Interaction of Brilliant Cresyl Blue with Gold Nanoparticles Modified with BETA-cyclodextrin as a Sensor for Warfarin

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Nanoparticles have become an essential tool for biomedical applications. For example, gold nanoparticles (AuNPs) are used in nanomedicine and they are also being tested for diagnosis, detect and drug delivery. In this investigation a chemical sensor for warfarin is proposed based on the interaction of Brilliant Cresyl Blue (BCB) with gold nanoparticles (β-CDAuNP) modified with β-cyclodextrin (β-CD). The first part of the procedure consisted in the synthesis of β-CDAuNP. For this HAuCl4, β-CD and NaOH solutions were made. Then 5.0 mL of 7.0 mM βCD solution was mixed with 40 µL of 15.0 mM HAuCl4 solution at room temperature and stirred continuously with a magnetic stirrer. To this solution, 50 µL of 1.0 M NaOH was added and boiled at 60 ºC till the color of the solution changed from pale yellow to wine-red. The second part of the procedure was BCB fluorescence. Samples of β-CDAuNP were excited at 580 or 620 nm with an emission range of 600 (or 630) up to 800nm. All fluorescence data was corrected for dilution using the relationship Fcorr=Fobs[(VolTotal+VolAdd)/(VolTotal)]. Using a calibration curve of the increase in BCB emission we can determine unknown concentrations of Warfarin. The Warfarin emission decreases in the presence of β-CDAuNP indicating a complex formation. Similarly, the BCB emission decreases in the presence of β-CDAuNP. Meanwhile, the emission increase when the BCB with β-CDAuNP was titrated with Warfarin. In conclusion, the sensor works to determine unknown concentrations of Warfarin through the emission of BCB.