Title : Optimization of Conditions for the Separation of Sugar Compounds Extracted from $PM_{2.5}$ Samples Using Ion Chromatography with Pulsed Amperometric Detection

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ABSTRACT

Sugars compounds are commonly detected in fine particulate matter ($PM_{2.5}$). The analysis of sugar compounds in this study is performed using ion chromatography with pulsed amperometric detection (IC-PAD). This study focuses on the separation and optimization of 12 sugars, categorized into 3 types such as anhydro sugars (levoglucosan, mannosan and galactosan), sugar alcohols (inositol, erythritol, xylitol, arabitol, sorbitol and mannitol), monosaccharides (glucose and galactose) and disaccharides (sucrose). Key factors of separation conditions optimization were considered i.e. elution condition, initial concentration of eluent (sodium hydroxide), and column temperature. The results indicated that stepwise gradient elution with 150 mM sodium hydroxide initially at a column temperature of 40 °C provided optimal condition for separation. These optimal condition was validated through parameters including linearity in the range of 0.01 – 10.00 mg L^{-1}, method detection limit in the range of 0.002 – 0.029 mg L^{-1}, limit of quantitation in the range of 0.005 – 0.088 mg L^{-1}, precision of retention time and peak area was evaluated with relative standard deviations (RSDs) of less than 1.1 % and, accuracy by the spiked sample method yielded recoveries of 90.5 – 104.3%. The improved method was shown to be efficient enough to quantification of sugars in $PM_{2.5}$ samples from Chiang Mai province, Thailand.

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