

THE SCIENCE OF HONEY: BIOLOGICALLY ACTIVE COMPOUNDS AND PARAMETERS TO DETERMINE QUALITY



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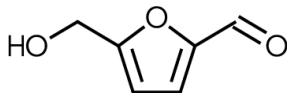
BEES AND HONEY

Bees live in highly developed social communities with 20.000 up to 80.000 members. There are different types of honey, based on the geographical and botanical source of nectar, collection method and season. Beekeeping is one of the oldest commercial activities.

HYDROXYMETHYLFURFURAL

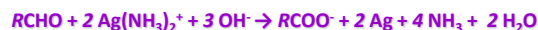
Hydroxymethylfurfural (HMF), also 5-(hydroxymethyl)furfural, is an organic compound formed by the dehydration of certain sugars.

Maximal permissible concentration of HMF in honey is 40 mg/kg.



TOLLENS' TEST

The most intense colouring was observed in home-made flower honey and the smallest amount of aldehydes and ketones was present in synthetic honey from sucrose and lactic acid under classic heating conditions.



FEHLING'S TEST

Samples, which contained monosaccharides, were coloured intensely yellow, some even orange. Positive test results: natural honey and synthetic honey made from glucose and lactic acid under classic heating.



HONEY SAMPLES

- Purchased flower and forest honey
- Home-made flower and mixed honey
- Synthetic honey from: sucrose and lactic acid / glucose and lactic acid / glucose and citric acid under microwaves or conventional heating conditions



BIURET REACTION

Most samples gave a negative result, only a slight colour change was observed in the samples of natural honey.

XANTHOPROTEIC REACTION

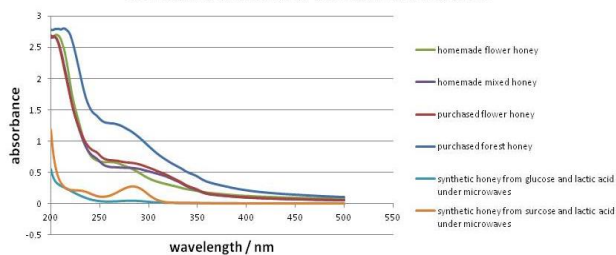
No colour change was observed in samples of synthetic honey, which don't contain proteins.

SPECTROPHOTOMETRIC HMF DETERMINATION

Sample	Content of HMF [mg/kg]
Bought flower honey	27,08
Homemade flower honey	13,80
Purchased forest honey	24,19
Homemade mixed honey	27,95
Synthetic honey from sucrose and lactic acid under microwaves	21,28
Synthetic honey from sucrose and lactic acid under conventional heating conditions	9,17
Synthetic honey from glucose and lactic acid under microwaves	11,57
Synthetic honey from glucose and lactic acid under conventional heating conditions	9,71
Synthetic honey from glucose and citric acid under conventional heating conditions	43,41
Synthetic honey from glucose and citric acid under microwaves	58,23

UVVIS SPECTRA

COMPARISON OF SPECTRA OF DIFFERENT HONEY SAMPLES



SUMMARY

Our research work describes the properties of honey, which are the indicators of quality and possibly pollution of the environment, where the bees forage and therefore where the honey comes from. Absorption spectra of the analysed honey samples were decreasing from 200 to 700 nm, with a maximum between 250 and 280 nm. The results of quantitative hydroxymethylfurfural (HMF) determination in natural honey samples were below the legal limit (40 mg/kg), higher values are commonly associated with elevated temperatures and light exposure. Treating the sample with microwaves causes a significant increase in the HMF concentration, which is consistent with the principles of microwave activation. Qualitative tests for specific components are a useful tool for determining the main components in honey and differentiating between natural and synthetic honey samples and could be used as a basis for developing more accurate quantitative methods.

LITERATURE

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