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Gas chromatographic analysis of metals

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Abstract

Metal analysis has conventionally been carried out with atomic absorption spectrometry (AAS), inductively-coupled plasma (ICP)-atomic emission spectrometry (AES) or ICP-mass spectrometry (MS). Despite their high sensitivity and wide popularity, these methods generally lack the capability of providing direct speciation results of metal elements. For speciation analysis, liquid chromatographic and capillary electrophoretic techniques are often employed to separate the various metal species prior to AAS or ICP-MS detection. Alternatively, gas chromatography (GC) can be a simple and efficient technique for speciation provided that volatile metal chelates were formed in advance. The commonly used chelating agents for volatility-enhancing purpose include tetraethylborate and trifluoroacetylacetonate. GC methods for volatile diethyl dialkyltins, Cr- and Al-trifluoroacetylacetonates have been successfully developed. Element specific detection was performed with either a flame photometric detector (FPD) or a MS detector. Coupled with solid-phase microextraction (SPME) or liquid-phase microextraction (LPME) technique, concentration limits of detection for Sn, Cr and Al were in the sub-ppb level. With the aid of microwave heating and on-fiber derivatization/SPME extraction, the analysis time of Cr in aqueous solution was less than 10 min.

References:

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