



METHYLMERCURY ANALYSIS





KEY FEATURES OF METHYLMERCURY SURVEYS

Methylmercury

- Long half-life in living organism. (around 70 days half-life in humans)
- High bioaccumulation potential.
- High toxicity to central nervous system

Hazardousness to humans and ecosystems is greater than other chemical forms.



Photo: IDEA Consultants

Methylmercury Analysis for Biota Sample

Biota / Food

- ❑ Organic/inorganic proportion of mercury varies by species and individuals.
 - Some species or individuals have less organic mercury
- ❑ Obtain the information of methylmercury concentration is an effective means of understanding the mercury cycle in ecosystem
- ❑ To evaluate the effect on humans, information of methylmercury in food is relevant.

Methylmercury
Analysis

Key Features of
Methylmercury
Surveys

Methylmercury Analysis for Human Sample

Human Hair

- Hair only accumulates **methylmercury** in theory.
- Elemental or inorganic mercury may **adhere to the hair surface** if the hair is exposed to high concentrations.
- The adsorbed mercury should be assessed separately from methylmercury (internal exposure).

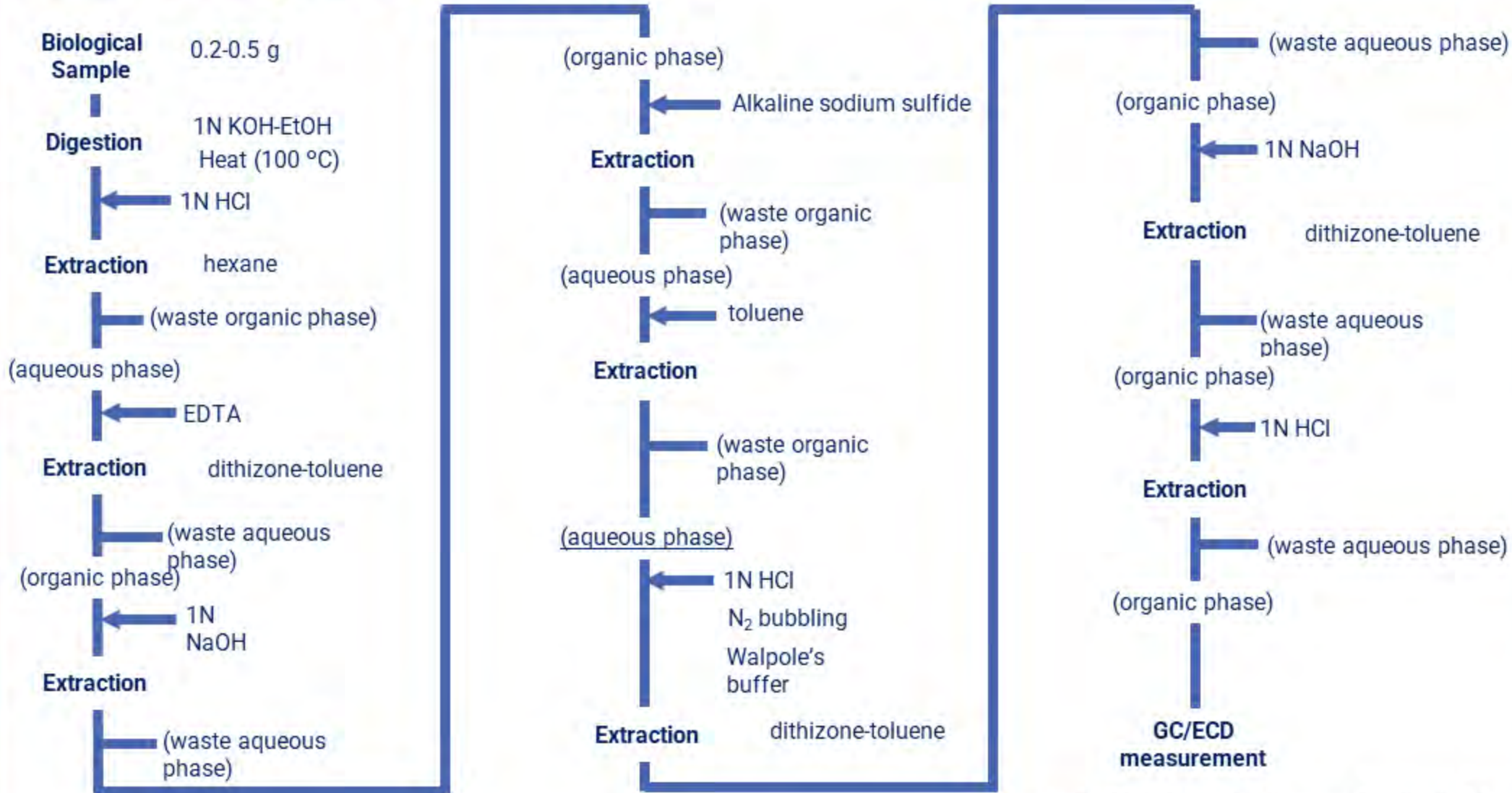
Methylmercury
Analysis

Key Features of
Methylmercury
Surveys



METHYLMERCURY ANALYSIS

Outline Flowchart of Methylmercury Analysis in Biological Sample



Source: MOEJ (2004). Mercury Analysis Manual

Methylmercury
Analysis

Methylmercury
Analysis

Taking Sample / Alkaline Digestion

- Weigh sample. (0.2-0.5 g)
- Add 1N KOH-EtOH solution.
- (Cap the sample vessel tightly.)
- Heat and digestion. (100 °C, 1 hour)

Be careful in handling alkaline ethanol solution (Highly caustic).

Methylmercury
Analysis

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Lipid Removal (Wash by Hexane)

- Add HCl.
- Add hexane.
- Shaking.
- Centrifuge.
- Remove hexane (upper) phase.

Methylmercury
Analysis

Methylmercury
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Dithizone-Toluene Extraction

- Add EDTA Solution.
- Shaking.
- Add dithizone-toluene (5mL accurately).
- Shaking.
- Centrifuge.
- Remove water (lower) phase.

Methylmercury
Analysis

Methylmercury
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Extraction/Back Extraction



- Add Na_2SO_4 .
- Add NaOH solution.
- Wash (shaking, centrifuge and remove water).
- Take toluene phase (3 mL accurately).
- Add NaS solution.
- Extract (shaking, centrifuge and remove toluene).
- Add toluene.
- Wash (shaking, centrifuge and remove toluene).
- Acidification (HCl).
- N_2 gas bubbling.
- Add Walpole's buffer.
- Add dithizone-toluene (0.5 mL accurately).
- Extract (shaking, centrifuge and remove water).
- Add NaOH solution.
- Wash (shaking, centrifuge and remove water).
- Add small amount HCl.
- Centrifuge.
- Transfer the measurement bottle (vial).

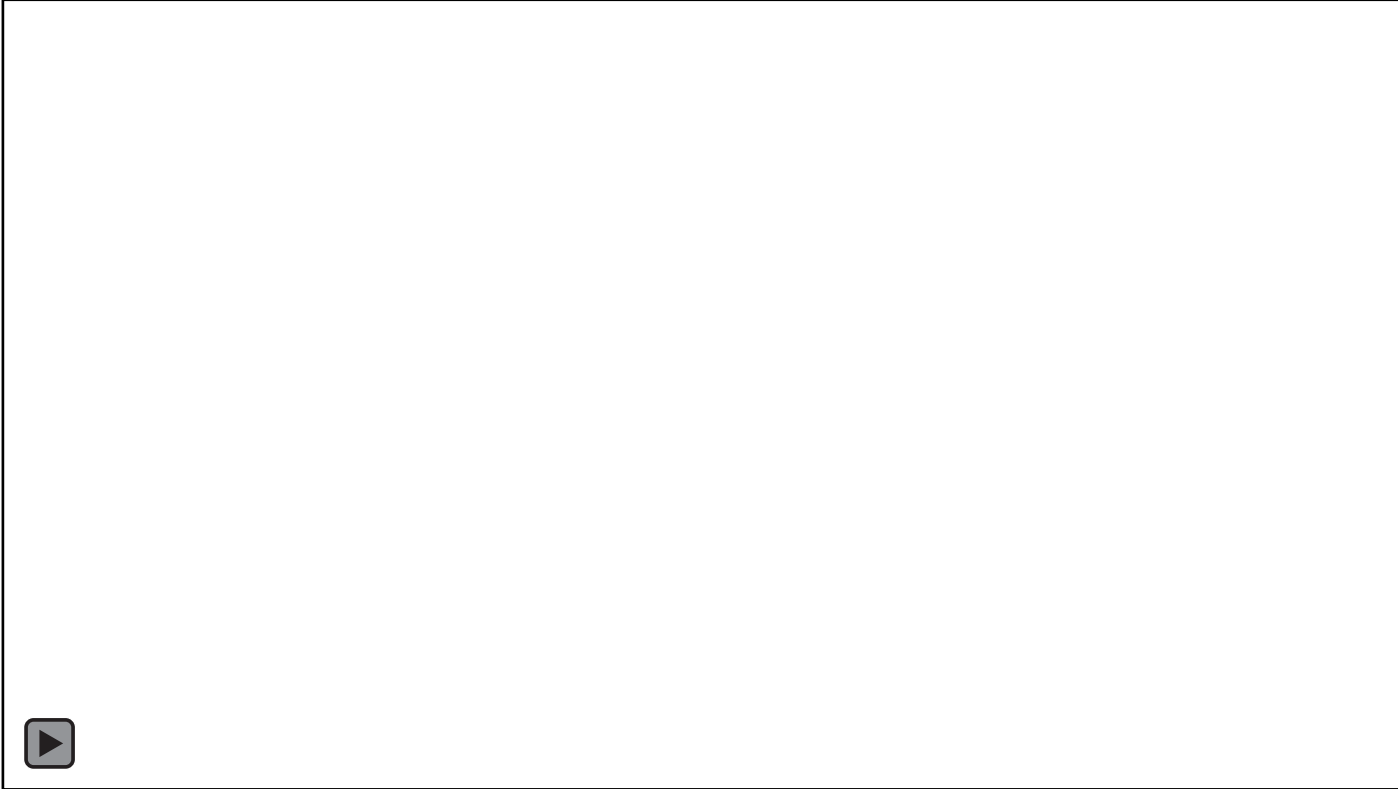


Methylmercury
Analysis

Methylmercury
Analysis

GC/ECD Measurement

- Packed GC column is used.



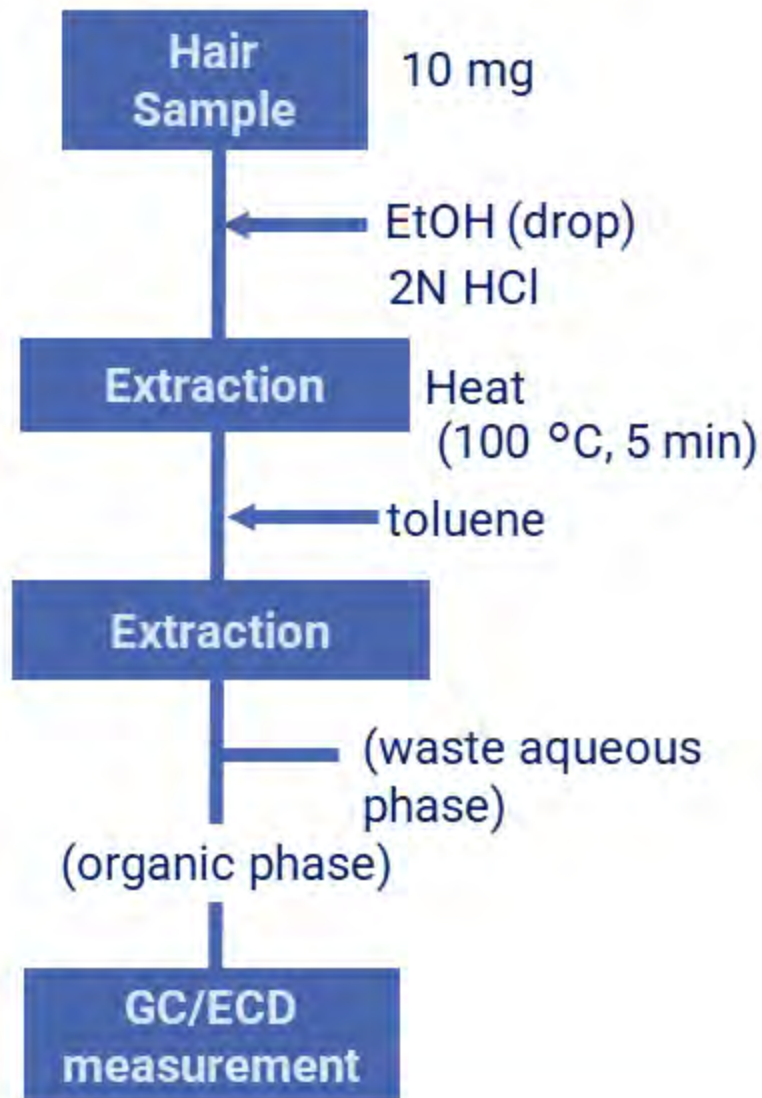
Methylmercury
Analysis

Methylmercury
Analysis



METHYLMERCURY ANALYSIS FOR HUMAN HAIR SAMPLES

Outline Flowchart of Methylmercury Analysis in Hair Sample



Methylmercury in hair can be **efficiently extracted by HCl solution**.

->Methylmercury analysis in hair can be conducted with **very simple operation procedure**.

Methylmercury Analysis in Hair

- Weigh hair sample (10 mg).
- Drop EtOH.
- Add 3 mL of 2N HCl accurately.
- Extract. (100 °C, 5 min)
- Take 1 mL of solution accurately.
- Add 2 mL of toluene accurately.
- Extract by toluene.
- Analyse by GC/ECD.

Methylmercury
Analysis

Methylmercury
Analysis for
Human Hair
Samples