

SILICON DIOXIDE: ANALYTICAL EVALUATION AND APPLICATIONS IN FOOD INDUSTRY

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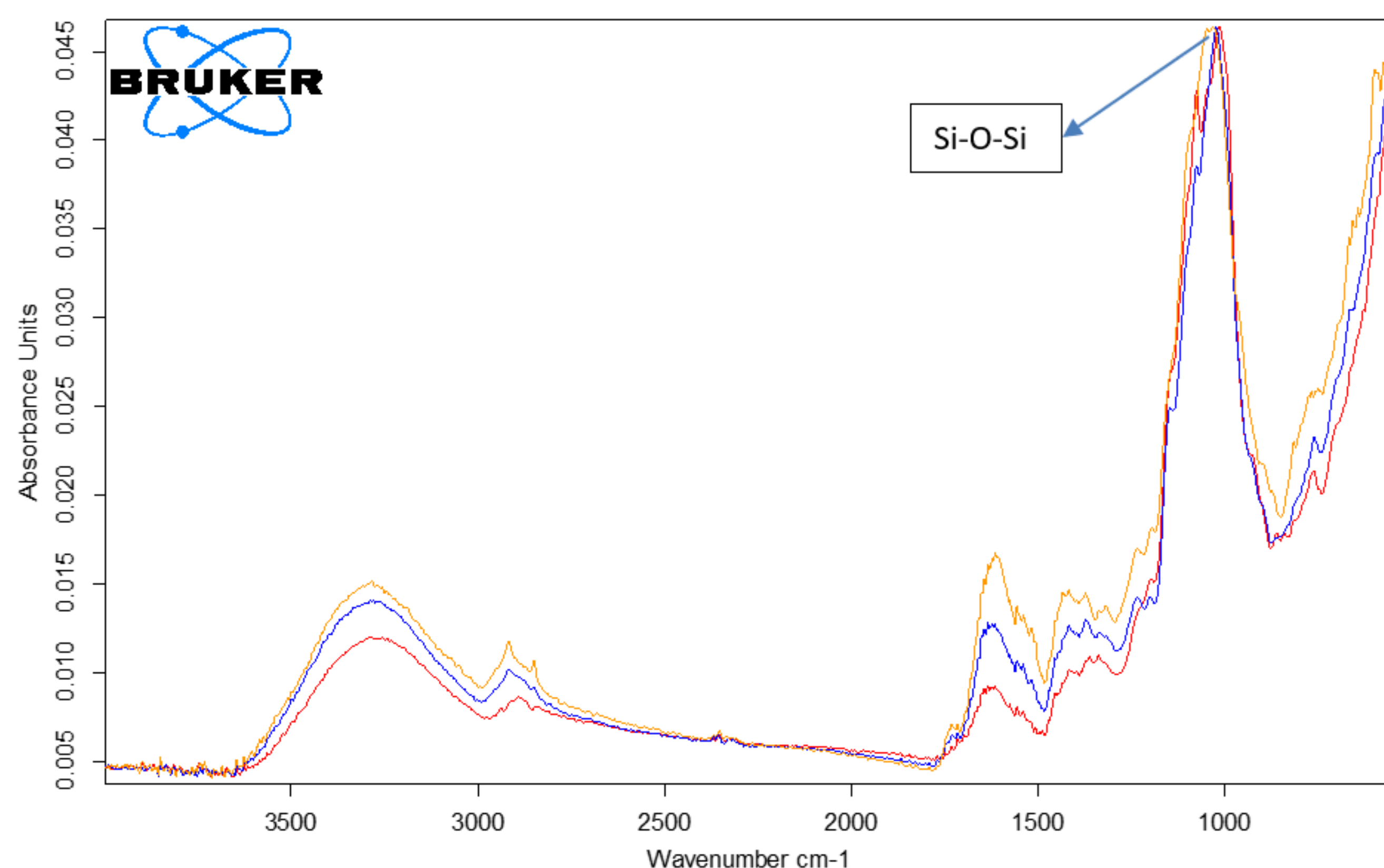
Introduction: Silicon dioxide (SiO_2), which is a natural compound can be found in various foods and beverages, for example: eggs, fish, bananas, grains, leafy greens, milk and water. Colloidal silicon dioxide is a polymeric form of silicon with certain industrial applications, such as: coating agent for dietary supplements or pharmaceutical products and freely flowing agent or anticaking ingredient in food products.

Materials and methods

- 3 dietary supplements based on silicon dioxide were investigated: "Siliciu organic" (Herbagerica), "Siliciu vegetal" (DVR pharm) and "Coadă calului" (Pronatura).
- Infrared spectra of the dietary supplements were obtained with a Bruker ALPHA FT-IR spectrophotometer (BrukerOptik GmbH, Ettlingen, Germany) in the range of $4000\text{--}600\text{ cm}^{-1}$.
- The total silicon content in terms of silicon dioxide was determined using UV-VIS spectrophotometric method proposed by Nikulin A.V. et al., 2019.

Results

FTIR spectra



Yellow line – coada calului (Herbagerica), blue line – siliciu organic (DVD pharm) red line – siliciu vegetal (Pronatura)

Spectrophotometric Analysis

$\lambda = 818\text{ nm}$

Sample	A	SiO_2 content (%)
Herbagerica	0.582	7.5%
DVD pharm	0.512	7%
Pronatura	0.525	7.1%



The FTIR spectrum shows a strong band at $1000\text{--}1100\text{ cm}^{-1}$ (Si-O-Si), confirming the presence of silicon dioxide in all samples, alongside secondary bands indicating varying organic components among the supplements.

Conclusions

- In conclusion, following this analytical control all dietary supplements with silicon dioxide are in accordance with the manufacturer's instructions. The UV-VIS FTIR spectrophotometric method proved to be an effective technique for verifying the silicon dioxide content.

References

Nikulin A.V., Potanina O.G., Platonov E.A., Bokov D.O., Smyslova O.A., Abramovich R.A., Development and Validation of a Spectrophotometric Procedure for Determining Silicon in Common Horsetail (*Equisetum arvense* L.) Herb., *Pharmacognosy Journal*, 2019, 11(5): 1124-1131.