

Use of different sampling inlets for the analysis of VOCs from solid waste samples by GC-MS

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Volatile Organic Compounds (VOCs) are defined as organic compounds that evaporate and diffuse into the gas phase at normal atmospheric pressure and temperature. Lately, many countries have been trying to reduce the emissions of VOCs by introducing appropriate legislation. VOCs are divided into biogenic and anthropogenic (man-made) VOCs based on their origin, and result in environmental and health impacts. Some of them are odorous, whereas other not.

Waste management and management of livestock is of paramount importance in national and European level. The continuous need to increase the agricultural and industrial activities leads to high VOCs emissions, with a negative impact both on human health and the environment. Therefore, there is a necessity to identify and control the emitted VOCs, especially those related for nuisance and low quality of life.

In the present study, different GC-MS inlet apparatus were examined for the gaseous analysis of VOCs from selected solid waste samples. Particularly, gas-tight syringe, gas sampling valve (GSV) and headspace solid-phase micro-extraction (HS-SPME) systems were tested. The examined samples were that of cattle waste, coffee waste, sludge and compost (Fig. 1). Based on the substrate, various sampling and analytical parameters were considered such as vial heating, increasing/lowering of vial pressure, volume/sample ratio, SPME exposure time, and GC-MS split/splitless mode.

SPME was proved the best sampling system for the analysis of VOCs emitted from solid waste samples. The great advantage of SPME compared to GSV and gas -tight syringe, is that it allows sample to pre-concentrate. HS-SPME-GC-MS is characterized by low detection limits, sensitivity and small sample preparation time; no solvents are used. Eluted chromatograms are apparently better than those given by the other methods. On the other hand, GSV is automatic but costly and is suitable only for inorganic gas samples under high pressure. Gas tight syringe is easy and cheap, but is manual.



Figure 1. Solid samples analysed for their headspace VOCs.

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