

## **A kinetic approach of DPPH free radical assay of ferulate-based Protic Ionic Liquids (PILs)**

### **ABSTRACT**

The antiradical efficiency (AE) and kinetic behavior of a new ferulate-based protic ionic liquids (PILs) were described using 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical assay. The reduction of the DPPH free radical (DPPH•) was investigated by measuring the decrease in absorbance at 517 nm. The time to reach steady state for the reaction of parent acid (ferulic acid) and synthesized PILs with DPPH• was continuously recorded for 1 h. Results revealed that the AE of 2-butylaminoethanol ferulate (2BAEF), 3-dimethylaminopropanol ferulate (3DMAPF) and 3-diethylaminopropanol ferulate (3DEAPF) PILs have improved compared to ferulic acid (FA) as the reaction class changes from low to medium. This attributed to the strong hydrogen abstraction occurred in the PILs. Furthermore, these PILs were found to have a good kinetic behavior compared to FA due to the high rate constant ( $k_2$ ) (164.17, 242.84 and 244.73  $M^{-1} s^{-1}$ , respectively). The alkyl chain length and more alkyl substituents on the nitrogen atom of cation were believed to reduce the cation-anion interaction and speed up the hydrogen atom transfer (HAT) and electron transfer (ET) mechanisms; hence, increased rate constant was observed leading to a strong antioxidant activity of the synthesized PILs.

**Keyword:** Protic ionic liquids; Antioxidant; DPPH radical scavenging; Kinetic; Antiradical efficiency