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Chemiluminescent determination of hydrogen peroxide using Fe^{III}-TAML activator, a potent peroxidase mimicking enzyme

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Efforts to replace native peroxidase with its low molecular weight alternatives have stimulated a search for peroxidase mimetics. Herein we describe the oxidation of luminol with hydrogen peroxide catalyzed by commercial available Fe^{III}-TAML activator 1a, which was showed to be more active catalyst than hemin. At Fe^{III}-TAML activator 1a use in chemiluminescent assay for H_2O_2 determination the limit value (3σ) was 5x10-8 M, whereas in the presence of hemin the detection limit was significantly higher and equal to $6x10^{-7}$ M. The linear ranges (R^2=0.98) of the assay were $6x10^{-8}$-$1x10^{-6}$ M and $6x10^{-7}$-$1x10^{-6}$ M H_2O_2 for FeIII-TAML 1a and hemin, respectively. The CV values for Fe^{III}-TAML 1a-based assay measured within the working range varied from 1.0 to 3.7% (n=4), whereas in the case of hemin -5.0 to 9.7% (n=4). Moreover, the sensitivity of Fe^{III}-TAML 1a-based method was 56 times higher than that of hemin-based method. The obtained results open good perspectives to apply Fe^{III}-TAML activator 1a in CL analytical methods instead of hemin, traditionally used peroxidase mimetic.

Biography

Marina M Vdovenko is a Scientific Researcher at the Department of Chemistry, Lomonosov Moscow State University (Russia). She has graduated with PhD degree in Biotechnology in 2011 under Prof. Ivan Yu Sakharov. Presently her work focuses on the development of novel sensitive chemiluminescent methods for their use in analytical practice. She has published more than 15 papers in peer-reviewed journals.

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