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A novel luminol chemiluminescent method catalyzed by silver/gold alloy nanoparticles for determination of anticancer drug flutamide

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Abstract

It was found that silver/gold alloy nanoparticles enhance the chemiluminescence (CL) of the luminol-H₂O₂ system in alkaline solution. The studies of UV-Vis spectra, CL spectra, effects of concentrations luminol, hydrogen peroxide and silver/gold alloy nanoparticles solutions were carried out to explore the CL enhancement mechanism. Flutamide was found to quench the CL signals of the luminol- H₂O₂ reaction catalyzed by silver/gold alloy nanoparticles, which made it applicable for the determination of flutamide. Under the optimum conditions, the CL intensity is proportional to the concentration of the flutamide in solution over the range 5.0×10^{-7} to 1.0×10^{-4} mol L⁻¹. Detection limit was obtained 1.2×10^{-8} mol L⁻¹ and the relative standard deviation (RSD) $\leq 5\%$. This work is introduced as a new method for the determination of flutamide in commercial tablets. Box-Behnken experimental design is applied to investigate and validate the CL measurement parameters.

Keywords: Flutamide, Silver/Gold alloy nanoparticles, Luminol, hydrogen peroxide, chemiluminescence

1. Introduction

Flutamide, 4-nitro-3-trifluoromethyl-isobutylanilide, is a synthetic antiandrogenic agent devoid of hormonal agonist activity (Fig. 1). It seems to have antiandrogenic specificity only in genitalia organs androgen-dependent, and it also shows therapeutic use in prostatic cancer [1, 2]. Flutamide is an unusual example of an antiandrogenic drug lacking with a steroidal structure.

<Fig. 1>

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