  |                  |
|------------------|------------------|
| Gradient         | Isocratic        |
| Temperature      | 80 °C            |
| Injection Volume | 25 µL            |
| Detection        | Refractive Index |
| Dimensions       | 305 x 7.8 mm     |
| Eluent A         | Water            |
| Flow Rate        | 0.8 mL/min       |



Compounds: 1: Sucrose 2: Fructose 3: Glucose

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