Separation of common artificial sweeteners by HPLC

Artificial sweeteners are increasingly used as a low-calorie substitute for sugar in food and beverages and can help to control body weight and insulin levels and aid dental health. Artificial sweeteners may be added individually or in combination to obtain specific taste characteristics. Classified as food additives, artificial sweeteners are regulated substances, with strict limits in place for the amounts that can be added to food and drinks. Artificial sweeteners authorised for use vary from country to country. Due to these controls, sensitive and robust methods are required for their determination in food matrices. This application note summarises a method for the separation of artificial sweeteners that is suitable for routine use in the food industry.
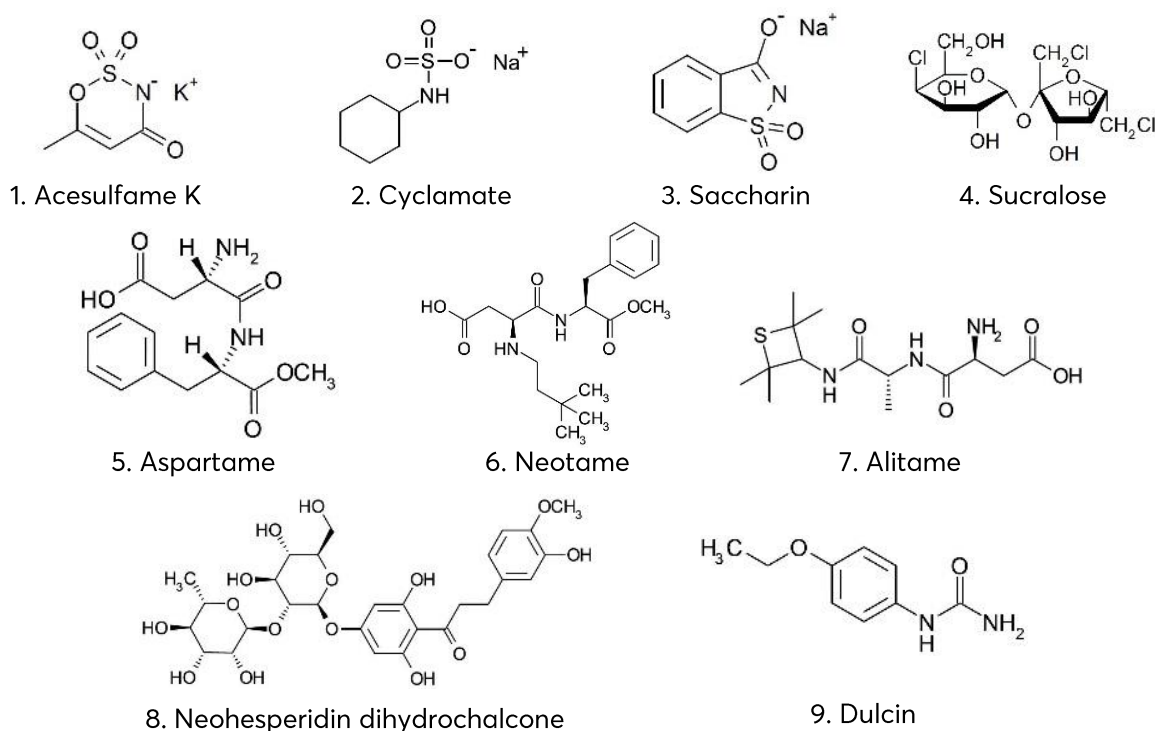

1. Acesulfame K   2. Cyclamate   3. Saccharin   4. Sucralose

5. Aspartame   6. Neotame   7. Alitame

8. Neohesperidin dihydrochalcone   9. Dulcin

Figure 1: Structures of artificial sweeteners analysed in this application.

Artificial sweeteners have widely varying structural forms and are often used as food additives in combination. Figure 1 shows the chemical structures of the sweeteners analysed in this application, many of which are approved for use globally. LC methods must therefore be able to reproducibly separate components with widely varying structural and physical properties. An additional challenge is that these compounds typically do not possess a chromophore, excluding the use of UV detectors. Figure 2 shows a gradient method for the simultaneous separation of nine artificial sweeteners on an ACE 5 C18 column. The high-purity, highly inert silica used in the manufacture of ACE columns provides excellent peak shape for the nine analytes and allows their successful separation under the conditions used. Detection was achieved using a Thermo Scientific Dionex Corona™ Charged Aerosol Detector (CAD™). Additionally, this method is also compatible with Evaporative Light Scattering Detectors (ELSD). This method is useful for routine screening of samples for multiple sweetening components and may also be used as a good starting point for the determination of other artificial sweeteners.

ACE
UHPLC & HPLC Columns

Conditions

Column:	ACE 5 C18
Dimensions:	250 x 4.6 mm
Part Number:	ACE-121-2546
Mobile Phase:	A: H_2O
	B: MeCN
	C: 0.1% TFA

Time (mins)	%A	%B	%C
0	88	2	10
25	50	40	10
30	30	60	10
35	88	2	10

Flow Rate:	1 mL/min
Injection:	50 µL
Temperature:	30 °C
Detection:	Corona CAD

1. Acesulfame K
2. Cyclamate
3. Saccharin
4. Sucralose
5. Aspartame
6. Neotame
7. Alitame
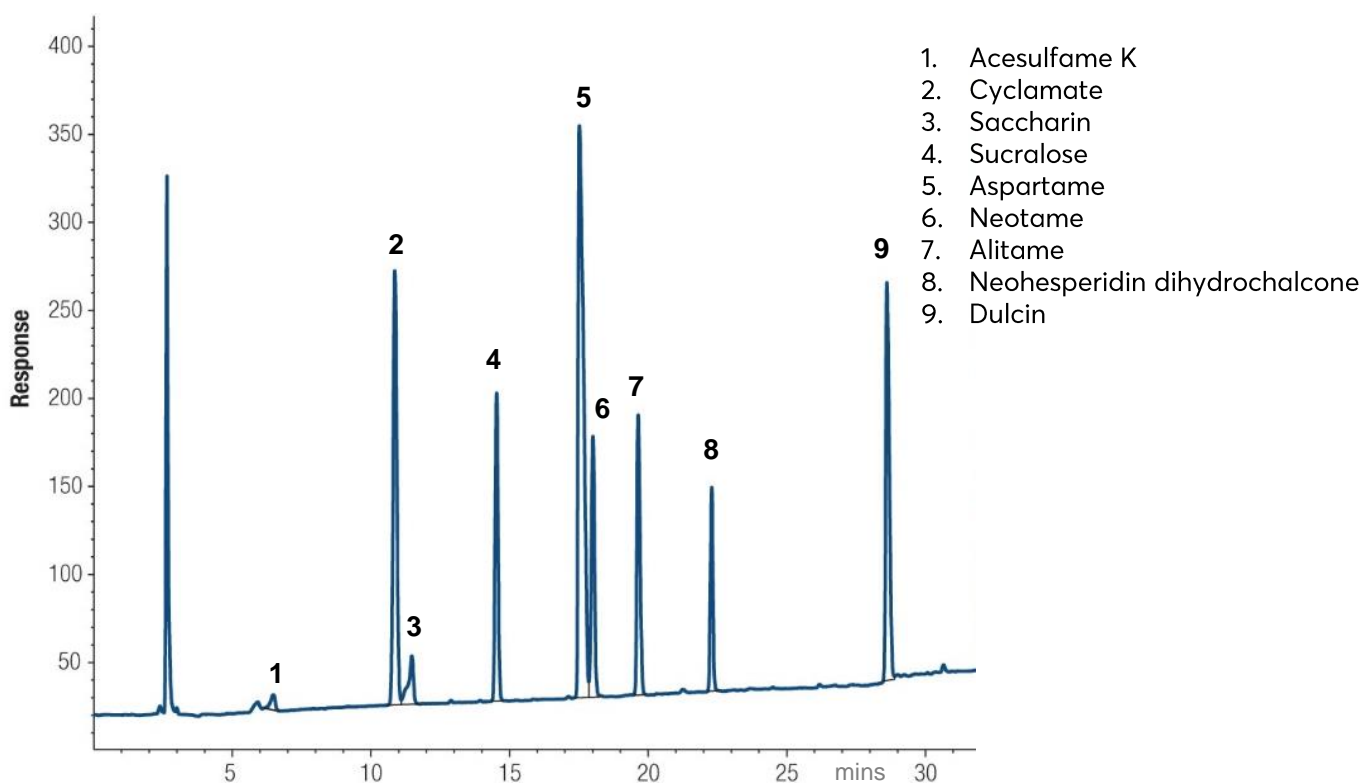8. Neohesperidin dihydrochalcone
9. Dulcin

Figure 2: Separation of artificial sweeteners on the ACE 5 C18 (ACE Application Note #AN1980). Data courtesy of Durham County Council Scientific Services, UK.

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