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Czech J. Food Sci.

**Hutapea E. B.,
Parkányiová L.,**

**Trávková J.,
Miyahara M., Sakurai
H., Pokorný J.**

Browning reactions between oxidised vegetable oils and amino acids

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Browning reactions of oxidised lipids with amino acids were studied in mixtures of refined soybean or rapeseed oil with alanine, valine, lysine, serine, cystine, cysteine, methionine, proline, and tryptophan. Oils were deposited in thin layers on cellulose fibres impregnated with the individual amino acids. The reaction proceeded in the dark, in dry air, at 50° C and at free access of oxygen. The browning determined at 430 nm followed a nearly zeroth order reaction without any induction period. The browning was very weak in the absence of amino acids, and all amino acids increased the browning rate, especially

ysteine, methionine, and even more proline and tryptophan. The reaction rates were nearly the same in mixtures with rapeseed and soybean oils. Small amounts of hydroperoxides did not appreciably affect the browning rate. In the presence of copper ions, which belong to the most active catalysts of oxidation, the reaction rate was substantially higher. On the contrary, in the presence of antioxidants, the reaction rate was reduced to a marked degree but no induction period was observed. The probable main reaction mechanism was the reaction of lipid hydroperoxides, free radicals produced by their decomposition and/or unsaturated aldehydes under the formation of unsaturated imines which further polymerised into brown macromolecular substances.

Keywords:

amino acids; autoxidation; browning, nonenzymic; hydroperoxides; imines; rapeseed oil; soybean oil

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