

RADICAL SCAVENGING BY OLIVE OIL – A NEW ASSAY USING SIFT-MS

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Introduction

The Selected Ion Flow Tube Mass Spectrometry Total Oxyradical Scavenging Capacity (SIFT-MS-TOSC) assay is a competitive assay which uses a radical species to attack a molecular probe (KMBA, Figure 1), which releases ethene gas when subjected to radical attack. An entire sample may be added to the assay solution (either an aqueous sample or an emulsified lipid), eliminating the need for extraction of certain components. Any antioxidants present scavenge the radicals, providing protection for the KMBA and causing a slower release of ethene. Two radical species were investigated thoroughly in this study: the peroxy radical (formed from AAPH, Figure 1) and the hydroxyl radical (formed through Fenton reaction of ascorbic acid with Fe^{2+}). SIFT-MS is ideal for the analysis of ethene in this assay, as it quantifies compounds in whole air mixtures in real-time.

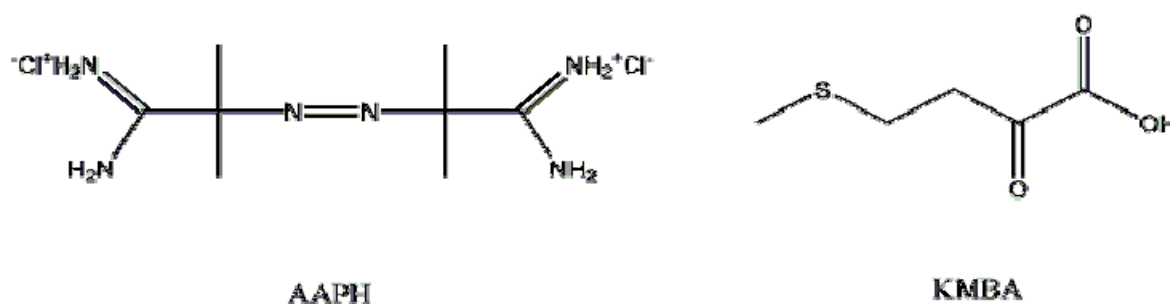


Fig. 1. The structures of 2,2'-azobis(2-amidinopropane)hydrochloride (AAPH) and α -keto- γ -methylthiobutanoic acid (KMBA).

Standardising the SIFT-MS-TOSC assay

The response of inhibition to antioxidant concentration in the SIFT-MS-TOSC assay is non-linear. To properly characterise the response, a number of olive oils were analysed to obtain a reference function which could be used for all olive oils. This reference function allows the calculation of the IC_{50} (the concentration which gives 50% inhibition of radical attack) value using any other inhibition at a known concentration. A single concentration is now used for all olive oils, standardising the assay preparation. The reduction in necessary information permits the simultaneous analysis of several oils where only one was previously possible. The value of the reference function is demonstrated by analysis of several plant products which have very different IC_{50} values.