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Determination of B-complex vitamins in pharmaceutical formulations by surface-enhanced Raman spectroscopy

Benedito Roberto Alvarenga Junior, Frederico Luis Felipe Soares, Jorge Armando Ardila, Luis Guillermo Cuadrado Durango, Moacir Rossi Forim, Renato Lajarim Carneiro*

**Federal University of São Carlos, Department of Chemistry, Rod. Washington Luís km 235, ZIP 13560-905 São Carlos – SP, Brazil*

Abstract: The aim of this work was to quantify B-complex vitamins in pharmaceutical samples by surface enhanced Raman spectroscopy technique using gold colloid substrate. Synthesis of gold nanoparticles was performed according to an adapted Turkevich method. Initial essays were able to suggest the orientation of molecules on gold nanoparticles surface. Central Composite design was performed to obtain the highest SERS signal for nicotinamide and riboflavin. The evaluated parameters in the experimental design were volume of AuNPs, concentration of vitamins and sodium chloride concentration. The best condition for nicotinamide was NaCl 2.3×10^{-3} mol L⁻¹ and 700 μ L of AuNPs colloid and this same condition showed to be adequate to quantify thiamine. The experimental design for riboflavin shows the best condition at NaCl 1.15×10^{-2} mol L⁻¹ and 2.8 ml of AuNPs colloid. It was possible to quantify thiamine and nicotinamide in presence of others vitamins and excipients in two solid multivitamin formulations using the standard addition procedure. The standard addition curve presented a R² higher than 0.96 for both nicotinamide and thiamine, at orders of magnitude 10^{-7} and 10^{-8} mol L⁻¹, respectively. The nicotinamide content in a cosmetic gel sample was also quantified by direct analysis presenting R² 0.98. The t-student test

* Corresponding author: renato.lajarim@ufscar.br (Renato Lajarim Carneiro) – Tel.: +55 16 33519366

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