

## ABSTRACT

Vitamin E refers to a group of compounds that include both tocopherols and tocotrienols. They are mostly found in fats and oils, which have both health-promoting and antioxidant properties. The intake of tocopherols is important, since it is an antioxidant that stabilizes the free radicals generated by stress. DPPH radical scavenging activity is often used to determine the in vitro antioxidant activity of fruit, vegetables and foods of plant origin. The objective of the present study was to investigate structure-activity relationship of tocopherols. Furthermore, the effect of aprotic and protic solvents and the temperature on the reaction between DPPH radical and tocopherols was determined.

Results showed that the antioxidant activity of tocopherols was strongly affected by their chemical structures. In general, tocotrienols are more potent antioxidants than tocopherols. The latter is attributed to the presence of double bonds in the aliphatic chain. The antioxidant activity of tocopherols is also influenced by the number and position of methyl groups onto aromatic ring. Overall,  $\alpha$ -tocotrienol was the strongest antioxidant among tocopherols, whereas  $\alpha$ -tocopherol had the most weak antioxidant potency.

Regarding to the temperature, the rate of the reaction between DPPH radical and  $\alpha$ -tocopherol was affected by the temperature. The rate of reaction increased as the temperature was raised. However, the boiling point of solvent and the stability of tocopherols at high temperature are critical points for this reaction.

Results also demonstrated a significant effect of solvent on estimated antioxidant activity. In particular, the use of isobutanol as solvent gave the highest values of antioxidant activity. On the other hand, the use of dimethyl sulfoxide led to the underestimation of antioxidant activity of tocopherols. Solvent properties such as the ability to form hydrogen bonds with the tocopherols as well as the solubility of tocopherols in solvents seem to influence the level of estimated antioxidant activity.

Overall, the tocopherol diversity, their concentration, the temperature and the solvent properties influence the estimated antioxidant activity of foods with plant origin such as food, vegetables, functional foods etc.

Keywords: tocopherols, tocotrienols, DPPH radical, antioxidant activity, temperature, aprotic and protic solvents