

CHROMATOGRAPHY

Think about **food**
Care about **safety**

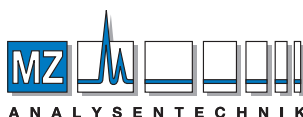


Vol. 5
**Sugars
Sweeteners**



MACHEREY-NAGEL

www.mn-net.com



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Since 1911

Focus on sugars and sweeteners

The global production and trading of food and feed products makes monitoring and control difficult.

Only analysis of food and raw materials for the production of food can ensure safe and edible food. Food safety is an essential part of our quality of life.

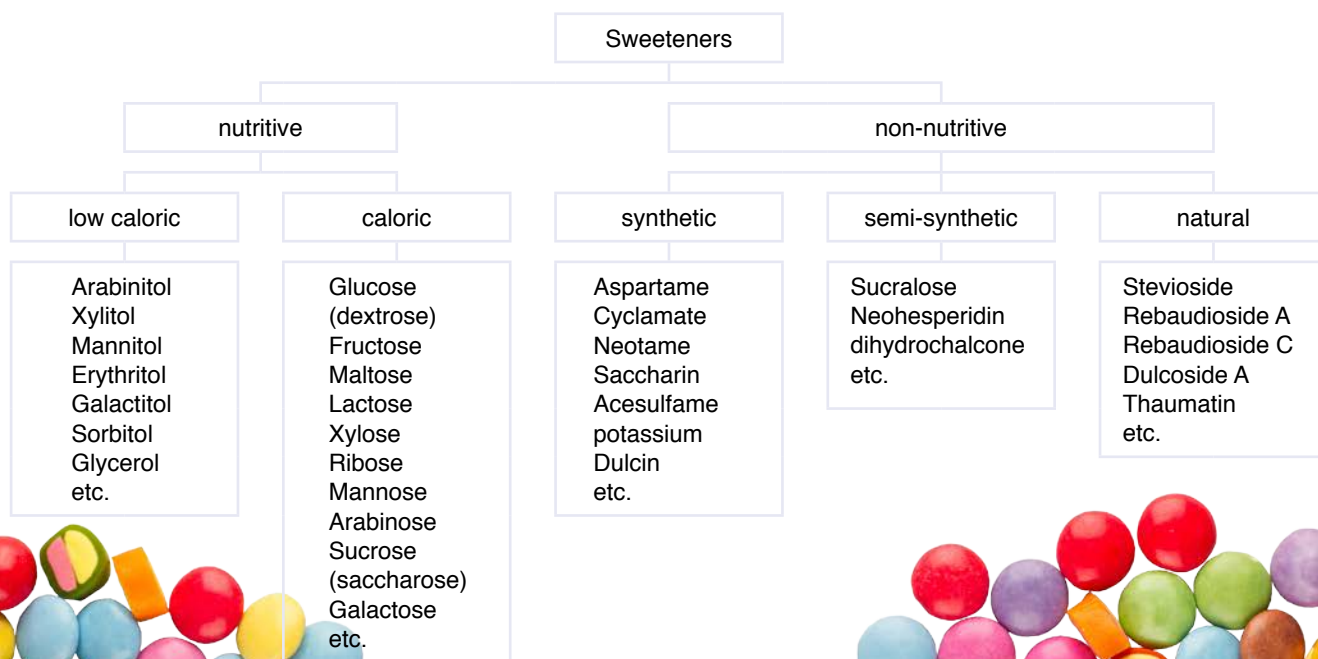
MN shows examples for food analysis that will help you with your work and make our food safer!

Vol. 5: Sugars and sweeteners in food and beverages

Sugars belong to the group of carbohydrates with empirical formula $C_n(H_2O)_n$. Examples for sugars are fructose, glucose, lactose and others. However, one uses the term sugar mainly for the sweet table sugar. This sugar is produced from sugar beet in Europe, and from sugar cane in other continents. The composition of table sugar (refined sugar) is 99.9% sucrose, which is composed of glucose and fructose.

It is well known that a high consumption of sugar contributes to serious health problems like obesity, diabetes and dental cavities, whereas synthetic sweeteners are suspected to be generally harmful to health.

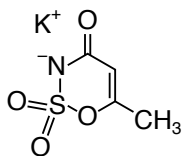
But there are a lot of sweeteners on the market. To get an idea how many sweeteners are available please see the systematic overview below



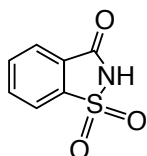


Chemical structures of sweeteners

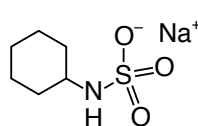
Acesulfame potassium



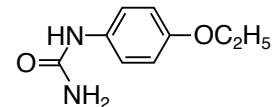
Saccharin



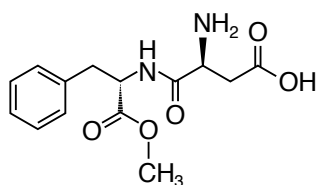
Sodium cyclamate



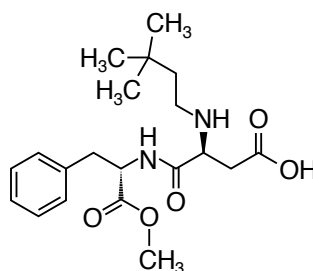
Dulcin



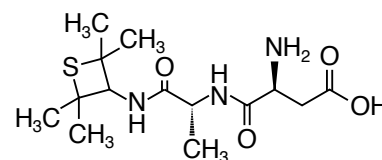
Aspartame



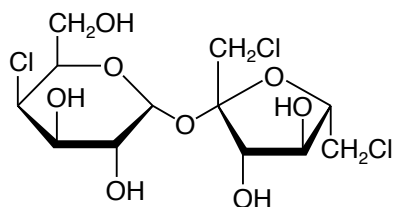
Neotame



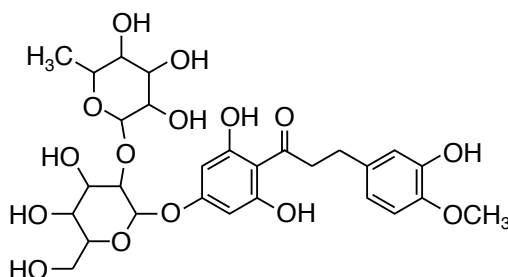
Alitame



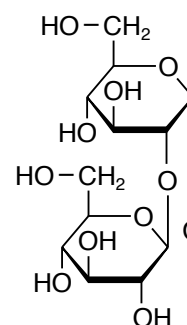
Sucralose



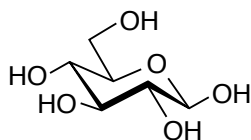
Neohesperidin dihydrochalcone



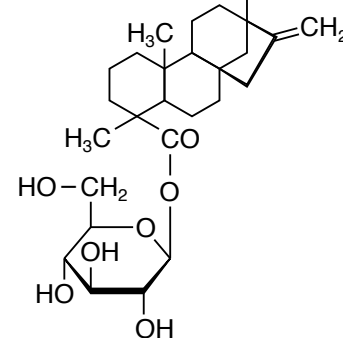
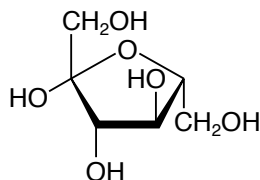
Stevioside



Glucose



Fructose



Typical samples, preparation

Sweeteners in beverages and canned or bottled fruit

Sample pretreatment

Weigh 5 g of the homogenized food sample into a volumetric flask of 50 mL. Make up to the mark with buffer solution (4 mL formic acid in 5 L water; adjust to pH 4.5 with ~12.5 mL triethylamine), mix thoroughly by hand to obtain a homogeneous suspension and sonicate for 15 min.

Transfer the obtained suspension to a 50 mL centrifuge tube, centrifuge at 4000 rpm for 10 min.

Solid phase extraction (SPE)

MN Appl. No. 305220

European Commission, Joint Research Centre, EUR 22727 Report, Geel, Belgium 2007 (see also Wasik, A. et al., J. Chromatogr. A 1157 (2007), 187–196)

Column type:

CHROMABOND® C₁₈ ec, 6 mL, 1000 mg
REF 730015

Column conditioning:

3 mL methanol, then 3 x 2 mL of buffer solution (see above)
Do not let run the column dry.

Sample aspiration:

2 x 5 mL of the prepared sample is passed through the column by vacuum (flow rate 1–2 mL/min)

Washing:

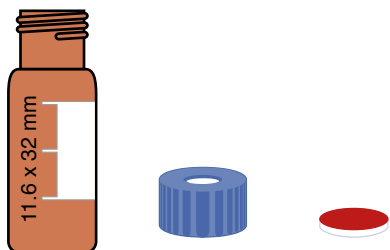
3 mL buffer solution (see above)

Elution:

2 mL methanol (flow rate: 1 mL/min); wait 10 min before applying a second portion of 2 mL of methanol (collect in the same 5 mL test tube)

Compounds investigated: acesulfame; alitame; aspartame; sodium cyclamate (cyclamic acid); dulcin; neotame; neohesperidine dihydrochalcone; saccharin; sucralose

Transfer into a sample vial, e.g., 1.5 mL screw neck vials N 9, amber, flat bottom, label and scale, wide opening, REF 702284 and ready assembled screw closures N 9, blue, center hole with septum silicone / PTFE, REF 702287.1



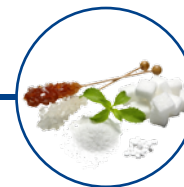
CHROMABOND® vacuum manifold for 12 columns
REF 730150



It is recommended to filter the prepared sample through disposable filters **CHROMAFIL® Xtra PET-45/25** REF 729220



For other applications see www.mn-net.com/apps

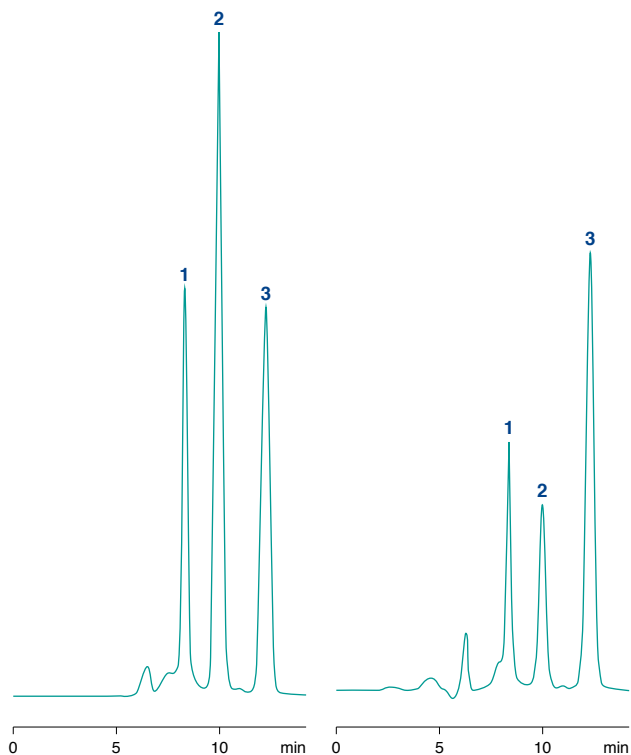


Subsequent analysis: HPLC

Sugars in commercial and home-made apple juice

MN Appl. No. 114620

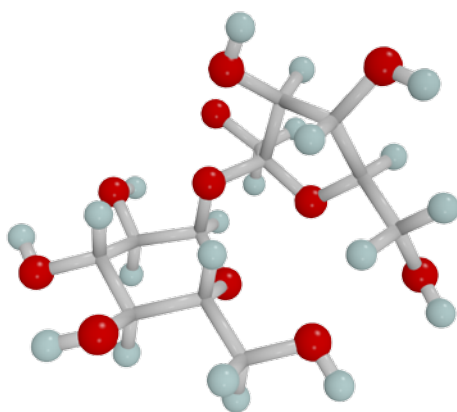
Column: VA 300/7.8 NUCLEOGEL® Sugar 810 Ca
REF 719570



left: commercial apple juice
right: home-made apple juice

Peaks

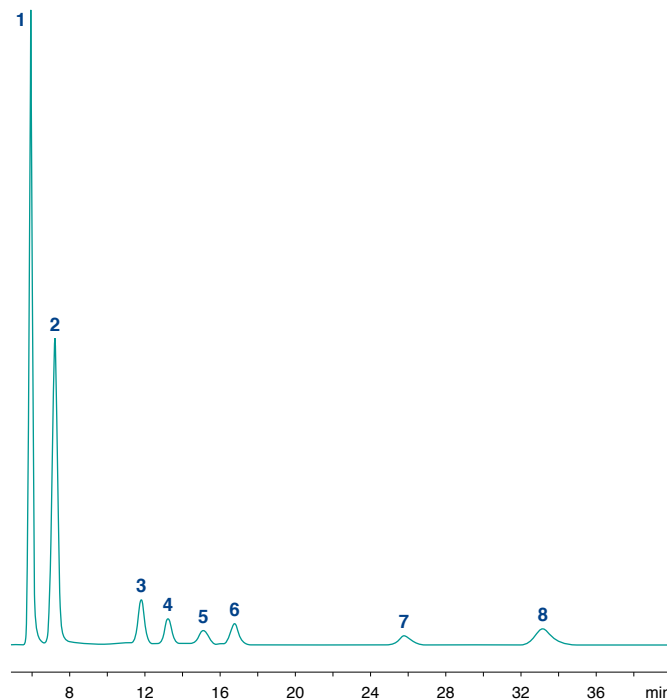
1. Sucrose
2. Fructose
3. Glucose



Determination of specific sugars

MN Appl. No. 122700

S. Dlugosch, Amt für Verbraucherschutz, Mettmann, Germany
Column: EC 250/4.6 NUCLEODUR® 100-5 NH₂-RP
REF 760732.46



Peaks

1. Fructose
2. Glucose
3. Sucrose (saccharose)
4. Turanose
5. Maltose
6. Trehalose
7. Melezitose
8. Raffinose / maltotriose



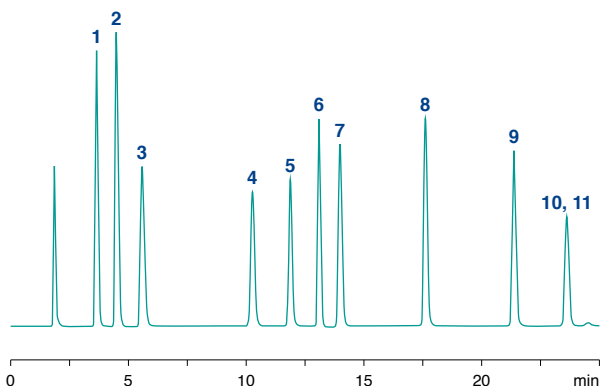
Detailed conditions are available online at www.mn-net.com/apps

Subsequent analysis: HPLC

Simultaneous determination of nine intense sweeteners in foodstuffs

MN Appl. No. 122120

Column: EC 250/3 NUCLEODUR® C₁₈ Pyramid, 5 µm
REF 760202.30



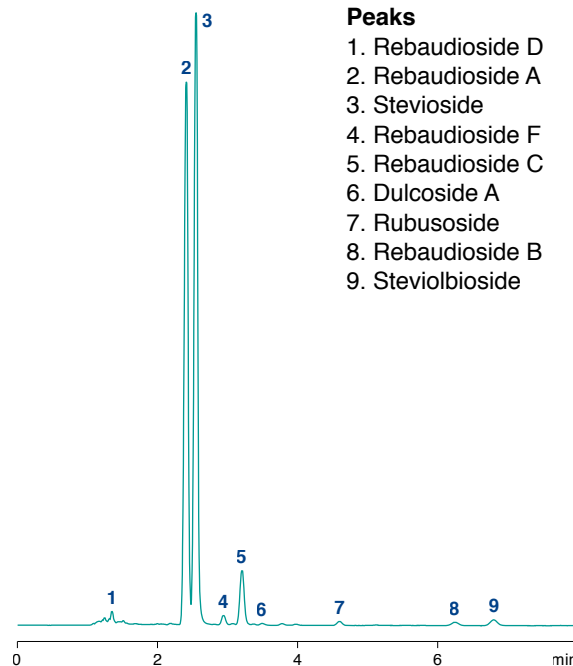
Peaks

1. Acesulfame-K
2. Saccharin
3. Cyclamate
4. Aspartame
5. Sucralose
6. Dulcin
7. Alitame
8. Neohesperidine dihydrochalcone
9. Neotame
10. Stevioside
11. Rebaudioside

Separation of steviol glycosides

MN Appl. No. 125621

Column: EC 150/4.6 NUCLEOSHELL® RP 18, 2.7 µm
REF 763136.46



Peaks

1. Rebaudioside D
2. Rebaudioside A
3. Stevioside
4. Rebaudioside F
5. Rebaudioside C
6. Dulcoside A
7. Rubusoside
8. Rebaudioside B
9. Steviolbioside

Detailed conditions are available online at
www.mn-net.com/apps

MN suggests using guard columns to protect your main column and significantly increase column life.

The **Column Protection System** (REF 718966) is suitable for all analytical HPLC columns with 1/16" fittings!





Ordering information

Step	Product	Pack of	REF
SPE	CHROMABOND® C ₁₈ ec, 6 mL, 1000 mg	30	730015
	CHROMABOND® vacuum manifold for 12 columns	1	730150
Filtration	Disposable filters CHROMAFIL® Xtra PET-45/25	100	729220
Vials and caps	1.5 mL screw neck vials N 9, amber, label and scale	100	702284
	Ready assembled screw closures N 9, blue, center hole with septum Silicone white / PTFE red	100	702287.1
HPLC 1			
Column	VA 300/7.8 NUCLEOGEL® Sugar 810 Ca	1	719570
Guard column	CC 30/4 NUCLEOGEL® Sugar 810 Ca	2	719571
Guard column holder	CC column holder 30 mm	1	721823
HPLC 2			
Column	EC 250/4.6 NUCLEODUR® 100-5 NH ₂ -RP	1	760732.46
Guard column	EC 4/3 NUCLEODUR® 100-5 NH ₂ -RP	3	761953.30
Guard column holder	Column Protection System	1	718966
HPLC 3			
Column	EC 250/3 NUCLEODUR® C ₁₈ Pyramid, 5 µm	1	760202.30
Guard column	EC 4/3 NUCLEODUR® C ₁₈ Pyramid, 5 µm	3	761917.30
Guard column holder	Column Protection System	1	718966
HPLC 4			
Column	EC 150/4.6 NUCLEOSHELL® RP 18, 2.7 µm	1	763136.46
Guard column	EC 4/3 NUCLEOSHELL® RP 18, 2.7 µm	3	763138.30
Guard column holder	Column Protection System	1	718966

Visit us at www.mn-net.com/chroma to get more helpful information

Selection tools for

Vials and caps

Syringe filters

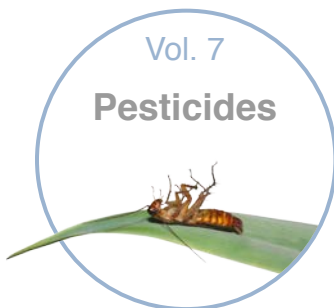
Troubleshooting guides

GC and HPLC

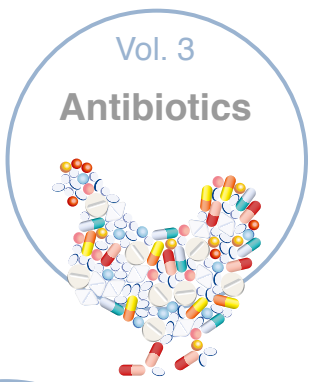
Detailed product information

...and much more

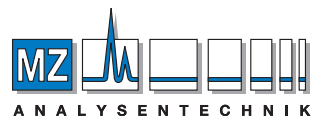




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