

### 牡蛎体液风味物质的GC-MS分析

刘文<sup>1</sup>, 张悦容<sup>1</sup>, 张腾军<sup>2</sup>, 王求娟<sup>2</sup>, 陈义芳<sup>2</sup>, 苏秀榕<sup>1</sup>

1. 宁波大学海洋学院, 浙江 宁波 315211;
2. 宁波今日食品有限公司, 浙江 宁波 315502

**摘要:** 用电子鼻和顶空固相微萃取气质联用法(HS-SPME-GC-MS)对不同加热温度的牡蛎体液风味物质进行分析,以探讨牡蛎体液挥发性成分与加工温度的关系。结果显示,电子鼻能够灵敏地检测到牡蛎体液在加热过程中气味的变化,新鲜牡蛎体液在加热到100℃和150℃时气味发生明显变化,利用GC-MS鉴定出体液中挥发性化合物主要有醛类、烃类、醇类、酮类、酯类和呋喃类等,它们的协同作用构成了牡蛎体液的特征风味;新鲜牡蛎体液以清新的果香为主(丙酸戊酯、D-丁香醛),略带肉香(反-4-癸烯醛),主要挥发性成分是醛类和酯类;100℃处理的牡蛎体液产生浓郁的花香和果香味(1-苯基-1,2-丙二酮、2-甲基-1-丁醇),肉香和焦香味增强(2-乙基呋喃、反-2-(2-戊烯基)呋喃),主要挥发性成分是酮类和呋喃类;150℃处理的牡蛎体液以浓郁的焦香和甜香为主(环己基丙酸甲酯、1-(2-呋喃)-1-丙酮),主要挥发性成分是酯类和杂环化合物。经不同温度处理的牡蛎体液可以弥补焙烤牡蛎风味的不足,掩盖一些不愉快的气味。

**关键词:** 牡蛎体液 电子鼻 顶空固相微萃取 气质联用 挥发性成分

### ANALYSIS OF THE FLAVOR SUBSTANCES IN OYSTER JUICE BY GC-MS

LIU Wen<sup>1</sup>, ZHANG Yue-rong<sup>1</sup>, ZHANG Teng-jun<sup>2</sup>, WANG Qiu-juan<sup>2</sup>, CHEN Yi-fang<sup>2</sup>, SU Xiu-rong<sup>1</sup>

1. Faculty of Ocean, Ningbo University, Ningbo Zhejiang 315211;
2. Ningbo Today Food CO.LTD, Ningbo Zhejiang 315502

**Abstract:** To discuss the relationship between oyster juice and processing temperature, the article analyzed the flavor substance in oyster juice at different temperatures with Electronic Nose technology and Headspace-solid phase microextraction (HS-SPME) coupled with gas chromatography-mass spectrometry (GC-MS). The results showed that the electronic nose could detect the scent sensitively in the heating process. Odor of fresh oyster juice changed significantly when it was heated to 100℃ and 150℃. The volatile flavor compounds were mainly aldehydes, hydrocarbons, alcohols, ketones, esters and furans, etc. The cooperation of these compounds provided a specific flavor of oyster juice. Aldehydes and esters were the main volatile flavor substances of the fresh oyster juice which had more fresh fruit (propanoic acid, pentyl ester and lilac aldehyde D) with less meat smell (E-4-Decenal). Ketones and furans were the main volatile flavor substances of the oyster juice with 100℃ heated which produced strong floral and fruit aroma (1,2-propanedione, 1-phenyl- and 1-Butanol, 2-methyl-) with strong meat and coke flavor (Furan, 2-ethyl- and trans-2-(2-Pentenyl)furan). Heterocyclic compounds and esters were the main volatile flavor substances of the oyster juice with 150℃ heated which had more burnt and sweet odor (cyclohexane methyl propanoate and 1-propanone, 1-(2-furanyl)-). Oyster juice at different temperatures can compensate for the lack of flavor in the baked oysters and cover up some unpleasant odor.

**Keywords:** oyster juice electronic nose headspace-solid phase microextraction gas chromatography-mass spectrometry volatile compounds

收稿日期 2012-05-24 修回日期 2012-08-13 网络版发布日期

DOI:

基金项目:

国家星火计划(2010GA701063); 国家现代农业产业技术体系建设专项(nycy-47); 浙江省重中之重学科资助项目(XK0613040); 浙江省教育厅重点资助项目(200517011)

#### 扩展功能

#### 本文信息

- Supporting info
- PDF(1437KB)
- [HTML全文]
- 参考文献[PDF]
- 参考文献

#### 服务与反馈

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- 引用本文
- Email Alert
- 文章反馈
- 浏览反馈信息

#### 本文关键词相关文章

- 牡蛎体液
- 电子鼻
- 顶空固相微萃取
- 气质联用
- 挥发性成分

#### 本文作者相关文章

- 刘文
- 张悦容
- 张腾军
- 王求娟
- 陈义芳
- 苏秀榕

#### PubMed

- Article by LIU Wen
- Article by ZHANG Yue-rong
- Article by ZHANG Teng-jun
- Article by WANG Qiu-juan
- Article by CHEN Yi-fang
- Article by SU Xiu-rong

通讯作者: 苏秀榕(1956-),女,浙江宁波人,教授,博导,研究方向为食品科学与工程。E-mail: suxiurong@nbu.edu.cn

作者简介:

作者Email: suxiurong@nbu.edu.cn

---

#### 参考文献:

- [1] 董晓伟, 姜国良, 李立德. 牡蛎综合利用的研究进展[J]. 海洋科学. 2004, 28(4): 62
- [2] 陈惠源, 蔡俊鹏. 牡蛎的营养药用价值及其开发利用[J]. 中药材. 2005, 28(3): 172-174
- [3] 吴成业, 刘智禹. 太平洋牡蛎、僧帽牡蛎和近江牡蛎中游离氨基酸和牛磺酸的分析[J]. 中国畜产与食品, 1998, 5(6): 258-259
- [4] 刘辉, 张伟, 史相国, 徐国卉. 固相微萃取(SPME)技术分析牡蛎肌肉中风味物质[J]. 食品科技, 2006, 11: 209-211
- [5] 顾聆琳, 杨瑞金, 陈 骞. SPME和气质联用测定牡蛎中的风味物质[J]. 中国调味品, 2004, 10: 43-46
- [6] 曾丹丹, 陈 宏, 黄国方. 固相微萃取技术在挥发性有机物分析中的应用研究进展[J]. 广东化工, 2009, 36(8): 315-316
- [7] 俞海峰, 何 芳, 周浙良. 水产品的风味研究进展[J]. 现代渔业信息, 2009, 24(3): 14-16
- [8] 孙宝国. 食用调香术[M]. 北京: 化学工业出版社, 2003
- [9] Kolanowski W, Jaworka D, Weibrod J. Importance of instrumental and sensory analysis in the assessment of oxidative deterioration of omega-3 long-chain polyunsaturated fatty acid-rich foods[J]. J Sci Food Agric, 2007, 87(2): 181-191
- [10] Cadwallader K R, Tan Q, Chen F, Meyers S P. Evaluation of the aroma of cooked spiny lobster tail meat by aroma extract dilution analysis [J]. Agric Food Chem, 1995, 43, 2432-