

# Easy Solution for Routine Analysis of Flavor Compounds in Beer

FOOD



## Introduction

Beer is one of the most widely enjoyed beverage in the world, and every brewery tries to have a distinct flavor. It is important for breweries to have the flavor compounds tested and monitored during the production process to ensure the flavor is consistently achieved.

This method covers the determination of acetaldehyde, acetone, ethyl formate, ethyl acetate, 1-propanol, isobutanol, isoamyl acetate, isopentanol, and ethyl hexanoate. These are the eight most common compounds that are related to the flavor of beer.

## Method Parameters

Table 1. Method Parameters for an Agilent 7697A Headspace Sampler

Temperature		Vial setting	
Oven	40 °C	Fill mode	Advance
Loop	60 °C	Ramp rate	20 psi/min
Transfer line	80 °C	Fill pressure	15 psi
Time		Final pressure	10 psi
GC cycle time	15 minutes	Fill flow	50.00 mL/min
Pressure equip time	0.1 minutes	Final hold	0.05 minutes
Vial equip time	20 minutes	Vent after extraction	No
Inject time	0.5 minutes		

Table 2. Method Parameters for an Agilent 7820A GC

Column	DB-WAXETER 30 m × 0.53 mm × 1.5 μm
Inlet setting	200 °C, split ratio: 1:1
Carrier (N <sub>2</sub> )	10 mL/min, constant flow
Oven program	40 °C (3 minutes) > 120 °C (0 minutes) at 10 °C/min > 200 °C (2 minutes) at 20 °C/min
FID setting	
Temperature	250 °C
H <sub>2</sub> flow	40 mL/min
Air flow	400 mL/min
Make up flow (N <sub>2</sub> )	45 mL/min

## Highlights

An Agilent 7820A GC coupled with Agilent 7697A Headspace Sampler System provides an easy solution for a routine analysis for beer flavor compounds.

Excellent repeatability and sensitivity were ensured in this solution.

## Referenced Document

GB/T 4928-2008 Beer analysis method\_national standard



## Standards and samples

**Standards (SUPELCO):** acetaldehyde, acetone, ethyl formate, ethyl acetate, 1-propanol, isobutanol, isoamyl acetate, isopentanol, and ethyl hexanoate

**Internal standard (SUPELCO):** 1-butanol

**Samples:** Heineken Standard beer (standard concentration listed in table 3), Qingdao beer (from market)

## Results and Discussion

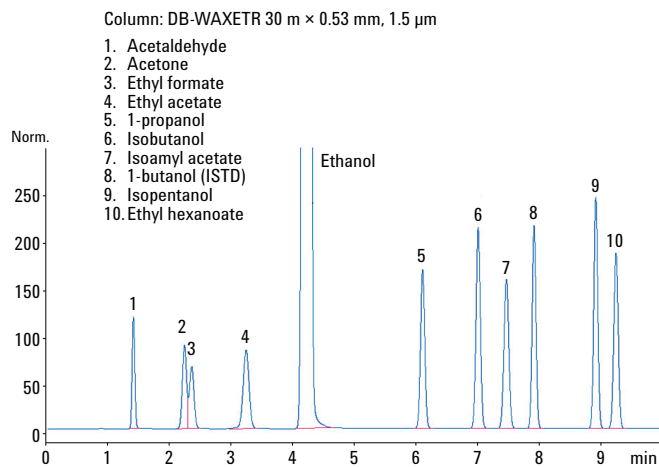


Figure 1. Chromatogram of standard mix on a DB-WAXETR column.

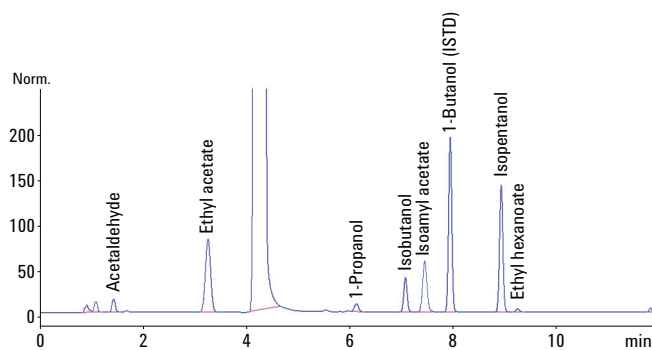


Figure 2. Chromatogram for analysis of Heineken standard beer by HS sampling.

Table 3. Information for the Typical Flavor Compounds in Beer

Target compounds	R.T. (min)	Peak area (pA*s)	Concentration of Heineken beer (mg/L)	RSD (%) n = 5 for Qingdao beer
Acetaldehyde	1.417	70.7	1.6	2.18
Acetone	2.246	-	< 0.3	-
Ethyl formate	2.363	-	< 0.1	-
Ethyl acetate	3.243	725.5	21.3	1.01
1-Propanol	6.119	46.6	12.7	2.60
Isobutanol	7.042	201.7	21.3	2.33
Isoamyl acetate	7.454	528.6	4.0	1.18
Isopentanol	8.918	777.4	77.0	2.29
Ethyl hexanoate	9.244	34.3	0.2	1.60

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