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木糖-草鱼肽美拉德反应产物的抗氧化性

Antioxidant activity of Maillard reaction products derived from xylose and ctenopharyngodon idellus peptide

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中文摘要:

为了探讨美拉德反应对草鱼肽抗氧化性的影响，该文以分子量小于5 KDa的草鱼肽为原料，加入木糖进行美拉德反应，并与单独加热的样品进行比较。分别检测分析了不同反应时间的热降解产物和美拉德反应产物的还原力、氧自由基吸收能力(ORAC, oyxgen radical absorbance capacity) 值及挥发性成分组成，并对反应产物中挥发性物质与其抗氧化活性之间的关系进行了探讨。试验结果表明：草鱼肽添加木糖反应比其单独加热的褐变程度更高，抗氧化性更强。且随着反应时间的延长，美拉德反应产物的抗氧化性能逐步增强，并产生了大量的呋喃、吡嗪等杂环化合物，通过相关性分析，发现美拉德反应产物的抗氧化性与上述挥发性组分含量显著相关（P > 0.95）。草鱼肽与木糖质量比为1∶1混合并在100℃下反应3 h具有较强抗氧化性。因此，美拉德反应修饰可使草鱼肽表现出更强的抗氧化性，是一种优秀的食品抗氧化原料。

英文摘要:

Abstract: Oxidative deterioration of oil and protein is a common problem in the food industry, which led to trending studies of safe antioxidants with strong antioxidant activity. Ctenopharyngodon Idellus is a commercial fish, which is rich in proteins and polyunsaturated fatty acids, and is widely distributed in fresh-water throughout China,. In recent years, the Ctenopharyngodon Idellus was prepared as condiment or nourishment, however, further studies are limited. In this study, Ctenopharyngodon Idellus was hydrolyzed by three proteases (papain, PTN6.0, and Alcalase2.4 L), and the hydrolysate was isolated at two fractions of molecular weight above and below 5 kD by ultrafiltration. The fraction below 5 kD (Ctenopharyngodon Idellus peptide) was heated with or without xylose at 100 ℃ for different times (30 min to 240 min). Oxygen radical absorbance capacity (ORAC), reducing power, UV absorption, and volatile components of Maillard reaction products (MRPs) and thermal degradation products (TDPs) with different reaction times were evaluated, respectively. This study focuses on the effects of Maillard reaction on the antioxidant activity and the volatile components from Ctenopharyngodon Idellus peptide and its derivatives. The correlation between reaction products, volatile components, and their antioxidant activity were also analyzed. Results revealed that the browning intensity and UV absorption of the intermediate products of MRPs were much higher than those of TDPs. Antioxidant activity of MRPs increased with increasing heat time, while TDPs had no obvious change. In addition, MRPs showed better antioxidant activity. Reducing power and oxygen radical absorbance capacity of MRPs for 240 min was 17.77 and 3.32 times than those untreated. 51 kinds of volatile compounds were separated and identified from MRPs; among them, pyrazines, furans, pyrroles, aldehydes, ketones, and alcohols had relatively high concentration. Whereas, aldehydes were the largest content of volatile compounds in TDPs (above 80 percent), little furan, ketones, and alcohols were also observed. In summary, the antioxidant activity of Ctenopharyngodon Idellus peptide could be increased obviously by Maillard reaction. There was significant correlation (P > 0.95) between Maillard reaction products and antioxidant activity. Thus, MRPs of peptide from enzymatic hydrolysis can be used as a new type of natural antioxidant.

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