以模式反應模擬油炸大蒜香味形成之研究

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摘 要

大蒜(Allium sativum L.)為中式食品中常用之調味蔬菜；除了可賦予強烈香味，而當作香辛料使用外，也是一種健康食品；可延長血液凝結時間，降低血漿中膽固醇含量，預防高血壓及心臟病之效果。 大蒜的香味主要是因存在於生大蒜中之香味前驅物質alk(en)yl cysteine sulfoxides 於細胞破裂時經酵素alliinase的作用產生的alk(en)yl cysteine thiosulfinates所賦予。經由殺菁後的大蒜中alliinase被破壞，因此大蒜的前驅物 sulfoxides不會被轉變為thiosulfinates。 本研究目的，乃在探討以大蒜之非揮發性香味前驅物質及一級香味化合物，利用油炸模式反應來模擬大蒜之香味潛在的貢獻性。 本研究共分為五部分：第一部分將剝皮油炸大蒜、未剝皮油炸大蒜與剝皮殺菁油炸大蒜香氣成分以Likens-Nickerson水蒸氣蒸餾及二氯甲烷萃取之方法，抽提香氣成分，所得之抽提液再經脫水、濃縮後，進行GC-MS分析。第二部分是利用酸鹼區分大蒜精油模式反應液香氣成分。取大蒜精油、cysteine、glucose、水及新鮮之黃豆油混合進行油炸模式反應，所得之反應液再進行香氣成分之萃取，萃取液再以酸鹼區分分成四部分，各區分經濃縮後，進行GC-MS分析。第三部分將油炸大蒜及殺菁後再油炸大蒜等處理樣品，再以第二部分之方法進行香氣成分抽提，所得之萃取液再以酸鹼區分分成四部分經濃縮後，進行GC-MS分析。第四部分自行合成大蒜香味前驅物alliin及deoxyalliin，及大蒜之一級香味化合物allicin，而後將此等物質個別或與glucose混合之溶液，進行油炸模式反應，之後利用Likens-Nickerson水蒸氣蒸餾及二氯甲烷萃取之方法，分離出反應液中之香氣成分經濃縮後，再以GC-MS加以分析鑑定。第五部分將大蒜香味前驅物之熱裂解物Allyl alcohol、Allyl mercaptan、Propanal及Acetaldehyde與Cysteine、Proline以及Glucose分別以不同組合於大豆油及水之體系進行熱裂解模式反應，之後利用Likens-Nickerson水蒸氣蒸餾及二氯甲烷萃取之方法分離出反應液中之香氣成分經濃縮後再以GC-MS加以分析鑑定。 總結本文之重要研究結果如下： 1.由官能品評試驗結果得知，以油浴初溫180°C油炸至終溫為145°C，可 使大蒜片有最佳的香味、色澤及整體喜好性。 2.由本研究結果發現添加allyl mercaptan對黃豆油具有抗氧化的作用， 以及能抑制梅納反應的生成，所以allyl mercaptan有抗氧化作用。 3.本研究之自行合成alliin、deoxyalliin及allicin經由TLC純度鑑定所 得到之純度極高。 4.由研究結果得知alliin、deoxyalliin及allicin經由油炸模反應可能形 成途徑可分成三類：⑴.可能由自身熱裂解而來之香氣化合物；⑵.由 脂質熱裂解而來之香氣化合物；⑶.由梅納反應而產生之香氣化合物。 5.由本研究得知殺菁後再油炸大蒜因殺菁處理可有效保留香味前驅物質， 因此比未殺菁油炸大蒜產生較高量之香氣成分。 6.比較大蒜香味前驅物之熱裂解物與Glucose、 Proline以及Cysteine模 式反應液中之香氣成分，發現Allyl alcohol + Proline + Glucose組 合與Control組合中發現allyl mercaptan的添加也造成油脂裂解模式不 同，而使油脂裂解而來之香氣化合物的含量及分佈不同。 7.於研究中發現，於Allyl mercaptan + Cysteine + Proline + Glucose + Propanal + Acetaldehyde組合中furan有極高的含量，這些 furan化合物主要是反應中的propanal與acetaldehyde中之醛醛縮合反 應，而thiazole，thiophene含量較其它組合高，主要是反應液中之allyl mercaptan與aldehyde之醛及硫醇縮合反應。 8.由本研究結果得知alliin及deoxyalliin之油炸模式反應主要仍是以非 環狀含硫化合物含量最多，而alliin + glucose與deoxyalliin + glucose之反應液於加入葡萄糖後對整個油炸模式反應含量組成有所改 變。

關鍵詞 : 大蒜 ; 模式反應

目錄

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