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KINETIC STUDY OF THE FORMATION OF COLLOIDAL GOLD NANOPARTICLES BY GALLIC ACID USING STOPPED-FLOW MIXING DEVICE AND LIGHT SCATTERING DETECTION

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The capability of gallic acid to reduce gold (III) chloride trihydrate to colloidal gold nanoparticles and the aggregation process in the presence of the cationic surfactant cetyltrimethyl ammonium bromide (CTAB) have been kinetically studied using a stopped-flow mixing device and light scattering as detection system. This study has given rise to a simple and rapid method for the determination of gallic acid in natural samples and can be extended to other antioxidant compounds. The aggregation process has been monitored by measuring the initial reaction-rate (v_0) and the light scattering signal at a prefixed-time (ΔIF_{40}), using stopped-flow mixing technique, which makes the method applicable to automate routine analysis. Each measurement was obtained in about 60 s, using an integration time of 0.1 s. The dynamic range of the calibration graph obtained for gallic acid, using the initial rate method, was 0.06 – 0.6 µM, and the detection limit was 0.01 µM. The precision of the method, expressed as relative standard deviation, ranged between 0.9 and 4.8 %.