EXTRACTION AND CHARACTERIZATION OF TiO₂ NANOPARTICLES IN CHEWING GUMS

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INTRODUCTION
Nowadays engineered nanoparticles (NPs) can be found in agriculture, cosmetics, pharmaceuticals, and even in food. One of the commonly used nanoparticles in the food industry is titanium dioxide (TiO₂). TiO₂ is classified as food colorant due to its white color (label E171). The most common products that may contain nanoparticles of titania are candies, sweets, chocolates, cookies, glazes and chewing gums [1].

METHODS
1) CLEANING
- Extraction impurities in water [2]
- Extraction impurities with dissolving, separation and purification [3]
2) CHARACTERIZATION
- Dry conditions (SEM, EDS, XRD)
- Wet conditions (Zeta potential, particle size)

AIM
- Content ?
- Size ?
- Easy method ?

RESULTS
EDS: (for all methods)
Elemental composition:
- Ti, O confirmed elements
- other elements as impurities

SEM:
Very small content of NPs in comparison to organics compounds.

XRD:
Low-intensity peaks of TiO₂ in comparison with the reference, due to its small content. Lot of organics.

pH & ZETA POTENTIAL:
Particle behavior in ultra-pure water, artificial saliva (AS) and phosphate buffer solution (PBS).

CONCLUSIONS
- The chewing gum coatings contain TiO₂ even in form of nanoparticles.
- Method 2 more cleaning-effective than method 1.
- For better results more effective cleaning

SAMPLES
Reference: Super-Duper-White (SDW)

METHOD 1
SEM:
Insufficient cleaning. Samples D and E the cleanest.

METHOD 2
SEM:
More effective cleaning. Confirmation that there are particles smaller than 100 nm.

PARTICLE SIZE ("as-scratched"): All samples had at least 5% of particles with dimensions between 130 nm and 170 nm (some are even smaller), but most of them are agglomerated.

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