

A comprehensive pyrolysis-gas chromatography/mass spectrometry analysis for the assessment of microplastics in various salts

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Abstract:

Analytical pyrolysis-gas chromatography/mass spectrometry(Py-GC/MS) was chosen to quantify microplastics (MPs) in edible salts: sea salt(SS), deep-sea salt(DSS), rock salt(RS), and lake salt(LS). Samples were filtered by two-step using 20 μm (MPs20) and 1 μm (MPs1) filters. Two Py-GC/MS methods with split ratios of 100/1 for high-level and 10/1 for low-level MPs were used. Quality control measures were taken to avoid precontamination. Methods showed high linearities ($R^2 > 0.995$) and recoveries (84.2–118.1 %) for standards, polyethylene(PE), polypropylene(PP), polystyrene(PS), and polyethylene terephthalate(PET). SS showed highest MPs concentration ($584.5 \pm 204.4 \mu\text{g/kg}$), followed by RS($34.2 \pm 16.7 \mu\text{g/kg}$) and LS($6.2 \mu\text{g/kg}$). Over 7.2 % of detected MPs in SS and RS were smaller than 20 μm . PE, PP, and PET comprised 98.4 % of MPs in SS and 88.1 % in RS. MPs contamination from packaging materials was experimentally confirmed by the presence of similarly shaped PS particles in RS. MPs annual exposure was highest in SS(2304 $\mu\text{g/person}$), followed by RS(135 $\mu\text{g/person}$), and LS(24 $\mu\text{g/person}$), indicating substantial variation in exposure based on salt type.

* Excerpted from online journal website (Click the title)

Frontier Labs Products used:

Multi-Shot Pyrolyzer (EGA/PY-3030D)