

# **A comparative study of smart spectrophotometric methods for simultaneous determination of sitagliptin phosphate and metformin hydrochloride in their binary mixture**

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## **Abstract**

Simple, specific, accurate and precise spectrophotometric methods were developed and validated for the simultaneous determination of the oral antidiabetic drugs; sitagliptin phosphate (STG) and metformin hydrochloride (MET) in combined pharmaceutical formulations. Three methods were manipulating ratio spectra namely; ratio difference (RD), ratio subtraction (RS) and a novel approach of induced amplitude modulation (IAM) methods. The first two methods were used for determination of STG, while MET was directly determined by measuring its absorbance at  $\lambda_{max}$  232 nm. However, (IAM) was used for the simultaneous determination of both drugs. Moreover, another three methods were developed based on derivative spectroscopy followed by mathematical manipulation steps namely; amplitude factor (P-factor), amplitude subtraction (AS) and modified amplitude subtraction (MAS). In addition, in this work the novel sample enrichment technique named spectrum addition was adopted. The proposed spectrophotometric methods did not require any preliminary separation step. The accuracy, precision and linearity ranges of the proposed methods were determined. The selectivity of the developed methods was investigated by analyzing laboratory prepared mixtures of the drugs and their combined pharmaceutical formulations. Standard deviation values were less than 1.5 in the assay of raw materials and tablets. The obtained results were statistically compared to that of a reported spectrophotometric method. The statistical comparison showed that there was no significant difference between the proposed methods and the reported one regarding both accuracy and precision.

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