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Quantitative analysis of selenium and its importance in food supplement quality and safety

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Abstract: *Selenium (Se) exhibits antioxidant, anti-inflammatory, anticancer and antibacterial activities. This study performed analytical quality control of selenium-based food supplements using portable X-ray fluorescence (pXRF) and FT-IR. pXRF values were in good agreement with labeled content for most samples. The combined use of pXRF and FT-IR provides rapid, efficient quality control. Keywords: food supplements, portable XRF, FT-IR, selenium content*

•Introduction

Selenium (Se) is an essential trace element with significant antioxidant, anti-inflammatory, anticancer, antiviral, and antibacterial properties. Selenium-based food supplements are increasingly consumed, making quality control essential — especially given Romania's insufficiently consolidated regulatory framework.

•Materials & Methods

Five commercial Se supplements (200 µg/capsule): S1–S2 inorganic (Na-selenite); S3–S5 organic (L-SeMet). Samples ground, stored −20°C.

FT-IR: Bruker ALPHA (4000–500 cm^{-1})

pXRF: ElvaX CEP-01; 300 s/sample

•Conclusions

Combined pXRF + FT-IR = rapid, efficient quality control for Se supplements. pXRF quantifies total Se; FT-IR identifies species (SeO_3^{2-} vs. L-SeMet). Recovery 95–126% for 4/5 samples; S2 deviation attributed to matrix effects.

•Results: FT-IR Analysis

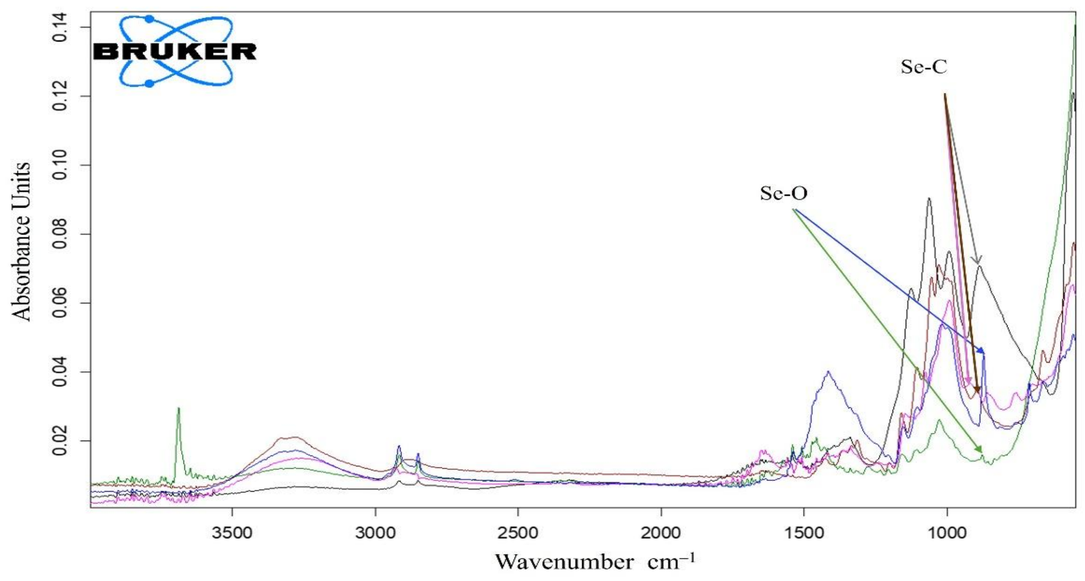
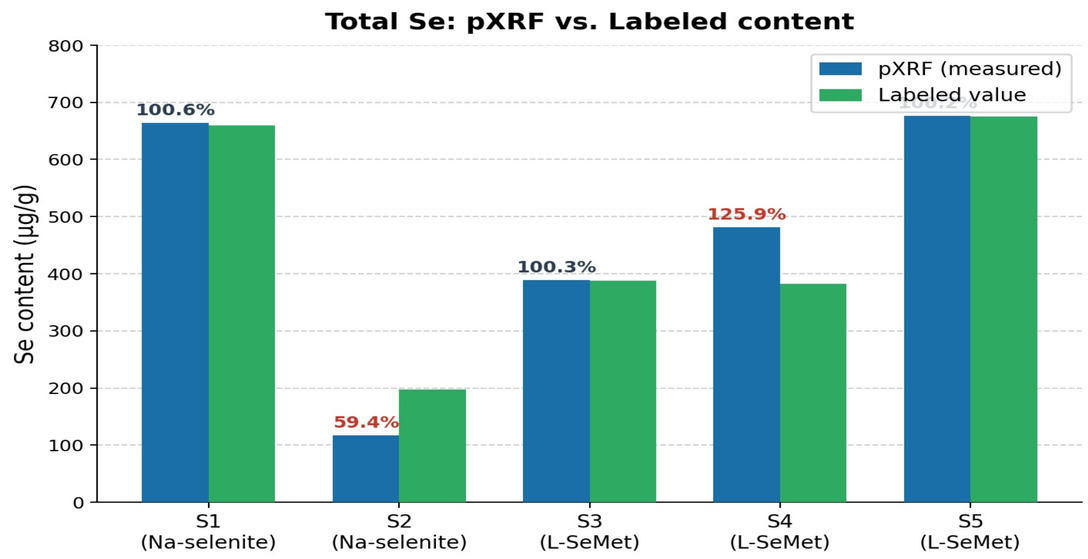


Fig. 1. FT-IR spectra: blue-S1, green-S2, purple-S3, black-S4, brown-S5

•Results: Total Se by pXRF



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