

English Text version of the Poster

**Cosmetics and Tattoos: Sample Preparation for the Determination of Elements
Tips from the working group „Elements and Element Species“ of the Chemical
Society of Food, a specialist member group within the German Chemical Society**

Presented at the Congress of German Food Chemists 2019, Dresden, Germany.

Download of the original version in German (with pictures) at

https://www.gdch.de/fileadmin/downloads/Netzwerk_und_Strukturen/Fachgruppen/Lebensmittelchemiker/Arbeitsgruppen/elemente/Poster_Kosmetik-2019-finA4.pdf

Before the digestion of the sample, a suitable preparation needs to be carried out (homogenizing, crushing, mixing ...).

Digestion method

For element determinations, the pressure digestion of cosmetic products is carried out under precisely defined conditions described in [1]. Depending on the type of sample, a total digestion cannot always be obtained. Therefore, this kind of extraction requires exact compliance with the digestion conditions specified in [1].

Sample weight

- Dry or powdered samples need to be slurried with water before the acid is added.
- Liquid or pasty samples may be weighted into gelatine capsules for easier handling. Place the capsules in the digestion vessel and also add an empty capsule to the blank value.
- Organic solvents or alcohols (e.g. nail polish) need to be removed before adding the acid (e.g. in a drying oven or by IRradiation) in order to avoid strong reactions or explosions.

Digestion vessels

- Digestion vessels need to be cleaned thoroughly. The inside surface of the vessel needs to be smooth and without scratches. Otherwise, the elements will adhere to the inside wall and thus escape determination.
- Fatty and waxy cosmetics (e.g. make-up) might leave residues in the digestion vessels after the digestion. Due to the lack of transparency, the residues are hard to notice in plastic or fluoropolymer vessels. For easy visual control, the use of quartz vessels is recommended.
- For cosmetic samples, only specific digestion vessels should only be used. Those specific vessels should not be used for the decomposition of e.g. food samples in order to avoid contamination of the latter.

Digestion

- The ratio of the sample weight and the amount of acid needs to be strictly adhered (see [1]).
- For the digestion, solely use nitric acid and add hydrochloric acid immediately before the vessels are closed.
- The temperature used for digestion needs to be measured directly in the vessels, which requires suitable temperature sensors.
- Select a slow microwave heating ramp up to the digestion temperature of 200 °C.
- Hold the maximum temperature of 200 °C for 30 minutes.

Measurement

Residues need to be removed before the elements are measured. Depending on the type of measurement device, the digestion solution needs to be diluted sufficiently. Prior to the determination of elements by ICP-MS dilution is mandatory!

The following official German analytical methods are available: ASU K 84.00-31 (ICP-MS), K 84.00-32 (ICP-OES), K 84.00-33 (Cold Vapor-AAS).

These methods are validated for the elements Sb, As, Ba, Cd, Ni, Hg and for certain concentration ranges only.

Literature: [1] ASU K84.00-29 „Untersuchung von kosmetischen Mitteln - Druckaufschluss zur Bestimmung von Elementen in kosmetischen Mitteln und Tätowiermitteln“, Juli 2016, Beuth-Verlag Berlin