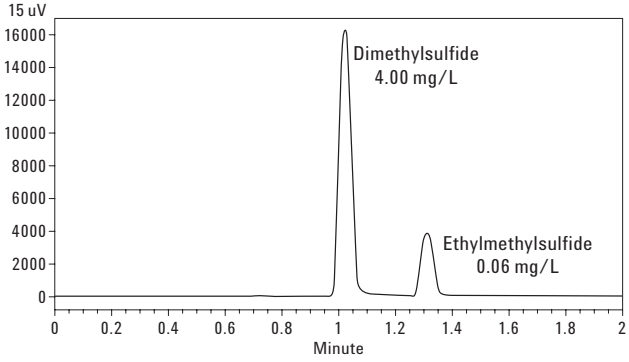
Agilent Model 355 Sulfur Chemiluminescence Detector (SCD): Dimethylsulfide in Beer Malt

Technical Overview

Introduction

Dimethylsulfide (DMS) plays an important role in the flavor and aroma of finished beer. The detection of free and total DMS in beer malt can be performed rapidly using headspace gas chromatography and sulfur chemiluminescence detection.

Dimethylsulfide (DMS) is a volatile sulfur compound found in finished beer, generally at very low ppb levels. The DMS contributes to the flavor and aroma of the finished beer. This flavor component is generally perceived as the aroma and can vary from cooked corn, celery or parsniplike to shellfish or oysterlike at high concentrations. The aroma threshold for DMS has been determined to be 30 ppb. There are two sources where DMS can originate: the first is by bacterial infection of the wort and secondly, where DMS is produced in processing. This application deals with one part of the processing where DMS is hydrolyzed from an amino acid type found in malt, S-methylmethionine (SMM). SMM is formed in grain during the germination process and is the precursor to DMS formation. During the different stages of processing the SMM is hydrolyzed into DMS and homoserine (HS), an amino acid. A portion of the DMS is oxidized to dimethyl sulfoxide (DMSO), which later in the process is reduced to DMS. During each stage DMS is formed and lost resulting in concentrations generally below 50 ppb in the finished beer. The determination of DMS formation from malt using headspace gas chromatography is relatively simple with the SCD. It involves the determination of free and total DMS with the resulting difference being the amount of precursor. The SCD is extremely sensitive and has a linear response greater than five orders of magnitude. The chromatogram below represents a 1 mL headspace injection of a prepared malt sample to determine free DMS. Ethylmethylsulfide (EMS) is added as an internal standard.



Chromatographic Conditions

Injector temperature:	120 °C
Initial temperature:	50 °C (isothermal)
Injection type:	Splitless
Injection volume:	1 mL headspace
Column flow:	1.0 mL/minute
Column type:	Supelco SPB-1
Column length:	30 m
Internal diameter:	0.32 mm
Film thickness:	4 µm

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Printed in the USA
May 23, 2007
5989-6779EN

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