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TiO₂ nanoparticles release from chewing-gums and candies.

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Titanium dioxide is a metal oxide used as a white pigment in coatings of food products as candies and chewing-gum. Food-grade TiO₂, referred to as E171 in Europe and INS171 in North America, includes a nano-sized fraction, representing less than 44% of the particles. Due to concerns about TiO₂ nanoparticles (NPs) as potentially hazardous, the size of TiO₂ particles released from food products during consumption, and an estimation of the intake of nanoparticles from daily life products as chewing-gums and candies is needed.

In this study, the coating of 5 food products (4 chewing-gums and 1 candy) were extracted, and TiO₂ particles were quantified and their physicochemical characteristics (size distribution, shape, crystallinity, chemical composition) were given by TEM, FT-Raman, and ICP-AES.

The presence of TiO₂ particles was confirmed by FT-Raman in the coating of food products. After coating separation from the gum, up to 12 mg TiO₂/ g food were detected according to the elemental analysis (ICP-AES). TEM analysis confirmed the presence of nano-sized TiO₂ particles, with a mean diameter of 133±42 nm. Additionally, TEM analysis showed in two chewing-gum samples the presence of hundreds of TiO₂ nanoparticles capped in a carbon matrix, forming large agglomerates up to 1750 nm. Other nanoparticles, such as Ca or Mg/Si compounds were also detected with TEM and ICP-AES analyses, depending on the sweet composition.

Our results confirmed the presence of TiO₂ in the coating of food products, up to 12 mg TiO₂ /g of food, with a minor fraction being as nanoparticle (21.8%). Numerous TiO₂ nanoparticles are embedded in the matrix formed by food ingredients. However, TiO₂ nanoparticles could be released during digestion and have different impact on health than taken individually.

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