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Determination of trace water contents of organic solvents by gas chromatography-mass spectrometry-selected ion monitoring

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Highlights

- This method has a low detection limit and an excellent linear correlation.
- It is not affected by the chemical properties of the organic solvents.
- This method is very environmentally friendly and saves reagents.

Abstract: This paper describes the development of a novel gas chromatography-mass spectrometry-selected ion monitoring (GC/MS-SIM) method for the determination of trace water contents of organic solvents, using the characteristic m/z 18, m/z 17, and m/z 16 ions of H₂O as the qualitative ion and the m/z 18 ion as the quantifier ion. The accuracy and precision of this method were validated. An excellent linear correlation was obtained for trace water contents between 0 and 0.5217 wt%, with a correlation coefficient (R^2) of 0.9999, in addition to spike recoveries of 82.6–112.6%, and relative standard deviations ($n = 6$) of 0.4–7.2%. The limit of detection ($S/N = 3$) and limit of quantitation ($S/N = 10$) for the trace water contents of organic solvents were 0.0005% wt% and 0.0016% wt%, respectively. The analytical results confirmed that this method was useful for determining the trace water contents of organic solvents, because it has a low detection limit and wide linear range. It requires only small amounts of the samples and enables sample batch analysis. It is very environmentally friendly and saves reagents.

Keywords: organic solvent; trace water determination; gas chromatography-mass spectrometry (GC-MS); selected ion monitoring (SIM)

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